# DEVELOPMENT AND VALIDATION OF PERCEPTION OF WISDOM EXPLORATORY RATING SCALE (POWER SCALE): AN INSTRUMENT TO EXAMINE TEACHERS' PERCEPTIONS OF WISDOM

by

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*Dedicated to*

*my affectionate, encouraging parents Ensiyeh Rahnama and Nasrollah Karami*

*my supportive, loving husband Mehdi Ghahremani*

*my bouncing, energetic daughter Termeh Ghahremani*

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# ABSTRACT

With countless problems facing the world, there is an indispensable need for individuals who are able to persist and succeed in generating virtuous actions to meet unsettling eventualities. There have even been successful attempts to deploy specific wisdom-based curricula and then measure the results. Since the possibility for developing wisdom in the classroom exists, teachers' perceptions of wisdom and the implicit beliefs that influence their ability to cultivate wisdom in their classroom become important to understand.

The purpose of this study was to develop and validate the Perception of Wisdom Exploratory Rating (POWER) Scale based on the Polyhedron Model of Wisdom (PMW). According to PMW, components that characterize wisdom are knowledge; reflectivity and self-regulation; moral maturity; openness and tolerance; sound judgment; creativity; and dynamic balance and synthesis. A total number of 585 responses from in-service and preservice teachers with no missing data was collected. Inservice and preservice samples were randomly split into two halves for Exploratory Factor Analysis ($n$ = 290) and Confirmatory Factor Analysis ($n$ = 295). In the EFA, the items fit a seven-factor structure, producing the following subscales: knowledge management; self-regulation; altruism and moral maturity; openness; tolerance; sound judgment and decision making; creative thinking. CFA was performed to test the construct validity of the scale. The model did produce a good fit to the data ($\chi^2$/df= 1.67, CFI= .92, TLI= .91, RMSEA= .049, and SRMR= .06). With continued testing and revisions, this instrument could be useful for cross-cultural comparison of perceptions of wisdom and identification of barriers to promoting wisdom instruction. It also could be used to identify and compare, across different populations, educators' perceptions of wisdom and measuring perceptional changes due to designed interventions.

# CHAPTER 1: INTRODUCTION

## Wisdom in Today's World

The world needs wisdom, more than ever before. The world is facing countless problems, including but not limited to social inequality, global political instability, wars, genocides, terrorism, nuclear weapons, biological weapon, climate change, waste disposal, and species extinction. Such problems make wisdom particularly important and relevant for the world today. Intelligence, creativity, and the search for knowledge are vital to solve problems; however, they have been resourced, developed, and applied in undesirable and unethical ways (Craft, 2006). Wisdom as a mediating or overarching construct, needs to be applied to ethical and potentially harmful situations. Wisdom is a situational construct that illuminates the adequate use of knowledge, intelligence and creativity, self-regulation, openness and tolerance, moral maturity, and sound judgement, which in turn are translated into wise action to face personal and social challenges. Hence, it is important to educate future leaders and citizens so that they are not only intelligent and creative but also wise (Dai & Cheng, 2017; Sternberg, 2017). Wisdom allows leaders and citizens to be "ethical and concerned about the well-being of all people irrespective of their racial, ethnic, sexual, cultural, or religious backgrounds" (Ardelt, 2020, p.30). The current COVID-19 crisis is a good example of how lack of wisdom could be counterproductive in solving social problems around the world and modern world. Despite impressive technological advancements, the world is becoming increasingly crisis prone.

According to the Johns Hopkins Coronavirus Resource Center (2020), COVID-19 is the disease caused by the new coronavirus that emerged in China in December 2019. According to the World Health Organization (WHO, 2020), most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special

treatment. Although young people might develop serious illness, older people, and those with underlying medical problems, are at more risk.

COVID-19 has been detected in people all over the world. The WHO has declared coronavirus a global pandemic. In less than three months, it has spread to over 194 countries, infected over two million people, and killed tens of thousands (Johns Hopkins Coronavirus Resource Center, 2020). The rapid spread of the virus and the fact that there are no specific vaccines or treatments for it has sparked alarm worldwide. Many countries, including the United States, have declared national emergencies. The crisis is affecting virtually every aspect of life. It is now inevitable that a global recession will grip the world (Davies, 2020). As a result of travel restrictions. airline industries (Slotnick, 2020), hotels, and restaurants (Thomas, 2020) are being closed down. Closures or lack of consumer activity have hurt small businesses (Shambaugh, 2020), and it is predicted some, perhaps many of them will never open again (Thomas, 2020). As expected, millions of Americans have already lost their jobs (Shambaugh, 2020). The severity of the current COVID-19 crisis is exacerbated by the extreme uncertainty as to how or when it will end.

From leadership positions, governments are facing impossible moral dilemmas that affect millions of lives. Unfortunately, not all of them are making wise decisions. For example, in Italy, hospitals do not have the resources to treat all critical patients. The Italian College of Anesthesia, Analgesia, Resuscitation, and Intensive Care published medical (SIAARTI) guidelines establishing criteria of access to address the current shortage of medical resources (2020). One of the recommendations of these guidelines that shocked the people was the establishing of an age limit for access to intensive care, in case of a shortage of resources. According to these guidelines, those who are too old to have a good chance of recovery or with few years left to live

will be allowed to die. The United States' president is being criticized for downplaying and ignoring the warnings about the potential severity of COVID-19 (Qiu, 2020). He finally, but belatedly, declared a national emergency for COVID-19. However, that resolve did not last long. In the face of experts' warnings against easing social distancing, the U.S. president argued that letting vulnerable people die from COVID-19 may be a reasonable price to pay for a strong economy, as the economic slowdown would itself prove deadly to many Americans (Trump, press briefing, March 23, 2020). The Governor of Texas, Dan Patrick, argued that grandparents should be willing to sacrifice their lives to save the economy for their grandchildren (Dan Patrick, interview, March 23, 2020). Public-health experts, on the other hand, warn that this virus will kill potentially millions with huge social and economic effects across the country (e.g., Inglesby, 2020; Lopez, 2020; Rivers, 2020).

On a personal level, the COVID-19 crisis has brought social dilemmas to people's personal lives. First, despite serious warnings about the exponential growth of COVID-19 cases, some people have been carrying on with life as usual and ignoring advice to practice social-distancing measures. This public ignorance reached the extent to which governments across the world were forced to close schools, universities, restaurants, and gyms, and eventually to order complete lock downs in some cities, simply to contain the spread of COVID-19.

Some people, however, see this as a vacation opportunity, especially because of cheap flights and flexible ticket policies. Some people planned travel, regardless of travel warnings from the U.S. State Department and the Centers for Disease Control and Prevention (Hoffower, 2020). The demand encouraged a game designer to create a program called "coronavirus flight alert," which finds cheap flights and emails users suggested itineraries (Wolfe, 2020). Some of these travelers are young and are not in the high-risk group. However, they may carry and spread

the virus to new locations without showing the symptoms, which can infect older adults and people with existing health conditions and put them at risk. And young people are by no means immune from the effects of the virus (Cha, 2020). For example, thousands of partying American college students traveled to Florida during the spring break. Right after the Spring break, a group of Florida college students tested positive for COVID-19 after traveling together during the spring break. By the end of the spring break, more than 330 people in Florida tested positive for COVID-19 and eight of them have died (Fieldstadt, 2020). Some of these spring-break travelers are now expressing regret they went and blame the government for not being clear about the threat posed by the virus (Kesslen, 2020).

In Southern California, people also crowded the region's famous beaches, despite the shelter-in-place order. However, young people are not the only people who ignore the safety rules. Reports show that some older people also see stay-at-home orders as a vacation opportunity. Some arrange travels, others participate in spiritual ceremonies, and still others get together to watch movies (Fears & Dennis, 2020). In fact, many young people talk about role reversal on the internet.

Some families planned large parties. For example, a New Jersey family bemoaned the loss of their family members to COVID-19 after their large family gathering at their matriarch's home (Warzel, 2020). To add salt to the injury, misuse of social networks and media has offered a platform for the spread of fake news and undesirable practices. The Associated Press (2020) illustrated extreme examples of young people around the world who not only ignored the warnings, but who also intentionally tried to rebel against the safety rules. Associated Press called them "Virtue Rebels." One example describes South German youths who hold "corona parties" and cough toward older people. Another example is the so-called "Coronavirus

Challenge" popular on TikTok, where teenagers are invited to "put their tongue on public toilets, doorknobs, grocery store carts and more," (Tierney, 2020, Para 1) tempting fate to catch the virus.

Panic buying is a classic social dilemma and another display of selfishness during the COVID-19 crisis. There is a clear distinction between disaster preparation and panic buying. Panic buying is an innate conflict between a person's self-interest and the good of other people (Cruickshank, 2020). Over the past weeks, many people around the world have experienced long lines and empty shelves. Many grocery stores have run out of toilet paper, wipes, sanitizers, masks, and certain grocery items because people do not show restraint (Lufkin, 2020). In some countries, shoppers had to wait in line for hours to buy toilet paper. Grocery stores owners in Australia have hired security guards to patrol their aisles (Andrew, 2020). Nine News Australia posted a video of two women fighting over toilet paper on their Twitter page (2020). Such extreme behavior hurts many groups of people. For example, grocery workers are being hurt in several ways by panic buyers.

First, such a crowded indoor environment put grocery workers at risk of infection. This could be a matter of life and death for some of them who are categorized as being in a high-risk group. Some of these workers had to leave their jobs because they were terrified (Winkie, 2020). However, many of them have had no paid sick leave and have needed their jobs to pay their rent (Zayas, 2020). As a result, they may come to work sick, which could and most likely will contribute to the spread of COVID-19.

People with special needs and elderly people are struggling in different ways as result of panic buying. There are many heartbreaking pictures of elderly and low-income people staring at empty shelves, struggling to find items they needed all over the internet. People with disabilities

who need supermarket food deliveries cannot get them due to panic buying (Ryan & Marsh, 2020). People with dietary restrictions due to their medical conditions are also struggling, as are people with auto-immune disorders whose medicine is being used in a futile attempt to treat COVID-19. Clearing out grocery stores and buying whatever is left has put these people in danger as their choices are limited, and they often cannot eat whatever is left. Some people have reported that they also struggled to get vital medical supplies for a variety of conditions, not just auto-immune disorders (Ryan & Marsh, 2020).

The internet named these ignorant and selfish people "COVIDIOTS". This term even has made it into the Urban Dictionary (2020). The site offers two definitions for a "COVIDIOT: Someone who ignores the warnings regarding public health or safety. A person who hoards goods, denying them from their neighbors." Such behaviors portray foolishness, which is considered as the opposite of wisdom (Ardelt, 2020; Sternberg, 2017). Foolishness is characterized by egocentrism, unrealistic optimism, and illusory perceived omniscience, omnipotence, and invulnerability (Sternberg, 2017). Foolishness also clouds openness to experience and tolerance of uncertainty, leading individuals to show less empathy and consideration to members of social groups different from their own (Dai & Cheng, 2017). They also show more dogmatism (Ambrose et al., 2012).

People's reactions to the crisis depicts misuse of knowledge, poor use of intelligence and creativity skills, impaired self-regulation, close-mindedness, and intolerance, and selfishness and immaturity. These deficits in turn lead to poor decision making and adverse outcomes. In a time when hopelessness and helplessness take over, wisdom is certainly necessary. The current crisis has provided more evidence that wisdom is a critically important attribute to seek not only in leaders but also in individuals (Sternberg, 2017). Hence, it is important to understand this

multidimensional complex concept, to find ways to foster it, and to make it prevail a little bit more in the world.

## Significance of the Study

Research on wisdom has gained momentum during the last 30 years; however, the definition of wisdom and how it can be cultivated continue to be unresolved (Webster, 2007; Weststrate et al., 2016). For this reason, to understand wisdom, a systematic review of the most commonly cited articles in psychology; management and business; and education was undertaken to examine points of consensus among conceptions of wisdom and how it might be fostered in educational settings (Karami et al., in press). Based on this review, the Polyhedron Model of Wisdom (PMW) was developed (Karami et al., in press). This model identifies the components that characterize wisdom as knowledge; reflectivity and self-regulation; pro-social behaviors and moral maturity; openness and tolerance; critical thinking; intelligence; creativity; and dynamic balance and synthesis (Karami et al., in press).

Teaching and cultivating wisdom in educational settings can be accomplished (Ardelt, 2020; Sternberg, & Hagen, 2019); but teachers' attitudes toward such an endeavor are critical as one of the determining factors that affect the efficacy of a wisdom-learning program (Ghahremani et al., 2017). Teachers play an important role in developing their students' skills. To foster students' wisdom, teachers need guidance in defining wisdom, recognizing the characteristics and behaviors of wise individuals, and establishing classroom environments that promote the development of wisdom. To this end, investigating teachers' perceptions of wisdom is of special importance as a precursor to instituting such a program. Therefore, exploring in-service and preservice teachers' beliefs is the primary focus of the proposed study.

By identifying their beliefs, teacher-education programs may address preservice teachers' misconceptions and naïve and maladaptive theories in order to assist the teachers in developing the knowledge, skills, and dispositions they need in their future teaching career. Investigating teachers' perception of wisdom facilitates interventions in terms of helping teachers develop more adaptive beliefs regarding wisdom. Therefore, in addition to addressing the gap in the literature, this study seeks to gain insights regarding teacher-education programs. Online and face-to-face workshops and courses may be designed based on teachers' beliefs of wisdom. POWER scale provides educational researchers, teacher preparation faculty, and professional development specialists the ability to quantitatively explore teachers' perceptional changes related to wisdom.

## Purpose of the Study

The primary aim of this study was to develop an instrument to assess teachers' perceptions of wisdom based on the *Polyhedron Model of Wisdom,* including teachers' implicit beliefs that affect their ability to cultivate wisdom in their classrooms.

## Research Questions

In this study I develop a scale that measures Wise Decision-Making based on the *Polyhedron Model of Wisdom* and evaluate the scale's psychometric properties. I investigate different sources of validity and reliability for this scale. The following research questions will guide this research:

1. To what extent does the (POWER) Scale demonstrate evidence of content validity?
2. To what extent does the (POWER) Scale demonstrate evidence of construct validity?
3. What evidence exists for the internal-consistency reliability of the POWER Scale?

# CHAPTER 2: LITERATURE REVIEW

## Wisdom

Throughout human history, people from different philosophical traditions, cultures, and religions have considered wisdom as a supreme and valuable concept (Brienza et al., 2017). Thinking wisely plays a role in any situation that is social in nature (Santos et al, 2017). As social beings, social considerations and interactions are common and often unavoidable in most everyday tasks in individuals lives (Santos et al, 2017). Some social situations like the current COVID-19 crisis become complex quickly when diverse interests arise. Furthermore, decisions made by individuals likely yield consequences affecting people outside that interaction (Santos et al., 2017). Wisdom's role in balancing diverse interests, immediate and/or lasting consequences, and environmental responses is vital to positive, constructive decision making (Sternberg, 2001).

Although empirical studies of wisdom in psychology have been conducted only relatively recently, wisdom research has gained in popularity during the last three decades. Yet, a generally agreed on definition of wisdom does not yet exist and there is significant variation among definitions and models of wisdom (Ardelt, 2020; Webster, 2007). However, most researchers refer to wisdom as aggregate of other components (Karami et al., in press). For example, the Berlin Wisdom Paradigm, which probably is the most common cited definition of wisdom, identifies five components of wisdom: (a) rich factual knowledge, (b) rich procedural knowledge, (c) life span contextualism, (d) relativism, and (e) uncertainty (Baltes & Smith, 1990; Baltes & Staudinger, 2000). Baltes and colleagues have conceptualized wisdom "as expertise in the conduct and meaning of life." (Baltes & Staudinger, 2000, p. 124).

The Balance Theory of wisdom is another popular model that was developed by Sternberg (2001). Sternberg has defined wisdom as the use of one's knowledge and skills for a

common good, balancing one's own, others', and larger interests over the long and short terms, through the infusion of positive ethical values. According to Sternberg, wisdom lies in the successful utilization of intelligence and creativity. Sternberg has developed two wisdom models, which are based on his balance theory, mainly for educational purposes; the WICS model (synthesis of wisdom, intelligence, and creativity) in 2005 and ACCEL (Active Concerned Citizenship and Ethical Leadership) in 2017.

Ardelt's (2000, 2003, 2011) Three-Dimensional Model of Wisdom is a third popular conceptualization of wisdom. Ardelt criticized the lack of emotional characteristics in the other two approaches and integrated not only knowledge-based criteria, such as cognitive and reflective abilities, but also an affective component as the third dimension. In her Three-Dimensional Wisdom model, wisdom is seen as an integration of cognitive (desire to know the truth and gain a deep understanding of life which includes knowledge of the positive and negative aspects of human nature, the limits of knowledge, and life's uncertainty), reflective (understanding of phenomena and events from multiple perspectives), and affective (sympathetic and compassionate love for others) elements.

There have been attempts aiming to identify points of consensus on definitions of wisdom (Aldwin, 2009; Jeste et al., 2010; Strauss et al., 2016). All such attempts have been conducted in the field of psychology (Ardelt, 2004; Webster, 2007; Jeste & Oswald, 2014). However, wisdom is an interdisciplinary and complex concept that goes far beyond psychology (Ambrose, 2009). Since its reappearance in scientific literature during the past century, wisdom has been adopted by different scientific communities, such as psychology, education, business, neurology, and computer/information science. Therefore, we broadened these efforts and systematically reviewed articles in psychology; management and leadership, and education to

investigate points of consensus. Based on the review, we offered the Polyhedron Model of Wisdom (PMW) and suggest components that characterize wisdom, including knowledge; reflectivity and self-regulation; pro-social behaviors and moral maturity; openness and tolerance; critical thinking; intelligence; creativity; and dynamic balance and synthesis (Karami, et. al., in press).

## The Polyhedron Model of Wisdom

The *Polyhedron Model of Wisdom* was offered based on a systematic review of studies of wisdom in three different disciplines (See Figure 1). Below I discuss the seven proposed components of wisdom.

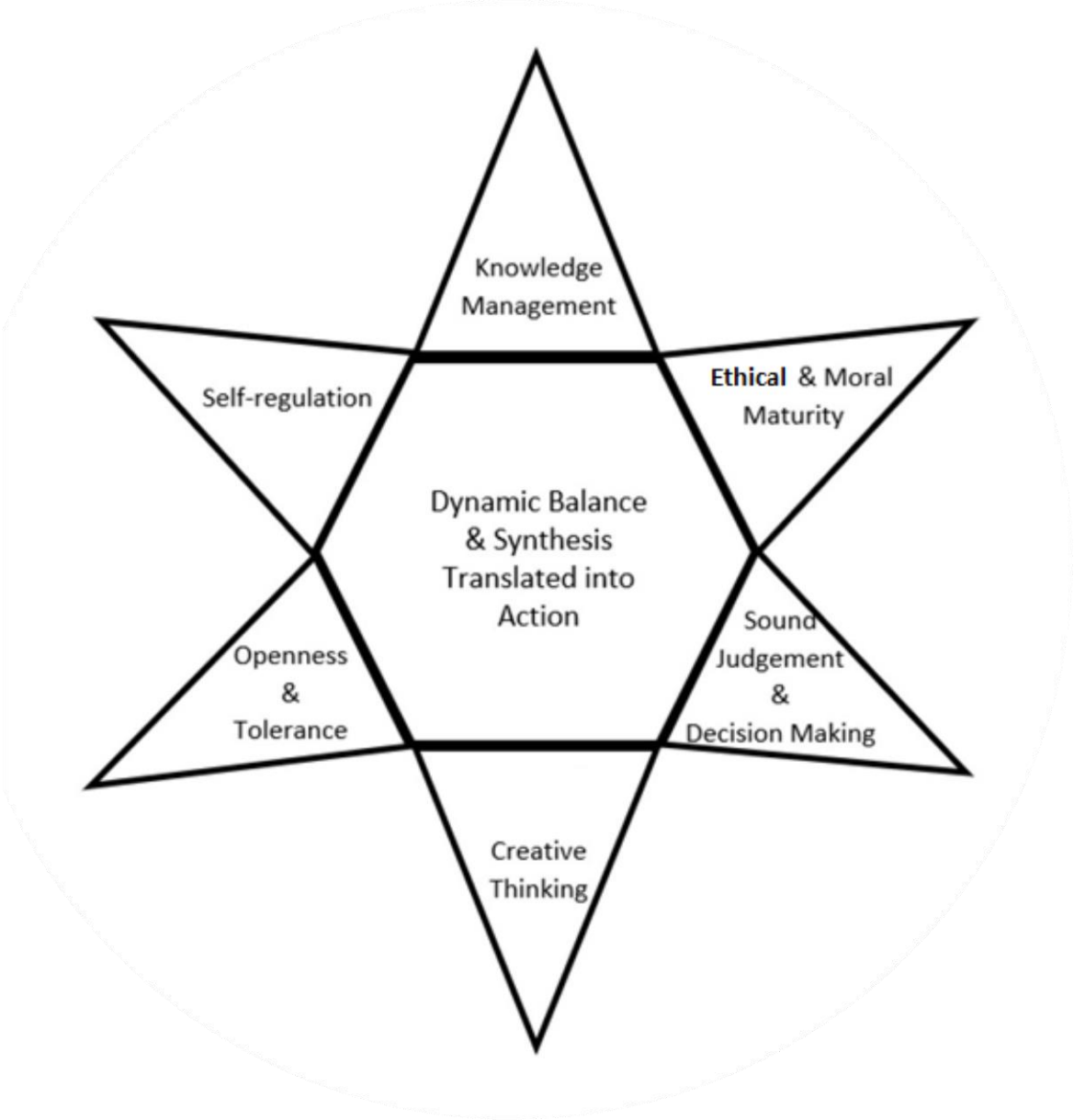


Figure 1 Polyhedron Model of Wisdom

**Component One: Knowledge Management**

Having knowledge about a particular phenomenon is not enough to put it into good use. Knowledge management is needed. A wise person actively acquires knowledge and retains knowledge that is relevant to understand and process a given situation in context. Wise people know when and how to apply knowledge to resolve a given situation. For example, knowledge

management plays an important role in the current COVID-19 crisis. One major problem is not the lack of knowledge but how it is ignored or even misused. Despite the wealth of knowledge scientists have compiled globally about the novel virus, political leaders and citizens have struggled to use this knowledge effectively: that is, in a way that informs and helps the public to make decisions. People have failed to gather accurate and useful knowledge about the crisis. Additionally, they have failed to determine when and how to use the circulating knowledge of coronavirus to follow prevention guidelines and to protect themselves and others from the pandemic. Some people have blamed governments and media for not providing sufficient and accurate information (Kesslen, 2020; Ryan, 2020). For example, some of the spring-breakers are now expressing regret for their behavior, but they blame the government for insufficient information and warning (Kesslen, 2020). Undoubtedly, in uncertain situations like this crisis, people may need information from professionals to make choices (Reynolds & Seeger, 2005; Seeger 2006). However, a wise person should be willing to collect knowledge by themselves before they make a decision.

Yascha Mounk (2020), a leading expert in political science, believes that people fail to realize the severity of the pandemic because they don't follow the news. In fact, media have been doing well covering the news about COVID-19. However, according to PEW research center (March 10-16) only 51% of U.S. adults were following news about COVID-19 relatively closely. Besides, when COVID-19 became a pressing issue in the U.S., many countries were already facing the problem. Because the threat was imminent, contemplating and reflecting on one's own life story and those of others (Randall, 2011, 2013) would have been a powerful tool to prepare for the coming crisis. A good example of knowledge management was recently displayed by Germany, where efforts have been made to prepare and mitigate the effects of the crisis before it

touched German soil (Sepkowitz, 2020). Besides a strong public health system, understanding the crisis was inescapable and crucial to ensure that death tolls and critical hospitalizations would be reduced.

**Sound Judgment**

Sound judgement involves purposeful judgment that results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. It involves thinking through problematic situations about what to believe or how to act in ways that facilitate the decision-making process.

The importance of sound judgment is undeniable in decision making in the current COVID-19 crisis. For example, people's failure to evaluate the relevance and credibility of information sources has aggravated this global crisis. Although there is an abundance of scientific knowledge about the virus, people are constantly exposed to fabricated information that contributes to misunderstandings and wrong decisions (Mitchell & Oliphant, 2020). Many people do not recognize the differences among opinions, reasoned judgments, and facts. Hence, countless individuals have taken the news of COVID-19 lightly, doubted the accuracy of scientific evidence, or what is worse, downplayed the severity of the problem while being influenced by misinformation. That is part of the reason why some of the spring breakers, believing COVID-19 was a minor threat, went on with their vacation plans. When affected by the crisis, they blamed Florida's officers for keeping beaches' and bars' open and giving them wrong information.

Faulty judgement leads to terrible decision making, especially in times of crisis (Fischhoff & Broomell, 2020). Anxiety and stress in difficult moments impair people's ability to

make accurate predictions about the future by using the available information they have. Additionally, they make poor evaluation of the potential outcomes, as humans are not good at making probability estimates (Maglio & Polman, 2016). Information, such as about social distancing, about avoiding gatherings and hoarding, and about the latent threat of economic crisis, have led people to make rushed decisions underestimating their consequences. People's ineptitude to estimate the effects of their social gatherings or how much food they need continues to feed the crisis (Cruickshank, 2020).

Failing to produce sound judgments and to make adequate decisions has implications for the resolution of ethical issues. In fact, reasoning plays significant roles in moral judgment (Haidt & Kesebir, 2010). Good people do bad things because of their bad judgment. On the other hand, reasoning can play a negative role, by making people find excuses for their moral violations (Mercier, 2011). For example, when President Donald Trump was rationalizing his "America needs to get back to work" decision, he minimized the risk posed by the virus and used a false analogy to car accidents (Qiu, 2020). Similar examples have occurred in other erroneous comparisons of COVID-19 to other well-known and treatable diseases. Unfortunately, many people are affected by the way information is framed (Bruine de Bruin et al., 2007). Without the ability to evaluate this type of information and its consequences, chaos is given a free rein. Therefore, the world needs people and leaders to make sound judgments and good decisions because their reactions to global changes will affect everyone.

**Self-Regulation and Reflectivity**

Self-regulation refers to the ability to conduct one's behavior by being self-aware and contemplative about the sort of person one is and is becoming. Self-regulation builds personal character emerging through one's actions. Self-regulation involves self-generated goal-directed

thought, emotions, and actions that people instigate, modify, and sustain. The most important element of the self-regulatory process is reflectivity, according to PMW. Self-regulation is a cyclical process because the feedback from prior performance and experience is used to make reflective adjustments during current efforts.

Wisdom is often considered as a trait that emanates from experience (Staudinger & Glück, 2011). However, it is not hard to find older people whose critical life experiences have not made them any wiser. Indeed, experience does not come with age per se. People do not grow from their experiences if they do not understand them and adjust their goals and actions accordingly. Such adjustments are especially important in today's world because personal, behavioral, and environmental factors are constantly changing. It is important to clarify that reflecting on one's life experiences is not the only reflection that can helps a person to make wiser decision. Reflecting on other people's experience also contributes to wisdom development (DeMichelis et al., 2015; Randall, 2011, 2013). Vicarious experience plays an important role in learning and in the construction of one's behavior.

During this pandemic crisis, many international correspondents (e.g., Feng et al., 2020) and experts (e.g. Clendinin, 2020; Pisano et. al, 2020; Usher, 2020) have reported experiences of how other countries than the US have responded to the virus. Reflecting on such experiences of the countries further ahead in the epidemic, whether successful or not, can help governments and people obtain better results in controlling the spread. For example, while knowing in advance the devastating effects of the virus, the practices of social distancing, closing non-essential businesses, and limiting outdoor activities in groups gave insight on how to adapt behavior in response to the crisis. Downplaying the reality, maintaining regular activities, and not adjusting to the upcoming changes depicted dangerous lack of self-regulation and reflectivity. According

to Dr. Dion Metzger, a psychiatrist, people need to think critically about their routine activities, and doing so has made people feel "not only exhausted, but on edge." (Yuko, 2020, para, 13). Nevertheless, it is only by reflecting and adjusting each day to day goals and behaviors that this crisis can be overcome.

**Tolerance of Ambiguity and Openness**

Tolerance of ambiguity acknowledges that the validity of information available to humans is essentially limited. Individuals have access only to select parts of reality in which the present and future cannot be fully known in advance. Understanding of such limitations leads to tolerance for unexpected events and to vagueness of situations. Openness involves openness for and appreciation of values and socio-cultural phenomena that are different from one's scheme of values and beliefs. We grouped these two traits together, as they are related (Bardi, 2009; McCrae, 1996). Following, Krohne (1989, 1993), ambiguity exists in real life; however, tolerance is the emotional response to such ambiguity. Adding openness permits a tolerant response to uncertain and vague situations, while considering that individuals do not have all the answers to respond to it; those answers often can be found in the interactions with those who are different from us.

This crisis is different from many other disasters, as uncertainty abounds about the disease itself. It is not clear what effects COVID-19 will have upon the world and how the crisis it has caused will end. Some experts believe that intolerance for ambiguity and fear of the unknown have contributed to people's irrational behaviors, such as panic buying, hoarding essential goods, and even challenging the policies that prevent the spread of the virus. Tolerance of ambiguity is a critical skill for making complex decision making (Endres et. al., 2009), as complex decisions are often characterized by ambiguity (Wood, 1989). To make a wise decision,

one needs to process ambiguous information while dealing with overload and incompatible challenges. For example, staying at home to prevent the expansion of the crisis, while work and other activities are also necessary to guarantee the success of current public health policies, is a constant challenge to people's tolerance. The more an individual can tolerate ambiguity, the better they can deal with problems (Enders. et. al., 2008). Tolerance of ambiguity enables individuals to deal with complex problems, to remain open to experience, and increase the probability of finding novel solutions (Zenasni et al., 2008).

Another pressing issue revealed by this crisis is the emergence of xenophobic practices and hate crimes. With the spread of the coronavirus across the globe, reports of crimes and negative attitudes against Asian Americans have increased due to the origin of the virus (Huang, 2020; Kim, 2020). Negative perspectives on Asian people surge as lack of openness and tolerance by assuming their culture is associated with the disease. Lack of openness and outright prejudice discourage empathy toward populations that are being also affected by COVID-19. Sentiments of distrust for, and rejection of other cultures prevent a society from developing solidarity toward others, thereby supporting them during their struggle. Besides, by rejecting these populations and their positive contributions to the economy, their help in the mitigation of the emergency is also ignored. Openness and tolerance are needed to create solidarity toward those who are outside one's social circles and one's own culture, and to receive and value their help when needed. Openness is key to working globally to stop the advancement of a global threat.

**Creative Thinking**

Creative thinking is the cognitive/affective interaction in which the generation or recognition of ideas, alternatives, or possibilities enhances solving problems, communication

with others, and otherwise improves a situation. Creative thinkers detect gaps, produce novel and useful ideas (fluency, originality), produce alternative ideational categories (flexibility), introduce details to ideas (elaboration), all the while recombining them, adapting them, and sensing novel relationships among and between ideas. Creative thinkers consider that available resources to solve problems are limited. Hence, they seek to maximize decision making that leads to optimal and useful outcomes. Creative thinkers address personal and social problems. Creativity has come in handy in the fight against the novel coronavirus.

The role of creativity in prevention, preparation, and damage control of crises has been studied (Pearson & Sommer, 2011; Web, 2006; Wooten & James, 2008). Crises create unpredicted and unforeseen challenges that can be addressed only by innovative decisions and solutions, which require creative thinking. Creativity has manifested itself in the COVID-19 crisis in several respects, such as in finding innovative ways to communicate what is known about the virus, searching for a solution to stop and treat the disease, and creating alternative and flexible options for people to continue their lives amidst social distancing ( e.g. telework, online education). Now there is a global race to make a vaccine and treatment for the COVID-19 coronavirus and to slow down the upcoming economic crisis. Governments would have done a better job of preventing this crisis, had they paid attention to the warning signals. But it is not too late to engage in creative thinking, to generate possible solutions, and to examine hypothetical consequences (Chermack, 2003).

Being creative helps humans to adapt to change in difficult times and to become better problem solvers in all areas of their lives. For example, people have become creative with social media in a wide variety of forms. Different music videos have been produced to encourage people to stay at home and, hopefully, to unify people, to entertain people, and to educate them.

Overall, it may be said that one cannot be wise without being creative (Sternberg, 2008). Usually, wise reasoning is needed in uncertain and complicated situations. Wisdom draws upon creativity in the formulation of useful and novel solutions to the raising problems.

**Ethical and Moral Maturity**

Moral maturity includes prosocial behaviors and realizing one's own interests and potentials while at the same time considering the well-being of other people and society. Mediated by virtue and morality, the PMW Model emphasizes this aspect, because people's creativity and genius have been resourced, developed, and applied in what might be seen as undesirable and unethical ways (Craft, 2006). Wise individuals are thought to be more empathetic, more accurate in their perceptions of an individual's emotions or feelings, and more considerate of the welfare of others. When assessing problem in context, wise people face complex decisions; however, they recognize the ethical implications of their solutions and strive for outcomes that are beneficial for society, themselves, and the environment. A solution that endangers others or the self cannot be deemed as wise.

Communities across the world are facing difficult decisions because of this novel coronavirus disease. It has raised challenges, such as distributing limited healthcare resources, moving to strict nationwide lockdowns, and shutting down businesses. In the face of severe time and resource constraints, governments across the world have had to respond to exceedingly complex ethical needs and concerns. Many organizations and centers have had to propose and publish ethical guidelines as foundations for ethical decision making (e.g., CDCP, Hastings Center, Johns Hopkins Coronavirus Resource Center, WHO). However, these guidelines are fundamentally different from one another. For example, Italy's guidelines (SIAARTI) emphasize that "the allocation criteria need to guarantee that those patients with the highest chance of

therapeutic success will retain access to intensive care" (as cited in Stewart & Jonas, 2020, para 6). Italian doctors are advised to let patients die who are too old to have a good chance of recovery or with few years left to live. On the other hand, the U.S prioritizes those who are at highest risk of complication of infection (CDCP, 2020).

To respond to epidemic novel coronavirus, most countries have placed a series of strict nationwide lockdown rules; however, some countries have decided not to do so (e.g. Sweden, Singapore, Japan, South Korea, Mexico, Brazil). Some of these countries restricted people's movements; some not. Shutting down all businesses has not been an obvious decision, as it might take three years for the U.S. and Eurozone's economies to recover from the impact of the COVID-19 (McKinsey & Company, 2020). Millions of people around the world have lost their jobs as a result of the COVID-19 crisis (Fowler, 2020). Unemployment leads to increases in suicide, substance abuse, domestic violence, homelessness, and food insecurity (Deluca et al., 2020). Making such ethical decisions is exceptionally challenging. That is why it is important to teach the next generation to think ethically (Sternberg, 2012a).

In addition to such complicated dilemmas, COVID-19 has brought less burdensome ethical challenges. However, many people failed to resolve the dilemmas in ethical ways. Younger people did not take physical distancing seriously, until reports of increasing numbers of younger people being hospitalized have surfaced. However, wisdom requires developing behaviors that benefit other people rather than oneself. Some of the spring breakers later expressed regret and blamed the officials for their travel to Florida. According to these students, government had to shut everything down, so they understood the severity of the situation. Unfortunately, many people fail to take responsibility for their part in the problems. They think that it is "leaders' responsibility to determine the ethical dimensions of their actions" (Sternberg,

2012b, p. 321). Nonetheless, in a global community, everyone's actions have impact in the outcomes. Therefore, moral maturity and altruism are key elements to take agency in finding solutions that prioritize the common wellbeing.

### Dynamic Balance and Synthesis Translated into Action

Wisdom is a multi-dimensional concept and cannot be considered as a collective of separate personal qualities. Wisdom involves a higher-order synthesis of a variety of domains with purposeful applications. There is a need for dynamic balance to maintain in the construction of the components. Dynamic balance and synthesis translated into action is the component that determines how much of the other six elements are needed. When wisdom is required, dynamic balance draws on the six elements to meet a need at the right moment and the right place, for the right reasons and purposes.

## Wisdom Can Be Taught

All the articles in our systematic review stated that acquiring wisdom is a developmental process. In fact, wisdom is more a process than a product (Karami et al., in press). Among the articles we reviewed 82% of the authors claimed that wisdom can be taught and fostered, and the others made no such claim (Karami et al., in press). Bruya and Ardelt (2018) reviewed some of the pedagogies that aimed to promote wisdom in the classroom and concluded that wisdom can be taught and fostered in formal education. However, the existing literature on theories of wisdom pedagogy is very limited (Ardelt, 2020) and many questions remain unanswered regarding fostering and cultivating wise thinking (Santos et al, 2017). Researchers have been investigating lay beliefs about wisdom, and lay theories have demonstrated some variability in how wisdom is defined across age groups, professions, cultures, and situations. However, we

didn't find any study investigates teachers' beliefs about wisdom (Karami et al., in press). Since the possibility for developing wisdom in the classroom exists, the factors that influence teachers' commitment to students' wisdom development become important to understand.

## Teachers' Beliefs

Teachers bring different beliefs they embrace to the classroom. Their beliefs "serve as epistemological base, or a theoretical underpinning, orchestrating cognitive, affective, and behavioral decisions that manifest in the classroom" (Hoffman & Seidel, 2015, p. 106). But it was not until 1980s that investigating teachers' perceptions and performances was investigated through classroom observations and semi-structured interviews (Skott, 2015). Such studies were conducted to investigate the acts of teaching, including teachers' thinking as it relates to the profession. Over the past decades, scholars argued that teachers' beliefs are of special importance as they influence instructional choices and teaching practices. For example, according to Clark and Peterson (1986), teacher behavior is "guided by and make[s] sense in relation to a personally held system of beliefs, values, and principles" (p. 287). Grossman et al., (1989) argued that teachers' beliefs "powerfully affect their teaching" (p. 31). Borko and Putnam (1996) suggested that teachers' knowledge and beliefs are key determinants of what they do in classrooms.

As teachers' beliefs are commonly considered as an explanatory principle for practice (Skott, 2009), it is important to investigate teachers' beliefs about wisdom to be able to promote it in the classroom. Understanding of teachers' beliefs and their development facilitates understanding the disagreements between teaches' implicit theories of wisdom and explicit theories in the field. It also provides opportunities to promote better teacher preparation and in-service development (Schraw & Olafson, 2014). Hence, the precise measurement of teachers'

beliefs is prerequisite to help teachers (Hoffman & Seidel, 2015), researchers, policy makers, and teacher-preparation programs.

# CHAPTER 3: METHODS

The purpose of the proposed study was to develop and validate the Perception of Wisdom Exploratory Rating Scale based on the Polyhedron Model of Wisdom. Specific research questions are:

1. To what extent does the Perception of Wisdom Exploratory Rating Scale demonstrate evidence of content validity?
2. To what extent does the Perception of Wisdom Exploratory Rating Scale demonstrate evidence of construct validity?
3. What evidence of internal-consistency reliability exists from the data used to develop the Perception of Wisdom Exploratory Rating Scale?

In this chapter, I describe the research design, research context and participants, procedures of data collection, and analysis.

## Scale Development Process

The goal of this study was to develop an instrument to capture teachers' perceptions of wisdom. I followed the steps of affective instrument design suggested by McCoach et al. (2013). The first 5 steps involve specifying the purpose of the instrument, making sure that no existing instrument serves the same purpose, describing the construct and its dimensions, and developing final conceptual definitions for each dimension through an extensive literature review. In fact, the first 5 steps of this scale have been addressed through my systematic review (Karami et al., in press). In this study, I addressed steps 6 to 14 as follow:

6. Develop operational definitions.
7. Select a scaling technique.

8. Match items back to the dimensions, ensuring adequate content representation on each dimension.
9. Conduct a judgmental review of items.
10. Develop directions for responding; create final pilot version of the instrument.
11. Pre-pilot the instrument with a small number of respondents from the target group. Make necessary revisions based on their feedback.
12. Gather pilot data from a sample that is as representative as possible of my target population.
13. Analyze pilot data (including factor analysis, item analysis, and reliability estimation).
14. Revise the instrument based on the initial pilot data analysis and re-administer if needed.

## Construct Definitions

According to the Polyhedron Model of Wisdom, components of wisdom are knowledge management, self-regulation, altruism and moral maturity, openness and tolerance, sound judgment, creative thinking, and dynamic balance and synthesis translated into action. However, the last component, dynamic balance and synthesis translated into action, is different from the other components. Dynamic balance and synthesis translated into action determines the variation of each component, depending on context, situations, and circumstances. Hence, I did not include it in this study. In fact, dynamic balance and synthesis translated into action is the component that needs to be investigated through in-depth interview. Moreover, I grouped openness and tolerance in the PMW Model because they are closely related (Bardi et al., 2009; Jach & Smillie, 2019; McCrae, 1996). However, they are different concepts (Bardi et al., 2009; Jach & Smillie, 2019). Therefore, I defined them separately and treated them as two different components for this study.

**Knowledge Management**

Knowledge management involves applying appropriate knowledge (factual, procedural, conceptual, and meta-knowledge) in a given situation. It also involves adding value to, improving, and advancing the frontiers of knowledge.

**Self-Regulation**

Self-regulation refers to the ability to be self-aware and contemplative about the sort of person one is and is becoming, and the kind of personal character that is emerging through one's actions. Self-regulation is the ability to intentionally plan, monitor, revise, and adapt one's behavior, attention, emotions, and cognitive strategies, in an attempt to attain personally relevant goals.

**Moral maturity**

Moral maturity includes prosocial behaviors and realizing one's own interests and potentials while at the same time considering the well-being of other people and society mediated by virtue and morality.

**Tolerance of Uncertainty**

Tolerance of uncertainty and ambiguity acknowledges that the validity of information available to humans is essentially limited, and individuals have access only to select parts of reality in which the present and future cannot be fully known in advance. Understanding of such limitations leads to tolerance for unexpected events and vagueness of situations.

### Openness

Openness involves openness for and appreciation of values and socio-cultural phenomena that are different from one's scheme of values and beliefs.

### Sound Judgment

Sound judgement involves purposeful judgment that results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. It involves thinking through problematic situations about what to believe or how to act that facilitate decision-making process.

### Creative Thinking

Creative thinking is the cognitive/affective interaction in which the generation or recognition of ideas, alternatives, or possibilities enhances solving problems, communication with others, and otherwise improve a situation. It is comprised of the capacity to detect gaps, to produce novel and useful ideas (fluency, originality), to produce alternative ideational categories (flexibility), to introduce details to ideas (elaboration), all the while recombining them, adapting them, and sensing novel relationships among and between ideas.

## POWER Scale Development Process

The POWER Scale is comprised of seven subscales: knowledge management; self-regulation; altruism and moral maturity; openness; tolerance; sound judgment and decision making; creative thinking. I anticipated having about 35 questions in the final version of the scale, including 5 items to reflect each of the seven components of wisdom. This online scale

takes about 20 minutes for participants to complete. I constructed a pool of items, including 78 items to reflect the seven components of wisdom including knowledge management; self-regulation; moral maturity; openness; tolerance; sound judgment; creative thinking. The items reflected the conceptual definitions of each dimension of wisdom (McCoach et al., 2013). Respondents were asked to help us understand how they perceive wisdom and what characteristics are necessary for a person to be considered wise. The survey did not ask if the participants consider themselves to be a wise person, but based on their understanding of wisdom, I asked them to rate the importance of each item that characterizes wisdom (Appendix A). I used a 6-point scale, with the following response options: 1 (Unimportant), 2 (Not very Important), 3 (Moderately Important), 4 (Important), 5 (Very important), and 6 (Essential). I used a 6-point response scale, as six points can usually be treated as continuous indicators (McCoach et al., 2013). Six points provide the maximum number of scale points that are differentiable and cover the entire measurement continuum (McCoach et al., 2013). Table 1 lists sample questions that were in the item pool. The 6-point level of importance response scale was consistently used all through the scale, as it made it simple and clear for respondents who had to respond to all items.

Table 1 Sample Form for The Expert Content Validation

| |
|---|
| Knowing how to apply appropriate knowledge |
| Being comfortable with unknown situations |
| Being aware of the limits of their knowledge |
| Treating others, the way they would like to be treated |
| Incorporating reasonable criteria for judgment |

## Establishing Content Validity

It is essential that the items be reviewed by experts (McCoach et al., 2013). Hence, to achieve content validation, I contacted 10 eminent experts in the field of wisdom, whom I identified based on their theories of wisdom, peer-reviewed publications or book chapters on wisdom, to evaluate my preliminary scale. Ten was a reasonable number of experts because of the likelihood that some of them might refuse to or be unable to participate. As I expected, five eminent experts responded to the email. Both qualitative and quantitative feedback were collected simultaneously. Experts were asked to provide qualitative feedback, such as suggestions regarding the definition of the dimensions, wording, additional items that could enhance the representativeness of the entire item pool, and items that needed to be eliminated from the pool. I asked the expert participants if the items covered the full range of content within each construct and if the items were appropriate for preservice and in-service teachers (McCoach et al., 2013). I also asked experts to fill in the content-validity form that asked their opinions about how well each item addresses the essence of that dimension (McCoach et al., 2013). Experts were asked to complete the form and to specify how relevant they feel that the item is to that subscale, with 1 representing "not relevant" and 3 representing "very relevant" (McCoach et al., 2013). See Table 2 for the example from the expert content validation (see Appendix B for instruction).

After collecting the responses, the items that were not rated 2 or 3 by at least three experts were eliminated from the item pool. Then, I made decisions regarding retaining, eliminating, and rewording items based on the theoretical framework and experts' qualitative and quantitative feedback.

Table 2 Sample Form for The Expert Content Validation

| Item | Relevance | | |
|---|---|---|---|
| Acquiring broad knowledge of the world. | 1 | 2 | 3 |
| Adapting behavior when the situation changes | 1 | 2 | 3 |
| Considering the well-being of other people and society | 1 | 2 | 3 |
| Willing to explore ideas with those who have different perspectives and beliefs | 1 | 2 | 3 |
| Recognizing and considering the need to seek contradictory evidence | 1 | 2 | 3 |

## Pre-Pilot Study

After revising the questions, I created the Qualtrics questionnaire with the remaining 46 questions. I randomized items from different specific content categories to reduce the occurrence of bias associated with particular item categories. Then, I asked six colleagues who have K-12 teaching experience to take the survey to ensure that the scale used clear and appropriate language and had no obvious errors or omissions (McCoach et al., 2013). In a follow-up cognitive interview, I discussed the clarity of the directions and the appropriateness of the response scales. I also asked the participants to identify any confusing or unclear items (McCoach et al., 2013). I made some revisions to the instrument based on the participants' feedback. One of the most important revisions I made was not to intersperse the items. As some of the items within particular categories were related and even similar, intermixing them caused confusion or impede comprehension. Hence, all items related to each category were blocked together. Items related to tolerance and openness were put in one block. To avoid bored or biased responses to particular categories, blocks were randomly presented in different orders to different participants. In other words, different participants took the survey in different block order. The instrument consisted of 46 items at this point.

## Psychometric Evaluation of the Pilot Instrument

After the completion of item generation and the establishment of content-validity evidence, I tested whether the internal structure of the POWER Scale was consistent with the hypothesized subscales (McCoach et al., 2013). The instrument consisted of 46 items and 7 components. I thereby estimated the variables-to-factors ratio range from 5-11, which is an appropriate ratio (Mundfrom et al., 2005).

## Data Collection and Participants

Following the approval of the Institutional Review Board, I recruited individuals who (a) were currently working as teachers in the United States, or (b) were a student/preservice teacher in a US university. Inservice teachers were recruited through national conferences' listservs, including the American Educational Research Association (Research on Giftedness, Creativity, and Talent SIG), AERA Career & Technical Education SIG; several listservs including Wisconsin's, Kentucky's, and Ohio's listservs for teachers and Gifted Education Research and Resource Institute ($GER^2I$) listservs; as well as through email communication with different school districts $GER^2I$ has contacts for recruitment. As shown in Table 3, teacher participants were from 19 different states, with 72% of them from the states of Indiana (70), Iowa (57), New York (52), Wisconsin (37), Illinois (23), and Ohio (21). Participants who completed the survey were entered into a drawing for one of the twenty $40 Amazon gift cards.

The preservice teacher sample consisted of undergraduate education students from Purdue University's College of Education. I contacted education-program faculty to assist with the recruitment of preservice teachers. The motivation for preservice teacher participation in the survey was accomplished through coordinating the activity as an extra-credit points opportunity

for particular education classes. Below, I discuss the sample size and demographics of participants.

Table 3 Number of teacher participants from each state

| State | Number |
|---|---|
| Arizona | 14 |
| Arkansas | 1 |
| Colorado | 4 |
| Florida | 2 |
| Georgia | 4 |
| Hawaii | 1 |
| Illinois | 23 |
| Indiana | 70 |
| Iowa | 57 |
| Kansas | 6 |
| Kentucky | 16 |
| Maine | 2 |
| Maryland | 4 |
| Michigan | 1 |
| Minnesota | 12 |
| Mississippi | 1 |
| Missouri | 3 |
| Montana | 1 |
| Nebraska | 7 |
| Nevada | 1 |
| New York | 52 |
| Ohio | 21 |
| Oklahoma | 1 |
| Pennsylvania | 4 |
| South Dakota | 2 |
| Tennessee | 1 |
| Texas | 14 |
| Virginia | 1 |
| Wisconsin | 37 |

*n* = 365

### *Sample Size*

A total number of 585 responses from in-service and preservice teachers with no missing data were collected. In-service and preservice samples were randomly split into two halves for EFA ($n$ = 290) and CFA ($n$ = 295). Appropriate sample size for EFA largely depends on the features of the obtained data, which means that definitive a priori decisions about sample size can be difficult. There are many sample-size rules of thumb; however, they usually fail to consider many of the complex dynamics of a factor analysis (Mundfrom et al., 2005). For the purposes of this study, sample size was determined using a compromise of the various suggestions from the literature. For example, according to Fabrigar et al. (1999), there is an inverse relationship between communalities of variables and sample size. High communalities (≥ .70) suggest adequate factor saturation, for which sample sizes as low as 60 could suffice. Low commonalities (≤ .50) suggest inadequate factor saturation, for which sample sizes between 100 and 200 are recommended (MacCallum et al., 1999). The number of 290 participants seemed appropriate for EFA, as it is greater than 140, which is usually considered satisfactory if the communalities are wide to high and there is the minimum number of 5 variables per factor (Mundfrom et al., 2005). This total number is better than Suhr's (2006) suggestion of having at least 100 cases and a ratio of no fewer than 5 variables per factor. This number of participants is also considered satisfactory to conduct EFA according to Comrey and Lee (2013), as it is close to 300. However, the adequacy of a sample cannot be fully determined until the analysis has been conducted. Hence after obtaining the data, the Kaiser-Meyer-Olkin Test of Sampling Adequacy (KMO) was used to ensure sampling adequacy. The KMO Test is a measure of how suited the data are for factor analysis. The test measures sampling adequacy for each variable in the model and for the complete model. The KMO indicates the proportion of variance in the

variables that might be caused by underlying factors (Pett et al., 2003). According to Kaiser (1974), a KMO of .90 to 1.00 is considered Marvelous, .80 to .89 Meritorious, .70 to .79 Middling, .60 to .69 Mediocre, .50 to .59 Miserable, and 0.00 to .49 Unacceptable. Additionally, Bartlett's Test was checked, as it provides evidence that the observed correlation matrix is statistically different from a singular matrix, confirming that linear combinations exist. The anti-image correlation matrix was also checked. Anti-image correlations contain the negatives of the partial correlation coefficients and, in a good factor model, most of the off-diagonal elements will be small. The KMO for 290 at .902 and was considered marvelous (see Chapter 4).

### *Summary of Demographic Variables*

Data regarding in-service teachers who responded to the survey instruments, arranged by gender, age, ethnicity, years of experience, education level, subject area taught, and school type, are presented in Tables 4 to 9. A total of 365 in-service teachers completed all the survey questions. By gender, 305 women, 59 men, and 1 agender teacher participated. The racial/ethnic diversity of the sample was very similar to that of public-school teachers in the United States, with 89% of participants White/White and the others, 3% Black, 2% Asian, 1% Latino, and 1% Native Hawaiian or Pacific Islander. Additionally, 24% of teachers had a bachelor's degree, 70% had a master's degree, and 3% respondents had a doctorate. The mean years of teaching experience was 16.53, with a standard deviation of 10.20. The range was from less than 1 year to 48 years teaching.

Table 4 In-service Teacher Participant Demographics: Gender

| Gender | Number | Percentage |
|---|---|---|
| Female | 305 | 84 |
| Male | 59 | 16 |
| Agender | 1 | <1 |
| Total | 365 | 100 |

Table 5 In-service Teacher Participant Demographics: Gender

| Ethnicity | Number | Percentage |
|---|---|---|
| White | 315 | 86 |
| Black | 11 | 3 |
| White, Other | 12 | 3 |
| Asian | 7 | 2 |
| Latino | 4 | 1 |
| Native Hawaiian or Pacific Islander | 2 | 1 |
| Preferred not to answer | 11 | 3 |
| Other | 3 | 1 |
| Total | 365 | 100 |

Table 6 In-service Teacher Participant Demographics: Age Groups

| Age Group | Number | Percentage |
|---|---|---|
| 21-24 | 10 | 3 |
| 25-34 | 88 | 24 |
| 35-44 | 87 | 24 |
| 45-54 | 102 | 28 |
| 54 or older | 74 | 20 |
| prefer not to answer | 4 | 1 |
| Total | 365 | 100 |

Table 7 In-service Teacher Participant Demographics: Highest Degree Attained

| Highest degree attained | Number | Percentage |
|---|---|---|
| Bachelor's degree | 86 | 24 |
| Master's degree | 257 | 70 |
| Doctoral degree | 11 | 3 |
| Professional degree | 11 | 3 |
| Total | 365 | 100 |

Table 8 In-service Teacher Participant Demographics: Years of Experience

| Experience | Number | Percentage |
|---|---|---|
| 1 to 5 | 65 | 18 |
| 6 to 10 | 58 | 16 |
| 11 to 15 | 59 | 16 |
| 16 to 20 | 60 | 16 |
| 21-25 | 48 | 13 |
| 26-30 | 44 | 12 |
| 31-35 | 16 | 4 |
| 36-40 | 9 | 2 |
| 40-50 | 6 | 2 |
| Total | 365 | 100 |

Table 9 In-service Teacher Participant Demographic: School Type and Level

| | School Level | | | |
|---|---|---|---|---|
| School Type | Elementary School | High School | Middle School | Total |
| Private School | 4 | 3 | 3 | 10 |
| City | 2 | 2 | 0 | 4 |
| Suburban | 2 | 1 | 2 | 5 |
| Town | 0 | 0 | 1 | 1 |
| Public School | 169 | 84 | 98 | 351 |
| City | 60 | 26 | 33 | 119 |
| Rural | 33 | 16 | 18 | 67 |
| Suburban | 59 | 32 | 28 | 119 |
| Town | 17 | 10 | 19 | 46 |
| Total | 173 | 87 | 101 | 361 |

Data regarding the preservice teachers who completed the survey are arranged by gender, age, ethnicity, major and teaching experiences. As presented in Tables 10 to 15, 86% of the preservice teachers who participated in this study were female. With regard to their age, as expected, 68% of the participants were younger than 21. Similar to the in-service teacher sample, 86% of preservice teacher participants were White; however, compared to in-service teachers, more Asian (4%) and fewer Black (2%) preservice teachers participated in the study. This makes sense, based on the Purdue University undergraduate ethnic diversity breakdown; according to

the Purdue Data Digest, 63% of Purdue Undergraduates in fall 2019 were White, 9% were Asian, and only 3% were Black. Sixty eight percent of preservice teacher participants reported teaching experiences. Among those who reported teaching experiences, 72% received their experiences through field experiences (64%) or cadet teaching (8%).

Table 10 Preservice Teacher Participant Demographics: Gender

| Gender | Number | Percent |
|---|---|---|
| Female | 187 | 86 |
| Male | 31 | 14 |
| Total | 218 | 100 |

Table 11 Preservice Teacher Participant Demographics: Age Group

| Age Group | Number | Percent |
|---|---|---|
| Younger than 21 | 149 | 68 |
| 21-24 | 67 | 31 |
| 25-34 | 1 | >1 |
| 45-54 | 1 | 0 |
| Total | 218 | 100 |

Table 12 Preservice Teacher Participant Demographics: Ethnicity

| Ethnicity | Number | Percent |
|---|---|---|
| White | 188 | 86 |
| Asian | 8 | 4 |
| White, Other | 7 | 3 |
| Black | 5 | 2 |
| Native Hawaiian or Pacific Islander | 1 | >1 |
| Prefer not to answer | 2 | 1 |
| Other | 7 | 3 |
| Total | 218 | 100 |

Table 13 Preservice Teacher Participant Demographics: Year in College

| Year in College | Number | Percent |
|---|---|---|
| Freshman | 24 | 11 |
| Junior | 71 | 33 |
| Senior | 44 | 20 |
| Sophomore | 79 | 36 |
| Total | 218 | 100 |

Table 14 Preservice Teacher Participant Demographics: Major

| Major | Number | Percent |
|---|---|---|
| Elementary education | 100 | 46 |
| Agricultural education | 28 | 13 |
| Special education, elementary education | 18 | 8 |
| Social studies education | 15 | 7 |
| Special education | 14 | 6 |
| Mathematics education | 12 | 6 |
| English education | 10 | 5 |
| Family and consumer sciences education | 7 | 3 |
| Engineering education | 5 | 2 |
| Chemistry education | 2 | 1 |
| Other | 7 | 3 |
| Total | 218 | 100 |

Table 15 Preservice Teacher Participant Demographics: Teaching Experience

| Teaching Experience | Number | Percent |
|---|---|---|
| Field Experiences | 91 | 64 |
| Cadet teaching | 11 | 8 |
| Sub Teacher | 11 | 8 |
| Summer | 8 | 6 |
| Sunday School | 5 | 4 |
| daycare | 5 | 4 |
| Teaching abroad | 5 | 4 |
| After School program | 3 | 2 |
| Tutoring | 2 | 1 |
| Sport | 1 | 1 |
| Total | 142 | 100 |

## Data Screening

After splitting the data into two halves and prior to performing the EFA, I examined the accuracy of data entry, missing values, outliers, multicollinearity, singularity, and normality within both halves. Skewness and kurtosis coefficients were also reviewed (Beavers et al., 2013).

### *Outliers*

For the outliers, I first investigated the box plots to check for extreme outliers. I also used Mahalanobis distance (MD) to look for outliers (Tabachnik & Fidell, 2007). MD is the squared distance between the data for a case and the center of the observed multivariate data cloud, standardized with respect to the observed variables' variances and covariances. MD helps measure the extent to which an observation is a multivariate outlier concerning the set of explanatory variables. Although MD can assist with identifying outliers, cases with large residuals are not necessarily influential and cases with high MD are not necessarily bad leverage points (Yuan & Zhong, 2008). I also calculated generalized Cook's Distance (gCD) to measure the influence of a case on a set of parameter estimates from a factor analysis model as gCD provides an efficient approach to examine case influence on subsets of estimates, especially in the context of complex models with many parameters (Yuan & Zhong, 2008). Like MD, gCD is in a squared metric with values close to zero indicating little case influence on parameter estimates and those far from zero, indicating strong case influence on the estimates. I looked for influential cases with gCD close to 1. I removed the cases with extreme scores that based on these metrics are not part of the population sampled. However, if unusual cases were simply extreme cases with otherwise legitimate values, I kept them as most methodologists recommend that they should not be deleted from the data set prior to model fitting (e.g., Bollen & Arminger, 1991; Yuan & Zhong, 2008; Pek & MacCallum, 2011). After removing all outliers, see Chapter

4, the total number of 280 participants for the EFA and 290 participants for CFA were included in the data set.

### *Multicollinearity and Singularity*

Multicollinearity is said to be present if there is intercorrelation among the independent variables (Green & Tull, 1978). Multicollinearity has been confused with correlation by many researchers (Alin, 2010). In fact, correlation is a special case of multicollinearity. High correlation implies multicollinearity, but the converse is not true. However, investigating the correlation matrix is not sufficient to detect multicollinearity, as one can have multicollinearity among explanatory variables, but still not have a high correlation between pairs of these variables (Alin, 2010). Then, I investigated the variance inflation factor (VIF) and tolerance (1-VIF) values. If VIF is a value exceeding 4.0, or by tolerance less than 0.2, then there is a problem with multicollinearity (Hair et al., 2010).

I also examined the SMC (squared multiple correlations) value. If any of the SMCs are one, then singularity is present. If any of the SMCs are very large (i.e., near 1), then multicollinearity is present (Tabachnick & Fidell, 2007). Tabachnick and Fidell (2007) suggested examining the Condition Index for each item. If the tolerance values were too low, we would next examine the Variance Proportion for Condition Index items that were greater than 30. According to Tabachnick and Fidell (2007), I would not want two Variance Proportions to be greater than .50 for each item. After deleting the items that caused multicollinearity, I checked for homoscedasticity, which refers to a situation in which the error term is the same across all values of the independent variables.

### *Normality*

No single test was found to be the most powerful in all situations. Looney (1995) suggested that decisions regarding normality should be based on the aggregate results of a battery of different tests with relatively high power. I investigated the chi-square plots, as they are also recommended for diagnosing possible deviations from normality. Mecklin and Mundfrom (2005) categorized normality tests into four groups: graphical and correlational approaches such as chi-squared plot, Skewness and kurtosis approaches such as Mardia's tests of skewness and kurtosis, Fit approaches such as Doornik-Hansen's omnibus tests, and Consistent approaches such as HenzeZirkler test using the empirical characteristic function. I used all these tests to investigate normality. They all indicated that the data were not normal (see Chapter 4).

## Exploratory factor analysis

As the initial investigation of the factorial structure of the data obtained from the designed instrument, an exploratory factor analysis procedure was used to determine the construct validity and the initial factor structure of the scale. "Factor analysis refers to a set of statistical procedures designed to determine the number of distinct constructs needed to account for the pattern or correlations among a set of measures" (Fabrigar & Wegener, 2012, p. 3). Using EFA, I was able to "empirically examine the interrelationships among the items and identify clusters of items that share sufficient covariation to justify their existence as a factor measured" in the POWER Scale (McCoach et al., 2013, p.114).

EFA is a complex procedure (Costello & Osborne, 2005) through which researchers are faced with numerous decisions when conducting EFA (Schmitt, 2011). Factor analysis is a cyclical process of continually refining and comparing solutions until the most meaningful solution is reached (Tabachnick & Fidell, 2001). In 1999, Fabrigar et al. systematically reviewed

the articles that used EFA as their methods and found that most researchers made poor decisions in the use of EFA. They also found some egregious errors concerning appropriate reporting practices. Henson and Roberts (2006) also examined articles that used EFA and came to the same conclusion. To avoid such errors, I used McCoach et al. (2013) recommended step to conduct and report the EFA and CFA results. However, I made sure to address recommendations for practice that are offered by different researchers (i.e. Cabrera-Nguyen, 2010; Fabrigar et al., 1999; Henson & Robert, 2006). The data were analyzed using SPSS software version 26.

1. I determined how many factors to extract after conducting a preliminary EFA. Many rules can be used to determine the number of factors to retain (Zwick & Velicer, 1986), including the Eigenvalue > 1 rule (EV > 1; Kaiser, 1960), scree plot test (Cattell, 1966), Minimum Average Partial Correlation (MAP) (Velicer, 1976), and Parallel Analysis (Horn, 1965; Turner, 1998). As the factor retention decision directly affects the EFA results obtained, I used all four criteria to find the number of factors to extract (McCoach et al., 2013; Henson & Roberts, 2006).
2. I decided to use Unweighted least squares (ULS) extraction technique that fits my non-normal data. There are several factor analysis extraction methods to choose from. Different models have different assumptions about the nature of model error and therefore perform differently relative to the circumstances under which they are used (MacCallum et al., 2007). With enough sample size, proper model specification, and multivariate normality, Maximum Likelihood (ML) will provide accurate standard errors, which can be used to test overall model fit, along with hypothesis tests of the interfactor correlations, factor loadings, and other model parameters (Schmitt, 2011). However, ML is sensitive to skewed data

and outliers (Briggs & MacCallum, 2003). Unweighted least squares (ULS) method minimizes the common variance that is ignored when only some factors are maintained. The proportion of common variance explained by each of the retained factors can then be interpreted. The ULS estimation method makes no assumptions regarding observed variable distributions (MacCallum, 2009). ULS also have received favorable reviews for coping with small sample sizes and many variables (Zygmont & Smith, 2014). Considering the sample size and non-normal data, ULS is the most appropriate extraction model for this data. However, as it is advised, I used different extraction techniques to see the outcomes from different methods (Zygmont & Smith, 2014). Nunnally (1978) stated that the results obtained with different extraction methods often are remarkably similar.

3. I used the Equamax rotation method as it is more appropriate to use for instrument development (Schmitt & Sass, 2011). Unfortunately, the importance of the rotation method is ignored in most researches and methodological books. Most researchers mainly focus on factor orthogonality and obliqueness and overlook fundamental differences between different rotation criteria, including how different rotation criteria influence the factor structure (Schmitt & Sass, 2011). In fact, different rotation criteria inversely affect cross-loadings and inter-factor correlations. There is no ultimate answer in terms of selecting the ‘‘best rotation’’ criterion. However, certain rotation criterion works better for certain phases of instrument validation (Schmitt & Sass, 2011). For example, rotation criteria that attempt to reduce cross-loading magnitudes, such as Geomin or Quartimax, should result in more comparable solutions to CFA. Such rotations are preferable

for use with well-developed measures in which researchers expect fewer and smaller cross-loadings (Schmitt & Sass, 2011). Because this is a new measure, I followed Schmitt and Sass's suggestion of considering a rotation that is better suited for complex data structures, such as Equamax and Facparsim. Such rotations are preferred when items' quality could be questionable due to limited prior structural validity and reliability evidence. Because this is a new instrument, it is possible that some items can measure multiple factors, therefore, I sought to remove items with larger cross-loadings to reduce the interfactor correlation. This simplifies variable and factor pattern matrix loadings, and spreads variances more equally across the factors providing a clean solution. Hence, I used equamax rotation to develop the POWER Scale.

4. I deleted items based on the criteria and reported the deleted items and the criteria used for deletion. I reran the EFA each time an item was deleted. Items with loadings below .4 were considered not to load on any factor and were deleted. Crossloading items with values ≥ .32 on at least two factors were deleted (Costello & Osborne, 2005). Besides, items were considered to load on two factors if the absolute difference between the loadings was less than .3. I also deleted the items with communalities below .5.

## Reliability

Cronbach's alpha is one of the most widely used measures of reliability in social studies (Bonett & Wright, 2015). Cronbach's alpha measures the internal consistency of the items in the scale, but it does not provide information on the scale's unidimensionality (Gliem & Gliem, 2003). In fact, factor analysis is a method to determine the dimensionality of a scale. Hence, I

calculated Cronbach's Alpha for each subscale of the POWER Scale to make sure that all the items in a subscale measure the same construct (DeVellis, 2017). Alpha should be calculated for each subscale rather than for the entire scale as the larger number of questions will inflate the value of alpha (Cohen & Swerdlik, 2010). There are different reports about the acceptable values of alpha. George and Mallery (2003) suggested that alpha greater than .90 is considered excellent, greater than .80 is considered good, greater than .70 is acceptable, greater than .60 is questionable, greater than .50 is considered Poor, and anything below .50 is considered unacceptable. A small alpha estimate could be due to a low number of questions; however, it could also be a result of poor inter-relatedness between items. To find a poor correlation between the items I computed the correlation of each test item with the total score test; items with low correlations should be revised or discarded. Moreover, if alpha is too large, it may suggest that some items are redundant; a maximum alpha value of .90 has been recommended (Tavakol & Dennick, 2011).

## Confirmatory Factor Analysis

EFA followed by CFA is one of the most common approaches to scale development and validation (Worthington & Whittaker, 2006). After establishing the preliminary evidence of the factor structure using EFA, CFA was used to test the construct validity of the *POWER Scale*. For CFA, using the Satorra–Bentler scaled $\chi 2$ and robust SEs with non-normal continuous variables is recommended (Satorra & Bentler, 1994). The data that I used for CFA were not normal. Hence, I could not use the Maximum Likelihood (ML), as it requires continuous and multivariate normally distributed data to obtain accurate parameter estimates, standard errors of parameter estimates, and model fit indices (Bollen, 1989; Rakov & Marcoulides, 2000). S-B $\chi 2$ is typically applied with ML estimation. S-B $\chi 2$ uses the observed data's distributional characteristics to

adjust the ML $\chi 2$ to better approximate $\chi 2$. S-B $\chi 2$ outperforms ML-based $\chi 2$ with non-normal data (Finney & DiStefano, 2006). Under the condition of moderate to severe non-normality coupled with small sample size ($n \leq 250$) S-B scaled RMSEA (Nevitt & Hankock, 2000), TLI, and CFI outperform unadjusted indices (Yu, 2002). Hence, I used both ML and S-B scaling methods to check the model fit.

Using Stata 16, I calculated the following values to check the model fit: a) (a) used $\chi 2$ statistic ($\chi^2$ / df) with values below 3 represent a good model (Wheaton et al., 1977) (b) the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values greater than .9 are indicative of an acceptable fit (c) the Root Mean Square Error of Approximation (RMSEA) values should be less than .05 and (d) the Standardized Root Mean Square Residual (SRMR) should be less than .08 (Brown, 2006; Hu & Bentler, 1999). I reexamined the internal-consistency reliability and checked the items' effects on the subscale reliability when the means were relatively similar. The items that had the most positive effect on the subscale's reliability were kept.

# CHAPTER 4: RESULTS

In this section, I present the results. I investigated the psychometric properties of the POWER Scale in terms of content and construct-validity evidence. I also examined the reliability of the scale.

## Content Validity

To achieve content validation, five experts provided qualitative and quantitative feedback on 79 items in the item pool. Experts were asked to provide qualitative feedback, such as suggestions regarding the definition of the components, wording, and items that needed to be eliminated from the item pool. I also asked the expert participants if items covered the full range of content within each construct. They were asked to suggest additional items that could enhance the representativeness of the entire item pool. Experts also filled the content validity form and specified how relevant they felt that the item was to that subscale, with 1 “not relevant” and 3 “very relevant.”

I made decisions regarding retaining, eliminating, and rewording items based on the theoretical framework and experts’ qualitative and quantitative feedback. I deleted the items that were not rated at 2 or 3 by at least three experts. I investigated all the items that were rated at 1 by one expert. However, this was a challenging task, as there were disagreements on the definition of wisdom among the participant experts. All the expert participants have developed models of wisdom; hence, they had the tendency to refer to their model and try to convince me that I should eliminate some of the components (not items). For example, creative thinking was not considered relevant to wisdom by one of the experts. It did not surprise me, as creative thinking is not considered as a component of wisdom in most psychological theories (Karami et

al., in press). However, this component was used in Educational and Management and Leadership studies more than in Psychological studies. One of the experts rated 8 items in the creative-thinking component as irrelevant to wisdom. However, the goal of this validation was not to identify if creative thinking was a component of wisdom but rather if the items were relevant to creative thinking. Hence, I decided to keep the items that were rated as highly relevant to creative thinking by other experts. I eliminated 33 items from the item pool. Only one item was suggested to be added to the item pool. In addition to eliminating the items, I made changes regarding the wording of some of the items. These changes are noted in Table 16, using strike-through for items or words eliminated and italics for words or items added.

Table 16 Changes During the Content Validity

| Item | Reason for change |
|---|---|
| Knowledge Management | |
| Acquiring broad knowledge of the world. | |
| Acquiring specialized forms of knowledge *about the challenge at hand*. | |
| Acquiring experience-based knowledge *in the face of a challenging situation* | |
| Synthesizing knowledge from opposing points of view. | |
| ~~Transferring knowledge into different contexts~~ | NR |
| ~~Making intentional effort to advance knowledge~~ | NR |
| Knowing how to apply appropriate knowledge *in a given situation*. | |
| Knowing when to apply appropriate knowledge *in a given situation*. | |
| Self-Regulation | |
| Knowing oneself | |
| Reflecting on the sort of person they are becoming | |
| Reflecting on what happens around them | |
| ~~Adjusting cognitive strategies~~ | NR |
| ~~Being aware of the limits of their knowledge~~ | O |
| ~~Frequently thinking about connections between their past and present~~ | NR |
| Willing to admit one's mistakes | |
| Correcting one's mistakes | |
| ~~Considering the possibility that their beliefs or behaviors may be wrong~~ | NR |
| ~~Delaying gratification~~ | NR |
| Adapting behavior ~~when the situation changes~~ *appropriate to the specific situation* | |
| Focusing their attention on what's most important at the time | |

Table 16 continued

| | |
|---|---|
| ~~Monitoring their attention~~ | O |
| ~~Adjusting their attention when the situation changes~~ | NR |
| ~~Considering the possibility that their beliefs or behaviors may be wrong~~ | O |
| ~~Adjusting their emotions to the situation at hand~~ | O |
| Identifying subtle emotions within oneself | |
| Expressing emotions without losing control *(e.g., showing anger without losing control)* | |
| Moral Maturity | |
| ~~Taking on situations where they know their help will be needed~~ | NR |
| Treating another person, the way they would like to be treated | |
| Behaving in a manner that also benefits other people rather than just themself | |
| Considering the well-being of other people and society | |
| Understanding moral principles | |
| ~~Considering what is good for humanity in their decisions~~ | O |
| Thinking ethically | |
| ~~Understanding ethical rules~~ | O |
| ~~Considering virtue as central to their decisions~~ | O |
| Tolerance for Uncertainty | |
| Considering that the validity of information available to humans could be limited | |
| Understanding that all people have limitations in how much they know | |
| Considering that the future cannot be fully known in advance | |
| Being comfortable with unknown situations | |
| Having tolerance for unexpected events | |
| Openness | |
| ~~Respect for~~ Having tolerance for beliefs and actions that are unfamiliar | |
| ~~Respect for~~ Having Tolerance for beliefs and actions that may be different from their own | |
| Being curious about other religious and/or philosophical belief systems | |
| Willing to explore ideas *with those who have different perspectives and beliefs* | |
| ~~Reading works that challenge the reader to think differently about issues~~ | O |
| ~~Considering differences in points of view~~ | NR |
| ~~Considering contrary positions~~ | NR |
| Willing to work with people from different backgrounds | |
| ~~Being open to new experience such as food and music~~ | O |
| Willing to be around people whose views are strongly different from their *own* | |
| Sound Judgment | |
| Incorporating reasonable criteria for judgment | |
| ~~Judging~~ *Evaluating* the credibility of an information source | |
| ~~Judging~~ *Evaluating* the relevance of an information source | |
| Recognizing differences among opinion, reasoned judgment, and fact | |
| ~~Determining~~ *Evaluatin*g whether their assumptions are justifiable | |
| Thinking about different probabilities to improve decision making | |
| Recognizing and considering the need to seek contradictory evidence | |
| *Perceiving possible compromises between opposing positions* | A |

Table 16 continued

| | |
|---|---|
| Considering the context in which they are making a judgment | |
| ~~Making risk-benefit ratio assessments~~ | O |
| ~~Raising vital questions and problems clearly and precisely~~ | NR |
| ~~Generating a reasoned method for selecting between several possible courses of action~~ | O |
| ~~Presenting a coherent and persuasive argument on a controversial topic~~ | NR |
| ~~Identifying their assumptions clearly~~ | O |
| ~~Determining~~ *Evaluating* the consistency and relevance of the conclusion | |
| Creativity | |
| Generating unique and novel ideas | |
| Elaborating on ideas by adding details | |
| Seeing relationships among ideas | |
| Synthesizing and recombining ideas to improve the solution | |
| Having an ability to sense when problems are about to arise | |
| ~~Having a problem-sensitivity attitude~~ | NR |
| ~~Generating useful ideas~~ | O |
| ~~Generating many ideas~~ | NR |
| ~~Making new connections among ideas~~ | O |
| ~~Generating different categories of ideas~~ | NR |
| ~~Having a risk-taking attitude~~ | NR |
| ~~Using analogies to make the unfamiliar known~~ | NR |
| ~~Defining a problem in multiple ways and from different viewpoints~~ | NR |

Note. O: Item eliminated because it overlaps with other items.
NR: Item eliminated because the items is not relevant to the component.
A: Item was added based on experts' suggestions.
Used strike through for items or words eliminated.
Used italics for words or items added

## Evidence for Construct Validity Through Exploratory Factor Analysis

### EFA Data Cleaning

#### *Outliers*

Prior to performing the EFA, I examined for the accuracy of data entry, missing values, outliers, multicollinearity, singularity, and normality of the EFA half. Cases with incomplete observations were removed from my data set. For the outliers, I first investigated extreme outliers using the explore function in SPSS and the commands for normality plots with tests and

outliers. In each index plot, cases with extreme values are typically visually identified as influential cases or outliers by their departure from the general level and range of points. I flagged the cases with extreme outliers and checked if their responses followed a systematic pattern of response. Another way I used to detect outliers was calculating Mahalanobis distance (MD) (Tabachnik & Fidell, 2007). I first calculated the critical value that the Mahalanobis distance must be greater than. The critical value for MD is $\chi^2$ with degrees of freedom equal to the number of variables. Using the criterion of $\alpha = .001$ with 46 degree of freedom (number of items), the critical $\chi^2 = 81.40$, I examined all Mahalanobis variables to see if their value exceeded the critical value of $\chi^2 = 81.40$. Then, I investigated all the cases with MDs larger than 81.40 to see if their responses were systematic. Mahalanobis value for 25 cases were greater than 81.40. However, after looking closer, I deleted only 3 extreme outliers with systematic response pattern.

Although MD can assist with identifying outliers, cases with large residuals are not necessarily influential and cases with high MD are not necessarily bad leverage points (Yuan & Zhong, 2008). Hence, I also calculated generalized Cook's Distance (gCD) to measure the influence of a case on a set of parameter estimates from a factor-analysis model, as gCD provides an efficient approach to examine case influence on subsets of estimates, especially in the context of complex models with many parameters (Yuan & Zhong, 2008). Like MD, gCD is in a squared metric with values close to zero, indicating little case influence on parameter estimates and those far from zero indicating strong case influence on the estimates. I looked for influential cases with gCD close to 1. I deleted 1 case that had a Cook's distance close to 1.

I removed the cases with extreme scores that I decided were not part of the population I sampled. However, if a case was simply extreme with otherwise legitimate values, I kept it, as

most methodologists recommend that such cases should not be deleted from the data set prior to model fitting (e.g., Bollen & Arminger, 1991; Pek & MacCallum, 2011; Yuan and Zhong, 2008). After removing 10 outliers, I had a total number of 280 participants for the EFA (175 in-service teachers and 105 preservice teachers).

### *Multicollinearity and Singularity*

As the first step to detect multicollinearity, I examined the correlation matrix for correlations above .85 (Bohrnstedt & Carter, 1971). I did not find any correlations above .85; however, the correlation between knowledge 5 and knowledge 6 was .85 and the correlation between prosocial 2 and 3 was .81. I decided to keep them and investigated the variance inflation factor (VIF) and tolerance (1-VIF) values. I did not find any tolerance below 2 and found three VIF above 4; however, they were less than 5. Two of them were knowledge 5 and 6; these two items have very similar wordings. However, one of them asks "Knowing how to apply appropriate knowledge in a given situation." The other Knowing when to apply appropriate knowledge in a given situation." As these items had VIF below 5 and have different meanings, I decided to keep them.

I also examined SMC (Squared Multiple Correlation) values and did not find any multicollinearity and singularity according to that table. The tolerance and SMC values were fine for this group of data. I also examined the Condition Index for all 46 items and at last 39 items had Condition Indexes that were greater than 30. Because of these high Condition Indexes, I examined the Variance Proportions and I did not have two Variance Proportions greater than .50 for each item. Hence, I did not have a multicollinearity and singularity problem; however, knowledge 5 and 6 were problematic. Besides, item 5, "Knowing how to apply appropriate knowledge in a given situation" can refer to "when to apply to apply appropriate knowledge in a

given situation" too. However, I decided to conduct EFA and see which one is stronger. I checked for the homoscedasticity and made sure the residuals were equally distributed.

### *Normality*

I used one test from each four groups of normality tests (graphical and correlational approaches such as chi-squared plot, skewness and kurtosis approaches such as Mardia's tests of skewness and kurtosis, and goodness of fit approaches such as Doornik-Hansen omnibus tests (Mecklin & Mundfrom, 2005). As SPSS does not provide all of these tests, I used Stata 16 to conduct these analyses. The graphs showed positive skewedness for all the items. Mardia's tests of skewness and kurtosis and as Doornik-Hansen omnibus tests were also significant. However, Mardia (1974) warned that it becomes easier for tests with larger sample sizes to become statistically significant. He argued that large sample sizes, those greater than 100, are going to be very skewed. In their review of 1,567 studies with univariate data and 254 studies with multivariate data, Cain et al. (2017) found that over 95 % of multivariate distributions with sample sizes greater than 106 were tested as nonnormal. As presented in Table 17, all the tests for normality were significant, which indicates that the data were nonnormal.

Table 17 Results for Different Normality Tests for EFA Data

| Normality Test | Test Statistics |
|---|---|
| Mardia | |
| Skewness | 28376.919* |
| Kurtosis | 51.94259* |
| Doornik-Hansen | (df = 92) 996.496* |

*$P$ value < .001

## Result of the Exploratory Factor Analysis

To conduct the EFA, I checked KMO and Bartlett's Test of Sphericity (see Table 18). KMO was greater than .90, which is considered Marvelous according to Kaiser (1974). Bartlett's Test of Sphericity was also significant. Anti-Image was checked too; as it was expected, all the off-diagonal elements were small.

Table 18 KMO and Bartlett's Test

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .902 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 8429.395 |
| | df | 1035 |
| | Sig. | .001 |

### *Determining the Number of Factors to Be Extracted*

I used four methods to decide the number of factors to extract (McCoach et al., 2013), including the Eigenvalue > 1 rule (EV > 1; Kaiser, 1960), scree plot test (Cattell, 1966), parallel analysis (Horn, 1965; Turner, 1998), and minimum average partial correlation (Velicer, 1976).

***Method 1. Principal Axis Factoring Eigenvalues.*** As presented in Table 19, principal-axis factoring Eigenvalues suggested a seven-factor model. Although this method has been popular for determining the number of factors to retain, recent research has indicated that this Eigenvalues-greater-than-one rule could overestimate or underestimate the correct number of factors to retain, and sometimes it underestimates the number of components (Zwick & Velicer, 1986).

Table 19 Principal-Axis Factoring Eigenvalues

| Extraction Sums of Squared Loadings | | | |
|---|---|---|---|
| Factor | Total | % of Variance | Cumulative % |
| 1 | 14.469 | 31.453 | 31.453 |
| 2 | 3.450 | 7.500 | 38.953 |
| 3 | 2.029 | 4.412 | 43.365 |
| 4 | 1.835 | 3.989 | 47.354 |
| 5 | 1.496 | 3.253 | 50.607 |
| 6 | 1.388 | 3.018 | 53.625 |
| 7 | 1.213 | 2.637 | 56.262 |
| 8 | 0.854 | 1.856 | 58.118 |
| 9 | 0.758 | 1.648 | 59.766 |
| 10 | .640 | 1.390 | 61.156 |

***Method 2. Scree Plot.*** The scree plot method has been a strongly promoted alternative rule of thumb (Cattell & Vogelmann, 1977). However, the reliability of scree plot interpretations is low (Crawford & Koopman, 1979; Streiner, 1998), as it involves eyeball searches of plots for sharp demarcations between the eigenvalues for major and trivial factors. However, such demarcations do not always exist or there may be more than one demarcation point (O'Conner, 2000). I decided there were 7 factors based on scree plot, but I also conducted parallel analysis and Velicer's minimum average partial (MAP) test as validated procedures, recommended widely by statisticians.

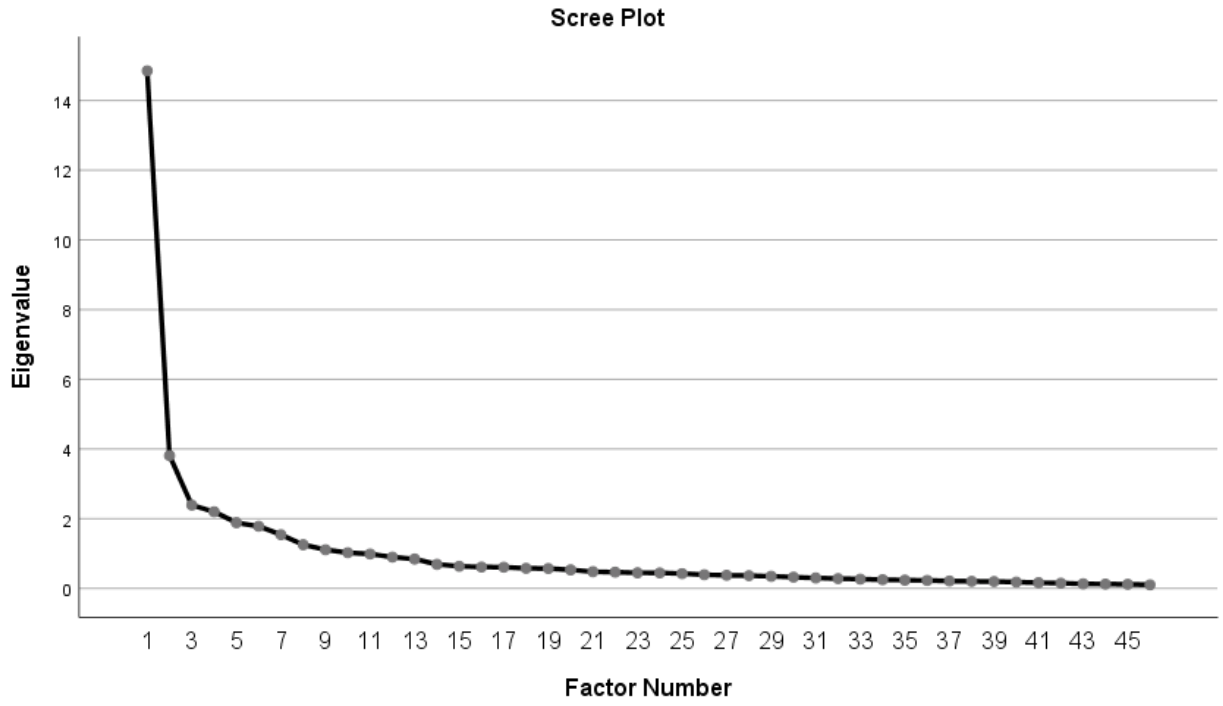


Figure 2 Scree Plot from EFA to Determine the Number of Factors to Retain

***Method 3. Parallel Analysis.*** I used O'Conner's (2000) syntax for SPSS to conduct parallel analysis. To decide on the number of components, I first extracted eigenvalues from a random data set that paralleled the actual data set regarding the number of cases and variables (see Table 20). Then I used the eigenvalues that corresponded to the 95th percentile of the distribution of random data Eigenvalues (Cota et al., 1993; Glorfeld, 1995; Turner, 1998). I ran parallel analysis on the data. This indicated the lowest eigenvalue for a factor to be retained in the solution should be greater than 1.025197. According to the original solution from the principal-axis factoring, 7 factors had eigenvalues greater than this number.

Table 20 Results for Parallel Analysis

| Random Data Eigenvalues | | |
|---|---|---|
| Root | Means | 95th Percentile |
| 1 | 1.05 | 1.16 |
| 2 | 0.95 | 1.02 |
| 3 | 0.88 | 0.93 |
| 4 | 0.82 | 0.87 |
| 5 | 0.76 | 0.80 |

***Method 4: Minimum Average Partial Procedure (MAP).*** Average Partial Correlations complement principal-components analysis followed by the examination of a series of matrices of partial correlations. Components were maintained if the variance in the correlation matrix represents systematic variance, as opposed to residual or error variance (Velicer, 1976). The MAP technique has been shown to perform quite well in determining the number of factors to retain in multiple simulation studies (Zwick & Velicer, 1986; Garrido et al., 2011; Ruscio & Roche, 2012). According to the original MAP test in 1976, the smallest average squared partial correlation was .0142, which suggests a 6- or 7-factor model. According to the revised MAP test partial correlation, the smallest average $4^{th}$ power partial correlation was .0007, which suggested a 7-factor model (see Table 21). Based on these results, I concluded I could extract 7 factors.

Table 21 Results for Minimum Average Partial Procedure

| Number of Factors | Velicer's Average Squared Correlation | Power4 |
|---|---|---|
| 0 | .1063 | .1940 |
| 1 | .0257 | .0032 |
| 2 | .0193 | .0020 |
| 3 | .0180 | .0015 |
| 4 | .0173 | .0012 |
| 5 | .0158 | .0010 |
| 6 | .0149 | .0009 |
| 7 | .0142 | .0008 |
| 8 | .0142 | .007 |

***Determining the Model and Items***

All four rules regarding the determination of the number of factors to be extracted supported a 7-factor model, which confirmed my theoretical hypothesis. Considering the sample size and non-normal data, I decided that Unweighted Least Squares (ULS) was the most appropriate extraction model for this data. However, as advised by Zygmont and Smith (2014), I used different extraction techniques to examine the outcomes from different methods. I used Equamax rotation as it is more suitable for my research goal; developing a new measure (Zygmont & Smith, 2014).

Table 22 First ULS Equamax Rotated Factor Matrix

| | Factor | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Know1 | | | | | .41 | | |
| Know2 | | | | | .43 | | |
| Know3 | | | | | .51 | | |
| Know4 | | | | | .54 | | |
| Know5 | | | | | .84 | | |
| Know6 | | | | | .84 | | |
| Creat1 | | | | | | | .70 |
| Creat2 | | | | | | | .74 |
| Creat3 | | | | | | | .53 |
| Creat4 | | | | | | | .57 |
| Creat5 | | | | | | | |
| Self1 | | | .62 | | | | |
| Self2 | | | .63 | | | | |
| Self3 | | | .55 | | | | |
| Self4 | | | .60 | | | | |
| Self5 | | | .64 | | | | |
| Self6 | | | .53 | | | | |
| Self7 | | | .48 | | | | |
| Self8 | | | .60 | | | | |
| Self9 | | | .50 | | | | |
| Prosoc1 | | .64 | | | | | |
| Prosoc2 | | .81 | | | | | |
| Prosoc3 | | .83 | | | | | |
| Prosoc4 | | .67 | | | | | |
| Prosoc5 | | .71 | | | | | |

Table 22 continued

| | | | |
|---|---|---|---|
| Tolera1 | | | .67 |
| Tolera2 | | | .61 |
| Tolera3 | | | .71 |
| Tolera4 | | .49 | .52 |
| Tolera5 | | .52 | .44 |
| Openn1 | | .70 | |
| Openn2 | | .72 | |
| Openn3 | | | |
| Openn4 | | .49 | |
| Openn5 | | .61 | |
| Openn6 | | .56 | |
| Judg1 | .60 | | |
| Judg2 | .66 | | |
| Judg3 | .66 | | |
| Judg4 | .60 | | |
| Judg5 | .66 | | |
| Judg6 | .57 | | |
| Judg7 | .63 | | |
| Judg8 | .57 | | |
| Judg9 | .70 | | |
| Judg10 | .66 | | |

Note. Extraction Method: Unweighted Least Squares.
Rotation Method: Equamax with Kaiser Normalization.
Rotation converged in 14 iterations.

As I found through data screening, items Knowledge 5 and 6 were highly correlated ($r=.846^*$, $p<.001$) and might have been problematic. I did not delete either item in the data screening, because I wanted empirical evidence about the best item to keep. According to Table 22, knowledge 5 is a stronger item. Besides, item 5, "Knowing how to apply appropriate knowledge in a given situation" includes "when to apply to apply appropriate knowledge in a given situation" too. Hence, I decided to eliminate item Knowledge 6.

I reran the EFA each time an item was deleted (Cabrera-Nguyen, 2010). Items with loadings below .4; crossloading items with values ≥ .32 on at least two factors; and items that load on two factors with absolute difference ≥ .30 were deleted. Items Knowledge 4 and 6;

Creativity 5; Self-regulation 7 and 8; Tolerance 4 and 5; Openness 1 and 3; and Judgment 3, 4 and 7 were deleted (see Table 23). Table 24 displays the changes the were made during the EFA. Table 25 displays the final EFA model using ULS extraction technique and Equamax rotation. This model explained 65.10% of the variance in the data.

Table 23 Deletions Based on the Exploratory Factor Analysis's Pattern Matrix Results

| Item Number | Primary Factor Loading | Second Factor Loading |
|---|---|---|
| Knowledge 4 | Knowledge: .61 | Judgment: .30 |
| Creativity 5 | Creativity: .34 | Knowledge: .33 |
| Self-Regulation 7 | Self-Regulation: .47 | Tolerance: .24 |
| Self-Regulation 8 | Self-Regulation: .58 | Tolerance: .24 |
| Tolerance 4 | Tolerance: .52 | Openness: .49 |
| Tolerance 5 | Tolerance: .48 | Openness: .34 |
| Openness 1 | Openness: .68 | Tolerance: .38 |
| Openness 3 | Openness: .35 | Tolerance: .32 |
| Judgment 4 | Judgment: .58 | Tolerance: .36 |
| Judgment 3 | Judgment: .62 | Knowledge: .40 |
| Judgment 7 | Judgment: .65 | Openness: .34 |

Table 24 Changes During Exploratory Factor Analysis

| Item | Reason for deletion |
|---|---|
| Knowledge Management | |
| Acquiring broad knowledge of the world. | |
| Acquiring specialized forms of knowledge about the challenge at hand. | |
| Acquiring experience-based knowledge in the face of a challenging situation | |
| ~~Synthesizing knowledge from opposing points of view.~~ | C |
| Knowing how to apply appropriate knowledge in a given situation. | |
| ~~Knowing when to apply appropriate knowledge in a given situation.~~ | HC |
| Self-Regulation | |
| Knowing oneself | |
| Reflecting on the sort of person they are becoming | |
| Reflecting on what happens around them | |
| Willing to admit one's mistakes | |
| Correcting one's mistakes | |
| Adapting behavior appropriate to the specific situation | |

Table 24 continued

| | |
|---|---|
| ~~Focusing their attention on what's most important at the time~~ | C |
| ~~Identifying subtle emotions within oneself~~ | C |
| Expressing emotions without losing control (e.g., showing anger without losing control) | |
| Moral Maturity | |
| Treating another person, the way they would like to be treated | |
| Behaving in a manner that also benefits other people rather than just themself | |
| Considering the well-being of other people and society | |
| Understanding moral principles | |
| Thinking ethically | |
| Tolerance for Uncertainty | |
| Considering that the validity of information available to humans could be limited | |
| Understanding that all people have limitations in how much they know | |
| Considering that the future cannot be fully known in advance | |
| ~~Being comfortable with unknown situations~~ | C |
| ~~Having tolerance for unexpected events~~ | C |
| Openness | |
| ~~Having tolerance for beliefs and actions that are unfamiliar~~ | C |
| Having tolerance for beliefs and actions that are different from their own | |
| ~~Being curious about other religious and/or philosophical belief systems~~ | C |
| Willing to explore ideas with those who have different perspectives and beliefs | |
| Willing to work with people from different backgrounds | |
| Willing to be around people whose views are strongly different from their own | |
| Sound Judgment | |
| Incorporating reasonable criteria for judgment | |
| Evaluating the credibility of an information source | |
| ~~Evaluating the relevance of an information source~~ | C |
| ~~Recognizing differences among opinion, reasoned judgment, and fact~~ | C |
| Evaluating whether their assumptions are justifiable | |
| Thinking about different probabilities to improve decision making | |
| ~~Recognizing and considering the need to seek contradictory evidence~~ | C |
| Perceiving possible compromises between opposing positions | |
| Considering the context in which they are making a judgment | |
| Evaluating the consistency and relevance of the conclusion | |
| Creativity | |
| Generating unique and novel ideas | |
| Elaborating on ideas by adding details | |
| Seeing relationships among ideas | |
| Synthesizing and recombining ideas to improve the solution | |
| ~~Having an ability to sense when problems are about to arise~~ | C |

Note. C: Item deleted because of Crossloadings.

As has been suggested for conductingEFA with different Extraction models, I used Principal-Axis Factoring (PAF) and the Maximum-Likelihood (ML) extraction technique as well. PAF yielded the exact same model as ULS, which explains 65.10% of the variance in the data (see Table 26). I also investigated this model using ML. I could keep items Judgment 7, Self-regulations 7, and knowledge 4 in the instrument with ML extraction technique. This model explained 63.83% of the variance in the data, less than the previous model (see Table 27).

Table 25 Final Model from ULS Equamax Rotated Factor Matrix

| | Factor | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Know1 | | | | | | | .46 |
| Know2 | | | | | | | .73 |
| Know3 | | | | | | | .74 |
| Know5 | | | | | | | .43 |
| Creat1 | | | | | .68 | | |
| Creat2 | | | | | .78 | | |
| Creat3 | | | | | .55 | | |
| Creat4 | | | | | .56 | | |
| Self1 | | | .62 | | | | |
| Self2 | | | .67 | | | | |
| Self3 | | | .58 | | | | |
| Self4 | | | .65 | | | | |
| Self5 | | | .64 | | | | |
| Self6 | | | .46 | | | | |
| Self9 | | | .44 | | | | |
| Prosoc1 | | .70 | | | | | |
| Prosoc2 | | .81 | | | | | |
| Prosoc3 | | .78 | | | | | |
| Prosoc4 | | .65 | | | | | |
| Prosoc5 | | .71 | | | | | |
| Toler1 | | | | | | .75 | |
| Toler2 | | | | | | .72 | |
| Toler3 | | | | | | .72 | |
| Openn2 | | | | .52 | | | |
| Openn4 | | | | .60 | | | |
| Openn5 | | | | .78 | | | |
| Openn6 | | | | .70 | | | |
| Judg1 | .59 | | | | | | |
| Judg2 | .61 | | | | | | |
| Judg5 | .66 | | | | | | |
| Judg6 | .56 | | | | | | |
| Judg8 | .57 | | | | | | |
| Judg9 | .70 | | | | | | |
| Judg10 | .70 | | | | | | |

Note. Extraction Method: Unweighted Least Squares.
Rotation Method: Equamax with Kaiser Normalization.
Rotation converged in 10 iterations.

Table 26 Final Model from PAF Equamax Rotated Factor Matrix

| Item | Factor | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Know1 | | | | | | | .46 |
| Know2 | | | | | | | .73 |
| Know3 | | | | | | | .75 |
| Know5 | | | | | | | .44 |
| Creat1 | | | | | .68 | | |
| Creat2 | | | | | .78 | | |
| Creat3 | | | | | .55 | | |
| Creat4 | | | | | .56 | | |
| Self1 | | | .63 | | | | |
| Self2 | | | .67 | | | | |
| Self3 | | | .58 | | | | |
| Self4 | | | .65 | | | | |
| Self5 | | | .64 | | | | |
| Self6 | | | .46 | | | | |
| Self9 | | | .44 | | | | |
| Prosoc1 | | .70 | | | | | |
| Prosoc2 | | .81 | | | | | |
| Prosoc3 | | .78 | | | | | |
| Prosoc4 | | .65 | | | | | |
| Prosoc5 | | .71 | | | | | |
| Tolera1 | | | | | | .75 | |
| Tolera2 | | | | | | .72 | |
| Tolera3 | | | | | | .72 | |
| Openn2 | | | | .53 | | | |
| Openn4 | | | | .61 | | | |
| Openn5 | | | | .78 | | | |
| Openn6 | | | | .70 | | | |
| Judg1 | .60 | | | | | | |
| Judg2 | .61 | | | | | | |
| Judg5 | .66 | | | | | | |
| Judg6 | .56 | | | | | | |
| Judg8 | .57 | | | | | | |
| Judg9 | .70 | | | | | | |
| Judg10 | .70 | | | | | | |

Note. Extraction Method: Principal Axis Factoring.
Rotation Method: Equamax with Kaiser Normalization.
Rotation converged in 10 iterations.

Table 27 Final Model from ML Equamax Rotated Factor Matrix

| Item | Factor | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Know1 | | | | | .50 | | |
| Know2 | | | | | .70 | | |
| Know3 | | | | | .67 | | |
| Know4 | | | | | .57 | | |
| Know5 | | | | | .52 | | |
| Creat1 | | | | | | | .70 |
| Creat2 | | | | | | | .85 |
| Creat3 | | | | | | | .47 |
| Creat4 | | | | | | | .49 |
| Self1 | | | .63 | | | | |
| Self2 | | | .66 | | | | |
| Self3 | | | .57 | | | | |
| Self4 | | | .64 | | | | |
| Self5 | | | .65 | | | | |
| Self6 | | | .48 | | | | |
| Self7 | | | .41 | | | | |
| Self9 | | | .46 | | | | |
| Prosoc1 | | .68 | | | | | |
| Prosoc2 | | .83 | | | | | |
| Prosoc3 | | .81 | | | | | |
| Prosoc4 | | .64 | | | | | |
| Prosoc5 | | .68 | | | | | |
| Tolera1 | | | | | | .75 | |
| Tolera2 | | | | | | .72 | |
| Tolera3 | | | | | | .73 | |
| Openn2 | | | | .52 | | | |
| Openn4 | | | | .60 | | | |
| Openn5 | | | | .77 | | | |
| Openn6 | | | | .72 | | | |
| Judg1 | .56 | | | | | | |
| Judg2 | .58 | | | | | | |
| Judg5 | .64 | | | | | | |
| Judg6 | .61 | | | | | | |
| Judg7 | .65 | | | | | | |
| Judg8 | .63 | | | | | | |
| Judg9 | .71 | | | | | | |
| Judg10 | .67 | | | | | | |

Note. Extraction Method: Maximum Likelihood.
Rotation Method: Equamax with Kaiser Normalization.
Rotation converged in 11 iterations.

As discussed in Chapter 3, ML is sensitive to skewed data and outliers (Briggs & MacCallum, 2003), and the ULS estimation method makes no assumptions regarding observed variable distributions (MacCallum, 2009). The data for this study were not normal. Hence, I chose the model from ULS methods as the final model. This model has 7 factors and 34 items (see Table 28).

Table 28 The Different Number of Pooled Item for Each Construct Before and After Exploratory Factor Analysis

| Factor/Component | Number of Items Before EFA | Number of Items After EFA |
|---|---|---|
| Knowledge Management | 6 | 4 |
| Creativity | 5 | 4 |
| Self-Regulation | 9 | 7 |
| Moral Maturity | 5 | 5 |
| Tolerance for Uncertainty | 5 | 3 |
| Openness | 6 | 4 |
| Sound Judgment | 10 | 7 |
| Total | 46 | 34 |

Table 29 presents the descriptive characteristics of each item after EFA. Means for the items range from 4.32 to 5.43 with the standard deviation range from 0.81 to 1.21.

Table 29 Descriptive Statistics of the Items Remain in the Scale after EFA

| Item | Mean | Mean | Standard Deviation | Standard Deviation | Response percentage | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| Know1 | 4.87 | 4.93 | 0.91 | 0.90 | 0.0 | 0.4 | 5.4 | 30.0 | 35.4 | 28.9 |
| Know2 | 4.72 | | 0.91 | | 0.0 | 0.7 | 6.8 | 34.3 | 36.4 | 21.8 |
| Know3 | 4.88 | | 0.91 | | 0.4 | 0.4 | 5.0 | 26.8 | 40.0 | 27.5 |
| Know5 | 5.27 | | 0.80 | | 0.0 | 0.4 | 0.7 | 17.9 | 33.2 | 47.9 |
| Creat1 | 4.32 | 4.70 | 1.02 | 0.91 | 0.0 | 5.4 | 13.2 | 37.9 | 31.4 | 12.1 |
| Creat2 | 4.46 | | 0.96 | | 0.0 | 3.2 | 12.1 | 32.5 | 40.0 | 12.1 |
| Creat3 | 5.03 | | 0.83 | | 0.0 | 3.2 | 12.1 | 32.5 | 40.0 | 12.1 |
| Creat4 | 4.99 | | 0.84 | | 0.0 | 0.4 | 3.2 | 20.7 | 44.3 | 31.4 |
| Self1 | 5.08 | 5.17 | 0.86 | 0.87 | 0.0 | 0.7 | 3.2 | 21.8 | 45.4 | 28.9 |
| Self2 | 5.15 | | 0.89 | | 0.0 | 0.0 | 5.7 | 16.1 | 42.5 | 35.7 |
| Self3 | 5.16 | | 0.83 | | 0.0 | 0.0 | 5.7 | 15.7 | 36.4 | 42.1 |
| Self4 | 5.43 | | 0.78 | | 0.0 | 0.0 | 3.9 | 15.4 | 41.1 | 39.6 |
| Self5 | 5.26 | | 0.82 | | 0.0 | 0.0 | 2.5 | 10.4 | 28.6 | 58.6 |
| Self6 | 5.04 | | 0.81 | | 0.0 | 0.4 | 2.9 | 20.0 | 46.1 | 30.7 |
| Self9 | 5.04 | | 1.03 | | 0.7 | 0.7 | 8.2 | 15.4 | 34.6 | 40.4 |
| Prosoc1 | 5.00 | 5.25 | 1.15 | 0.93 | 1.1 | 3.2 | 6.4 | 16.8 | 29.3 | 43.2 |
| Prosoc2 | 5.13 | | 0.98 | | 0.0 | 1.1 | 6.8 | 15.0 | 32.5 | 44.6 |
| Prosoc3 | 5.32 | | 0.89 | | 0.0 | 1.1 | 2.1 | 15.7 | 26.1 | 55.0 |
| Prosoc4 | 5.36 | | 0.82 | | 0.0 | 0.4 | 3.2 | 10.0 | 32.5 | 53.9 |
| Prosoc5 | 5.42 | | 0.82 | | 0.0 | 0.4 | 3.2 | 9.3 | 28.6 | 58.6 |
| Tolera1 | 4.46 | 4.53 | 1.11 | 1.15 | 1.8 | 2.9 | 11.1 | 34.6 | 30.7 | 18.9 |
| Tolera2 | 4.55 | | 1.21 | | 2.1 | 3.6 | 11.1 | 28.6 | 29.3 | 25.4 |
| Tolera3 | 4.58 | | 1.13 | | 1.1 | 2.9 | 12.9 | 27.1 | 32.1 | 23.9 |
| Openn2 | 5.11 | 5.13 | 0.89 | 0.92 | 0.0 | 0.4 | 4.3 | 18.9 | 36.4 | 40.0 |
| Openn4 | 5.12 | | 0.96 | | 0.0 | 0.7 | 6.8 | 16.1 | 32.9 | 43.6 |
| Openn5 | 5.29 | | 0.90 | | 0.0 | 0.4 | 4.6 | 13.9 | 27.9 | 53.2 |
| Openn6 | 5.02 | | 0.94 | | 0.0 | 1.1 | 5.0 | 21.8 | 35.4 | 36.8 |
| Judg1 | 4.93 | 5.03 | 0.91 | 0.87 | 0.0 | 1.1 | 5.0 | 21.8 | 35.4 | 36.8 |
| Judg2 | 5.26 | | 0.82 | | 0.0 | 0.7 | 6.1 | 22.5 | 41.1 | 29.6 |
| Judg5 | 4.99 | | 0.87 | | 0.0 | 2.9 | 15.0 | 35.4 | 46.8 | 31.1 |
| Judg6 | 4.91 | | 0.89 | | 0.0 | 0.0 | 5.7 | 27.1 | 37.1 | 30.0 |
| Judg8 | 4.95 | | 0.88 | | 0.0 | 1.1 | 5.4 | 18.9 | 46.8 | 27.9 |
| Judg9 | 5.10 | | 0.84 | | 0.0 | 0.7 | 2.5 | 19.3 | 41.4 | 36.1 |
| Judg10 | 5.05 | | 0.88 | | 0.0 | 0.7 | 3.6 | 21.4 | 38.6 | 35.7 |

*n*=280

## Evidence for Reliability After EFA

After conducting EFA, I evaluated the internal-consistency estimates of the data for each subtest (see Table 30). The alpha reliability estimates ranged .75- .89, so each subscale exceeded the minimum recommended reliability estimate of .70 suggested by McCoach et al. (2013) and Nunnally and Bernstein (1994). None of the items had a corrected item-total correlation lower than 0.30, so they were all acceptable (Briggs & Cheek, 1986; Cristobal et al., 2007). The subscales' interitem correlations were investigated, but no individual items were correlated above .75 or below .20 (see Table 30). I also investigated the influence of each item on the total subtest internal-consistency reliability estimate. Eliminating none of the items would increase the reliability estimates (see Table 30). Next, I investigated this model using CFA.

Table 30 Item's Reliability Analysis for Exploratory Factor Analysis

| Item | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted | Cronbach Alpha | Average Interitem Correlation |
|---|---|---|---|---|
| Know1 | 0.51 | 0.71 | .75 | .42 |
| Know2 | 0.62 | 0.65 | | |
| Know3 | 0.61 | 0.65 | | |
| Know5 | 0.45 | 0.74 | | |
| Creat1 | 0.58 | 0.74 | .79 | .48 |
| Creat2 | 0.66 | 0.70 | | |
| Creat3 | 0.56 | 0.75 | | |
| Creat4 | 0.59 | 0.74 | | |
| Self1 | 0.63 | 0.84 | .86 | .47 |
| Self2 | 0.66 | 0.84 | | |
| Self3 | 0.67 | 0.83 | | |
| Self4 | 0.68 | 0.83 | | |
| Self5 | 0.66 | 0.84 | | |
| Self6 | 0.57 | 0.85 | | |
| Self9 | 0.55 | 0.86 | | |
| Prosoc1 | 0.68 | 0.89 | .89 | .64 |
| Prosoc2 | 0.82 | 0.85 | | |
| Prosoc3 | 0.81 | 0.86 | | |
| Prosoc4 | 0.73 | 0.88 | | |
| Prosoc5 | 0.73 | 0.88 | | |
| Tolera1 | 0.66 | 0.76 | .82 | .59 |
| Tolera2 | 0.68 | 0.74 | | |
| Tolera3 | 0.67 | 0.75 | | |
| Openn2 | 0.61 | 0.83 | .84 | .57 |
| Openn4 | 0.66 | 0.81 | | |
| Openn5 | 0.75 | 0.77 | | |
| Openn6 | 0.71 | 0.79 | | |
| Judg1 | 0.60 | 0.89 | .89 | .56 |
| Judg2 | 0.67 | 0.88 | | |
| Judg5 | 0.72 | 0.88 | | |
| Judg6 | 0.67 | 0.88 | | |
| Judg8 | 0.67 | 0.88 | | |
| Judg9 | 0.75 | 0.87 | | |
| Judg10 | 0.75 | 0.87 | | |

## Evidence for Construct Validity Through Confirmatory Factor Analysis

### Data Screening CFA

Following the same steps that I took for EFA, I screened the data for CFA. Prior to the cleaning, the data set 2 had 295 observations with 2 missing data lines, which I deleted. I followed the same steps that I took for EFA data screening. I calculated Mahalanobis to determine cutoff scores for eliminating extreme observation $\chi^2(42) = 76.09$ $p < .001$, and I deleted 5 cases based on Mahalanobis distances. I also calculated generalized Cook's Distance (gCD) and deleted 4 cases with (gCD) values close to 1 and systematic response patterns. Hence, the clean data set included 284 (176 in-service teachers and 108 preservice teachers) observations with no missing data. I checked for homoscedasticity and linearity as well. Then, I investigated the normality using plots and tests. As presented in the Table 31, the data I used for CFA were non-normal.

Table 31 Results for Different Normality Tests for CFA Data

| Normality Test | Test Statistics |
|---|---|
| Mardia | |
| Skewness | 21469.257* |
| Kurtosis | 2113.769* |
| Doornik-Hansen | (df= 84) 710.787* |

* $p$ value < .001

### Confirmatory Factor Analysis

Confirmatory factor analysis was performed based on the Final EFA model. Figure 3 shows the seven-factor base model that was tested, using Stata 16. This model has 7 factors and 34 items. The first item loading of each scale was fixed to 1. I used the Satorra–Bentler method as it is more appropriate considering the sample size (284) and nonnormality of the data; however, I also used Maximum Likelihood (ML) to compare the outcomes from different

methods. Table 32 includes ML and Satorra–Bentler $\chi 2$ values and fit indices for the CFA model as specified by the EFA. As presented in Table 32, the base model fit did not meet the criteria. Thus, this model did not produce good fit to the data. Tables 33 and 34 present standardized Parameter estimates for POWER Scale base model using Satorra–Bentler and ML methods respectively.

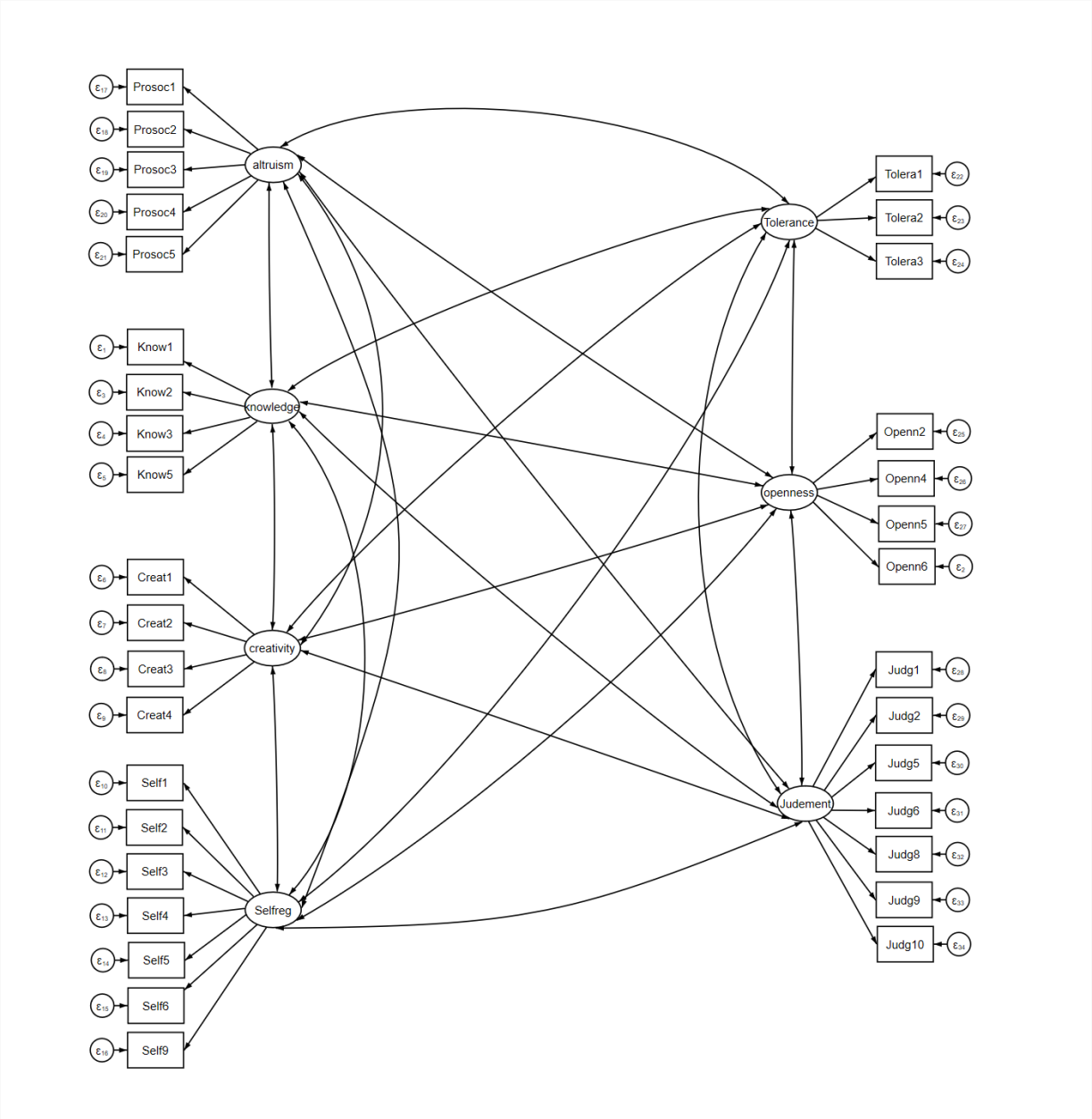


Figure 3 The Seven-Factor Base Model

Table 32 $\chi 2$ Values and Fit Indices for the CFA Model as Specified by the EFA

| Model Description | $\chi^2$ | df | $\chi^2$/df | CFI | TLI | RMSEA (95% CI) | RMSEA (95% CI) | SRMR |
|---|---|---|---|---|---|---|---|---|
| Seven-Factor Base Model Using ML | 1373.922* | 506 | 2.715 | .827 | .808 | 0.078 | 0.073-0.083 | .066 |
| Improved Seven-Factor Model Using Satorra–Bentler | 1156.310* | 506 | 2.285 | .844 | .878 | .067 | | .066 |

*$p$ value < .001

Table 33 Standardized Parameter Estimates for the Base Model Using Satorra-Bentler

| Item | Standardized Coef. | Satorra-Bentler Std. Err. | [95% Conf. Interval] | |
|---|---|---|---|---|
| Know1 | .59 | .04 | .50 | .67 |
| Know2 | .74 | .03 | .68 | .79 |
| Know3 | .77 | .03 | .72 | .83 |
| Know5 | .58 | .04 | .49 | .66 |
| Creat1 | .68 | .03 | .62 | .75 |
| Creat2 | .75 | .03 | .70 | .81 |
| Creat3 | .70 | .03 | .64 | .77 |
| Creat4 | .74 | .03 | .67 | .80 |
| Self1 | .68 | .03 | .62 | .74 |
| Self2 | .74 | .03 | .68 | .79 |
| Self3 | .65 | .04 | .57 | .72 |
| Self4 | .70 | .03 | .63 | .76 |
| Selfreg | .73 | .03 | .67 | .79 |
| Self6 | .57 | .04 | .49 | .65 |
| Self9 | .54 | .03 | .45 | .63 |
| Prosoc1 | .75 | .03 | .69 | .80 |
| Prosoc2 | .88 | .02 | .84 | .91 |
| Prosoc3 | .86 | .02 | .82 | .90 |
| Prosoc4 | .63 | .04 | .54 | .71 |
| Prosoc5 | .61 | .04 | .52 | .69 |
| Tolera1 | .75 | .03 | .68 | .81 |
| Tolera2 | .81 | .04 | .74 | .89 |
| Tolera3 | .72 | .04 | .65 | .79 |
| Openn2 | .69 | .03 | .62 | .76 |
| Openn4 | .77 | .03 | .70 | .83 |
| Openn5 | .77 | .03 | .72 | .82 |
| Openn6 | .81 | .02 | .76 | .86 |
| Judg1 | .65 | .03 | .59 | .71 |
| Judg2 | .66 | .03 | .61 | .72 |
| Judg5 | .72 | .03 | .65 | .78 |
| Judg6 | .73 | .03 | .68 | .79 |
| Judg8 | .71 | .03 | .65 | .76 |
| Judg9 | .77 | .02 | .72 | .82 |
| Judg10 | .83 | .02 | .79 | .87 |

Note. All estimates were significant at $p < .001$.

Table 34 Standardized Parameter Estimates for the Base Model Using ML

| Item | Standardized Coef. | ML Std. Err. | [95% Conf. Interval] | |
|---|---|---|---|---|
| Know1 | .58 | .05 | .49 | .68 |
| Know2 | .72 | .04 | .65 | .80 |
| Know3 | .78 | .03 | .71 | .84 |
| Know5 | .59 | .05 | .50 | .68 |
| Creat1 | .55 | .05 | .46 | .65 |
| Creat2 | .64 | .04 | .55 | .72 |
| Creat3 | .76 | .03 | .69 | .83 |
| Creat4 | .81 | .03 | .74 | .87 |
| Self1 | .61 | .04 | .52 | .70 |
| Self2 | .69 | .04 | .61 | .76 |
| Self3 | .65 | .04 | .57 | .73 |
| Self4 | .65 | .04 | .57 | .73 |
| Self5 | .70 | .04 | .63 | .77 |
| Self6 | .60 | .04 | .52 | .69 |
| Self9 | .55 | .05 | .46 | .65 |
| Prosoc1 | .77 | .03 | .71 | .83 |
| Prosoc2 | .87 | .03 | .81 | .93 |
| Prosoc3 | .83 | .03 | .76 | .89 |
| Prosoc4 | .59 | .05 | .49 | .68 |
| Prosoc5 | .55 | .05 | .46 | .65 |
| Toler1 | .75 | .04 | .68 | .82 |
| Toler2 | .81 | .03 | .75 | .88 |
| Toler3 | .72 | .04 | .64 | .79 |
| Openn2 | .69 | .04 | .62 | .76 |
| Openn4 | .76 | .03 | .70 | .82 |
| Openn5 | .77 | .03 | .71 | .83 |
| Openn6 | .81 | .03 | .76 | .86 |
| Judg1 | .62 | .04 | .55 | .70 |
| Judg2 | .63 | .04 | .56 | .71 |
| Judg5 | .72 | .03 | .66 | .78 |
| Judg6 | .73 | .03 | .67 | .80 |
| Judg8 | .72 | .03 | .65 | .78 |
| Judg9 | .78 | .03 | .72 | .83 |
| Judg10 | .84 | .02 | .80 | .88 |

Note. All estimates were significant at $p < .001$.

To improve the model fit, Modification Indices (MI) were considered. I systematically analyzed items with the largest MI to determine their effect on the model fit. MI estimates changes in χ2 if the parameter were freely estimated. The MI in the model suggested an error covariance term between: Prosoc4 and Prosoc5; Self1 and Self2; Creat1 and Creat2; Creat3 and Creat4; Self4 and Self5; Prosoc2 and Prosoc3; and Judg1 and Judg2 (see Table 35). All these items contain similar words or phrases. The modifications were made and as shown in Table 36, it improved the model $\chi^2$ and fit indices.

Table 35 Modification Indices

| Items | MI | EPC | standard EPC |
|---|---|---|---|
| Prosocial 4 and 5 | 161.14 | 0.32 | 0.82 |
| Self-Regulation 1 and 2 | 68.49 | 0.28 | 0.61 |
| Creativity 1 and 2 | 56.90 | 0.35 | 0.65 |
| Creativity 3 and 4 | 38.15 | 0.20 | 0.53 |
| Self-Regulation 4 and 5 | 34.67 | 0.14 | 0.43 |
| Prosocial 2 and 3 | 31.25 | 0.15 | 0.80 |
| Judgment 1 and 2 | 28.66 | 0.16 | 0.35 |

Table 36 χ2 Values and Fit Indices for the Improved Seven-Factor Model

| Model Description | $\chi^2$ | df | $\chi^2$/df | CFI | TLI | RMSEA | RMSEA (95% CI) | SRMR |
|---|---|---|---|---|---|---|---|---|
| Improved Seven-Factor Model Using ML | 985.541* | 499 | 1.975 | .903 | .891 | .059 | 0.054-0.064 | .06 |
| Improved Seven-Factor Model Using Satorra-Bentler | 832.586* | 499 | 1.668 | .920 | .910 | .049 | | .06 |

*$p$ value < .001.

Tables 37 and 38 present standardized parameter estimates for the improved model using Satorra–Bentler and ML methods respectively. The standardized path coefficients were greater than .50 and statistically significant at the $p < .001$ level.

Table 37 Standardized Parameter Estimates for the Improved Model Using Satorra-Bentler

| | | Satorra-Bentler | | |
|---|---|---|---|---|
| Item | Standardized Coef. | Std. Err. | [95% Conf. Interval] | |
| Know1 | .58 | .04 | .50 | .67 |
| Know2 | .73 | .03 | .68 | .79 |
| Know3 | .77 | .03 | .72 | .83 |
| Know5 | .58 | .04 | .50 | .66 |
| Creat1 | .61 | .04 | .52 | .69 |
| Creat2 | .69 | .04 | .62 | .77 |
| Creat3 | .67 | .04 | .58 | .75 |
| Creat4 | .71 | .05 | .62 | .81 |
| Self1 | .61 | .04 | .52 | .69 |
| Self2 | .68 | .04 | .61 | .76 |
| Self3 | .65 | .04 | .57 | .72 |
| Self4 | .65 | .04 | .57 | .73 |
| Self5 | .70 | .04 | .63 | .77 |
| Self6 | .61 | .04 | .53 | .69 |
| Self9 | .56 | .05 | .46 | .65 |
| Prosoc1 | .77 | .03 | .71 | .84 |
| Prosoc2 | .87 | .03 | .80 | .93 |
| Prosoc3 | .83 | .04 | .76 | .90 |
| Prosoc4 | .59 | .05 | .49 | .69 |
| Prosoc5 | .55 | .05 | .45 | .66 |
| Tolera1 | .75 | .03 | .68 | .81 |
| Tolera2 | .81 | .04 | .74 | .89 |
| Tolera3 | .72 | .04 | .65 | .79 |
| Openn6 | .81 | .02 | .76 | .86 |
| Openn2 | .69 | .04 | .62 | .76 |
| Openn4 | .76 | .03 | .70 | .83 |
| Openn5 | .77 | .03 | .72 | .82 |
| Judg1 | .62 | .04 | .55 | .70 |
| Judg2 | .63 | .03 | .57 | .70 |
| Judg5 | .72 | .03 | .65 | .78 |
| Judg6 | .73 | .03 | .68 | .79 |
| Judg8 | .72 | .03 | .66 | .77 |
| Judg9 | .78 | .02 | .73 | .82 |
| Judg10 | .84 | .02 | .80 | .88 |

Note. All estimates were significant at $p < .001$.

Table 38 Standardized Parameter Estimates for the Improved Model Using ML

| Item | Standardized Coef. | ML Std. Err. | [95% Conf. Interval] | |
|---|---|---|---|---|
| Know1 | .58 | .05 | .50 | .67 |
| Know2 | .73 | .04 | .66 | .80 |
| Know3 | .77 | .03 | .71 | .84 |
| Know5 | .58 | .05 | .49 | .67 |
| Creat1 | .61 | .05 | .51 | .71 |
| Creat2 | .69 | .05 | .60 | .78 |
| Creat3 | .67 | .05 | .60 | .76 |
| Creat4 | .71 | .05 | .62 | .80 |
| Self1 | .61 | .04 | .52 | .69 |
| Self2 | .68 | .04 | .61 | .76 |
| Self3 | .65 | .04 | .56 | .73 |
| Self4 | .65 | .04 | .56 | .73 |
| Self5 | .70 | .04 | .63 | .78 |
| Self6 | .61 | .04 | .52 | .69 |
| Self9 | .56 | .05 | .46 | .65 |
| Prosoc1 | .77 | .03 | .71 | .83 |
| Prosoc2 | .87 | .03 | .81 | .93 |
| Prosoc3 | .83 | .03 | .76 | .89 |
| Prosoc4 | .59 | .05 | .50 | .68 |
| Prosoc5 | .55 | .05 | .46 | .65 |
| Tolera1 | .75 | .04 | .68 | .82 |
| Tolera2 | .81 | .03 | .75 | .88 |
| Tolera3 | .72 | .04 | .64 | .79 |
| Openn6 | .81 | .03 | .76 | .86 |
| Openn2 | .69 | .04 | .62 | .76 |
| Openn4 | .76 | .03 | .70 | .82 |
| Openn5 | .77 | .03 | .71 | .83 |
| Judg1 | .62 | .04 | .54 | .70 |
| Judg2 | .63 | .04 | .56 | .71 |
| Judg5 | .72 | .03 | .65 | .78 |
| Judg6 | .73 | .03 | .67 | .80 |
| Judg8 | .72 | .03 | .65 | .78 |
| Judg9 | .78 | .03 | .72 | .83 |
| Judg10 | .84 | .02 | .80 | .88 |

Note. All estimates were significant at $p < .001$.

I also examined the correlations among the factors on the POWER Scale to find if there were any correlations of .85 or larger, which indicates poor discriminant validity (McCoach et al., 2013). As presented in Table 39, all the correlations among subscales were less than .85.

Cronbach's Alpha was calculated for data for each subscale of the POWER Scale to provide evidence that all the items in a subscale work together to measure the same construct (see Table 41). The alphas Alpha Reliability estimates of the data for the subscales ranged from .76 to .89 which exceeds McCoach et al. (2013) and Nunnally & Bernstein's (1994) suggested .70 for research in new stages.

Table 39 Correlations Among Subscales for the Confirmatory Factor Analysis

| Subscale | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1.Knowledge | 1.00 | .57 | .67 | .40 | .44 | .53 | .62 |
| 2. Creativity | | 1.00 | .55 | .48 | .35 | .47 | .51 |
| 3. Self-Regulation | | | 1.00 | .52 | .38 | .64 | .51 |
| 4. Moral Maturity | | | | 1.00 | .43 | .49 | .49 |
| 5. Tolerance | | | | | 1.00 | .52 | .55 |
| 6. Openness | | | | | | 1.00 | .57 |
| 7. Judgment | | | | | | | 1.00 |

Note. All estimates were significant at $p < .001$.

Table 40 Descriptive Statistics of Final Subscales for the Confirmatory Factor Analysis

| | | | | | Response percentage | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Item | Mean | Mean | Standard Deviation | Standard Deviation | 1 | 2 | 3 | 4 | 5 | 6 |
| Know1 | 4.79 | 4.87 | 0.97 | 0.92 | 0.0 | 1.4 | 8.5 | 26.1 | 37.7 | 26.4 |
| Know2 | 4.61 | | 0.94 | | 0.0 | 1.1 | 10.6 | 33.1 | 37.0 | 18.3 |
| Know3 | 4.83 | | 0.91 | | 0.0 | 0.7 | 6.7 | 26.8 | 40.5 | 25.4 |
| Know5 | 5.26 | | 0.86 | | 0.0 | 0.7 | 1.4 | 19.0 | 29.2 | 49.6 |
| Creat1 | 4.21 | 4.61 | 1.12 | 0.97 | 1.4 | 3.9 | 20.4 | 34.5 | 26.1 | 13.7 |
| Creat2 | 4.37 | | 1.02 | | 0.0 | 4.2 | 13.7 | 35.9 | 32.7 | 13.4 |
| Creat3 | 4.92 | | 0.88 | | 0.0 | 1.1 | 3.5 | 25.7 | 41.5 | 28.2 |
| Creat4 | 4.95 | | 0.88 | | 0.0 | 0.7 | 4.2 | 24.3 | 40.5 | 30.3 |
| Self1 | 5.05 | 5.11 | 0.96 | 0.89 | 0.0 | 1.1 | 6.0 | 19.7 | 33.8 | 39.4 |
| Self2 | 5.06 | | 0.97 | | 0.0 | 1.8 | 5.6 | 16.9 | 36.3 | 39.4 |
| Self3 | 5.13 | | 0.84 | | 0.0 | 0.0 | 3.2 | 20.1 | 37.0 | 39.8 |
| Self4 | 5.39 | | 0.80 | | 0.0 | 0.0 | 2.5 | 12.3 | 28.9 | 56.3 |
| Self5 | 5.25 | | 0.81 | | 0.0 | 0.0 | 2.8 | 14.4 | 37.7 | 45.1 |
| Self6 | 4.94 | | 0.91 | | 0.0 | 1.1 | 6.0 | 20.1 | 44.0 | 28.9 |
| Self9 | 4.93 | | 0.97 | | 0.0 | 2.1 | 4.6 | 24.6 | 35.9 | 32.7 |
| Prosoc1 | 5.06 | 5.21 | 1.03 | 0.87 | 0.0 | 2.1 | 7.0 | 16.2 | 32.4 | 42.3 |
| Prosoc2 | 5.19 | | 0.93 | | 0.0 | 1.1 | 4.6 | 14.8 | 33.1 | 46.5 |
| Prosoc3 | 5.34 | | 0.82 | | 0.0 | 0.7 | 1.4 | 13.7 | 31.7 | 52.5 |
| Prosoc4 | 5.33 | | 0.83 | | 0.0 | 0.7 | 2.5 | 11.3 | 33.8 | 51.8 |
| Prosoc5 | 5.45 | | 0.76 | | 0.0 | 0.0 | 2.5 | 8.8 | 30.3 | 58.5 |
| Tolera1 | 4.51 | 4.57 | 1.08 | 1.12 | 1.1 | 1.4 | 13.4 | 35.2 | 27.5 | 21.5 |
| Tolera2 | 4.56 | | 1.21 | | 1.4 | 5.6 | 10.6 | 25.0 | 32.4 | 25.0 |
| Tolera3 | 4.66 | | 1.08 | | 0.0 | 2.5 | 12.7 | 27.8 | 30.3 | 26.8 |
| Openn2 | 5.05 | 5.11 | 0.95 | 0.92 | 0.0 | 0.0 | 6.7 | 22.5 | 29.9 | 40.8 |
| Openn4 | 5.04 | | 0.93 | | 0.0 | 1.1 | 4.6 | 21.5 | 35.2 | 37.7 |
| Openn5 | 5.33 | | 0.83 | | 0.0 | 0.0 | 3.5 | 12.7 | 31.3 | 52.5 |
| Openn6 | 5.04 | | 0.95 | | 0.4 | 0.7 | 6.0 | 17.3 | 38.7 | 37.0 |
| Judg1 | 4.83 | 4.90 | 0.93 | 0.91 | 0.0 | 0.7 | 7.0 | 27.8 | 37.7 | 26.8 |
| Judg2 | 5.08 | | 0.89 | | 0.0 | 0.4 | 3.5 | 22.9 | 34.5 | 38.7 |
| Judg5 | 4.91 | | 0.91 | | 0.0 | 0.4 | 6.3 | 24.6 | 39.1 | 29.6 |
| Judg6 | 4.85 | | 0.89 | | 0.0 | 0.7 | 5.3 | 28.2 | 40.1 | 25.7 |
| Judg8 | 4.83 | | 0.94 | | 0.0 | 1.4 | 7.0 | 24.6 | 41.2 | 25.7 |
| Judg9 | 4.95 | | 0.90 | | 0.0 | 0.4 | 6.7 | 20.8 | 41.9 | 30.3 |
| Judg10 | 4.87 | | 0.89 | | 0.0 | 0.4 | 5.3 | 28.9 | 37.7 | 27.8 |

*n* =284

Table 41 Reliability Analysis of Final Subscales for the Confirmatory Factor Analysis

| Item | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted | Cronbach Alpha | Average Interitem Correlation |
|---|---|---|---|---|
| Know1 | .51 | .72 | .76 | .37 |
| Know2 | .62 | .66 | | |
| Know3 | .64 | .65 | | |
| Know5 | .45 | .75 | | |
| Creat1 | .61 | .77 | .80 | .48 |
| Creat2 | .68 | .72 | | |
| Creat3 | .59 | .77 | | |
| Creat4 | .62 | .76 | | |
| Self1 | .62 | .81 | .84 | .34 |
| Self2 | .68 | .80 | | |
| Self3 | .55 | .82 | | |
| Self4 | .64 | .81 | | |
| Self5 | .67 | .80 | | |
| Self6 | .50 | .83 | | |
| Self9 | .48 | .83 | | |
| Prosoc1 | .66 | .84 | .86 | .42 |
| Prosoc2 | .75 | .82 | | |
| Prosoc3 | .75 | .82 | | |
| Prosoc4 | .65 | .84 | | |
| Prosoc5 | .62 | .85 | | |
| Tolera1 | .62 | .75 | .80 | .72 |
| Tolera2 | .71 | .65 | | |
| Tolera3 | .60 | .77 | | |
| Openn2 | .62 | .83 | .85 | .48 |
| Openn4 | .70 | .79 | | |
| Openn5 | .68 | .80 | | |
| Openn6 | .72 | .78 | | |
| Judg1 | .62 | .88 | .89 | .43 |
| Judg2 | .63 | .87 | | |
| Judg5 | .68 | .87 | | |
| Judg6 | .68 | .87 | | |
| Judg8 | .64 | .87 | | |
| Judg9 | .71 | .86 | | |
| Judg10 | .77 | .86 | | |

## Chapter Summary

The primary goal of this study was to design an instrument that would measure teachers' implicit beliefs about wisdom based on the PMW Model. After establishing the content validity of the POWER Scale, I investigated the construct validity and reliability evidence of the scale. Using EFA, the ULS extraction method, and Equamax rotation, I investigated the factorial structure of the scale. The items fit a seven-factor extraction, producing seven subscales with items loading on the intended factor and only on the intended factor, indicating the unidimensionality of the items. Each subscale had good reliability and inter-item correlations without being too highly correlated. Figure 4 shows the final model when tested through CFA, which yielded a good model fit.

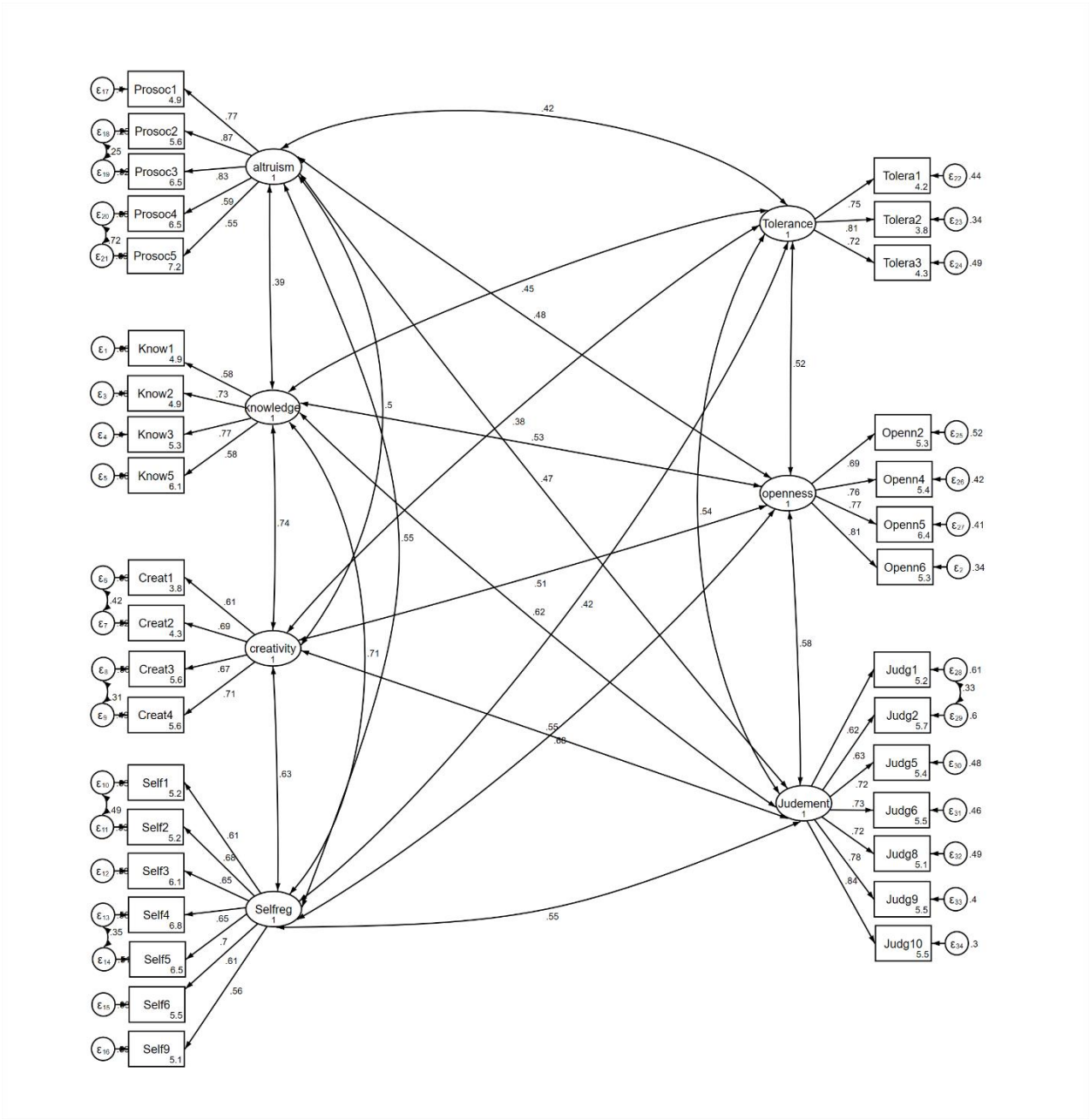


Figure 4 The Seven-Factor Improved Model

# CHAPTER 5: DISCUSSION

For this dissertation study, I developed and validated the Perception of Wisdom Exploratory Rating (POWER) Scale based on the Polyhedron Model of Wisdom (Karami et al., in press), developed in my previous work. Through EFA and CFA, I found evidence to support the internal structure of the POWER Scale. This result supported the idea that there were seven distinct, latent factors that were addressed by POWER Scale items. This seven-factor model was then further evaluated using CFA methods, which further supported the seven-factor model with 34 items. This project is a natural progression of my research and my desire to promote teaching wisdom in educational settings.

I used the PMW Model as a framework in this study. Building scales advances theory development as it contributes to understanding the concepts, constructs, and the relationships among them (Shoemaker et al., 2011). Theoretical model development is an ongoing process. The model is constantly revised as new knowledge is discovered through research (Alvesson & Karreman, 2011). Hence, this study provided empirical evidence for PMW model. During POWER Scale development, I observed and explained relationships between components. Findings of this study challenged the PMW Model and made me rethink and illustrate some components of theory (Alvesson & Karreman, 2011). I made revisions to the instrument and its operational definitions based on the results of the study. Some overlap existed in operational definitions. For example, during the EFA, I reduced the overlaps between knowledge management and sound judgment. Knowledge item 4 ‘Synthesizing knowledge from opposing points of view’ also loaded on sound judgment and I decided that considering contrary points of view is related to sound judgment. I defined each component more specifically and eliminated the overlaps. However, this was initial step and like other theories, I will continue to improve the

model through further research. This is very important as there are many theoretical models of wisdom, and most of them have not been tested. “Theoretical [wisdom] models need to be translated into functional terms and models have to be tested.” (Ardelt, 2020, p.14). In this chapter, I discussed implications for students, teachers, and researchers. Finally, limitations of this study and future directions of this ongoing project are discussed.

## Implications

Since the possibility for developing wisdom in the classroom exists, the factors that influence teachers’ commitment to students’ wisdom development become important to understand. Teachers’ perceptions are important and integral to the efficacy of learning programs (Bandura, 1986; Pajares, 1992; Stronge et al. 2007). Designing and implementing successful teachers’ professional development program plays a central role in achieving the desired reform in education (Jegede et al., 2000). Hence, in order to prepare and enable teachers to integrate wisdom in their classrooms, teachers’ existing knowledge, beliefs and attitudes should be studied. In fact, many reform efforts in the past have been ineffective because they failed to take teachers’ existing knowledge, beliefs and attitudes into consideration (Van Driel et al., 2001). There have been attempts to foster wisdom (e.g. Bassett, 2011; Norman, 1996; Sternberg, 2004). Some researchers have even developed and implemented wisdom curricula in the classroom (Ardelt, 2020; Bruya & Ardelt, 2018; DeMichelis et al., 2015; Sharma & Dewangan, 2017). Yet, teachers’ implicit beliefs of wisdom have not been investigated (Karami et al., in press). To our knowledge, there is no professional-development program for teachers that addresses wisdom development. The POWER Scale can help provide insights into the prerequisites for professional development programs that can help teacher foster wisdom in classroom. The POWER scale

provides educational researchers, teacher preparation faculty, and professional development specialists the ability to quantitatively explore teachers' perceptional changes related to wisdom.

Fostering wise reasoning in students prepares them to face daily challenges in their life, current and future. Challenges such as a conflict with their friends, parents, partners, teachers, and colleague at work. Wise people combine knowledge, self-regulation, creative thinking, sound judgment, openness and tolerance, and moral maturity and altruism into dynamic balance and translate it into the best practice and best solution needed in a given context (Karami et al., in press). Studies have shown that people from Western cultures have trouble reasoning wisely about their personal issues (Epley & Caruso, 2008). However, the ability to reason wisely in challenging personal issues promotes the well-being of individuals (Grossmann et al., 2013).

The world is facing countless problems. In Chapters 1 and 2, I discussed how lack of wisdom has played a role during the COVID-19 crisis. Media and major world leaders have labeled COVID-19 the greatest challenge of the 21$^{st}$ century (Kamineni, 2019; Roberts, 2020; Sheshabalaya, 2020). With anticipated greater consequences than the Second World War, the current crisis defies the ability to act collaboratively, efficiently and ethically, in the face of a global pandemic. There is no certainty as to what the future holds for human race. With the uncertainty of when the crisis will be over, the outcomes seem bleak, adding the threat of economic recession and climate change around the corner. However, at a time when foolishness and selfishness abound, hope cannot be lost. It is important to teach the current and next generations "to wisely make very difficult decisions involving ethical considerations where the answers are anything but clear cut" (Sternberg, 2012b, p. 324). Wisdom provides hope for progress in harmony with nature and others. An educated world that seeks wisdom should be able to persist and succeed in generating virtuous actions to meet unsettling eventualities such as

COVID-19. The world needs wise people and wise leaders, COVID-19 is a problem, a crisis, but it is also an opportunity to learn and reflect on human race influences on nature and society. Hence, evidence-based practices for K-16 should involve teaching students how to make wise decisions (Sternberg, 2017). The contribution of the POWER Scale is one step toward understanding teachers' perceptions of Wisdom. These perceptions can then be understood and used to design professional developments programs for teachers. It can also be used to evaluate and improve the designed programs. Teachers' commitment to promote wisdom in the classroom is one of the most important factors of its success (Tsui & Cheng, 1999).

## Limitations

Developing an instrument is an ongoing process. This is the first step of development and validation of *POWER Scale*. The scale will be revised and tested based on the result of this study. The main limitation of this study was splitting the data set in two randomly selected sub-samples. Despite being common practice in validation studies across different fields, it is not without problem. I collected the data at the same time because of time limits. Hence, I did not have a chance to modify the instrument before conducting the CFA. Had I been able to make these modifications, the CFA results might have differed (DeVellis, 2017). For example, tolerance and openness were the most problematic components. Two questions from each factor loaded on both factors. There might be two possible explanations for theses cross-loadings. It is possible that the way I presented these questions have confused the participants. In addition to presenting them in one box, I used similar wordings in tolerance for ambiguity question 'Having tolerance for unexpected events' and openness question 'Having tolerance for beliefs and actions that are unfamiliar.' Had conducted CFA after modifications, I would have added 2 or 3 questions to tolerance subscale. Self-regulation is another subscale that would have been

modified before CFA, if I had been able to. The question 'focusing their attention on what's most important at the time' was referring to setting goals. However, it was not clear enough. I would need to add 2-3 questions regarding setting goals in the next study. Hence, it is very important to study again with the trimmed scale (with a few items added to the smaller scales).

I had restriction of range in the responses and the data were negatively skewed. This means that teachers did not use the full 6-point scale. There are two possible explanations for the skewness and kurtosis of my data. First, one of the limitations of this study is using the convenience sampling. The teachers who decided to donate their time to this research project may have been a self-selecting group who truly valued wisdom; teachers who were uninterested or who did not value wisdom may not volunteer to complete the survey. An additional possibility is that teachers responded in a socially expected manner. In other words, teachers may have given socially desirable responses instead of choosing responses that were reflective of their true beliefs. Either of these conditions would result in negatively skewed responses.

It is possible that item blocking of the scale influenced the responses. However, item blocking was necessary to this study. As discussed in Chapter 3, according to the participants in the cognitive interview intermixing the items was extremely confusing and distracting. Although it has been suggested to randomize the items from different categories to reduce the occurrence of possible response biases (Tourangeau & Rasinski 1988), Sparfeldt et al. (2006) found that there is little or no effect of item blocking on the factorial structure, the psychometric properties, and the scale means. Moreover, item blocking also improves the respondents' attention and motivation (Schriesheim et al., 1989; Solomon & Kopelman, 1984). Maintaining respondents' attention and motivation was important due to the large number of questions on the instrument.

I conducted cognitive interviews for in-service teachers; however, I did not do this with preservice teachers. Thus, I could not establish if there were different understandings of the items between the two groups in the sample. Hence, personal interpretation could be an explanation for some of the constructs with large variation. I will conduct cognitive assessments in future studies.

Another limitation was that the preservice participants of this study were Purdue College of Education undergraduate students, thus they did not represent other undergraduate teacher-education students. The potential disadvantage of using Purdue undergraduates in this research was that Purdue maintained its 50 ranking among the nation's in Best Education Schools, according to U.S. News (2020). In next study, I will include preservice teachers from other universities, programs, and

## Future Directions

The POWER Scale aims to explore teachers' implicit beliefs about wisdom that affect their ability to teach wisdom in their classrooms. I will modify the POWER Scale based on the results of this study and then perform CFA to evaluate the model. As discussed in this chapter, I will add few items to the smaller scales. After finalizing the Scale, I will use POWER Scale in a mixed method study, incorporating in-depth interviews to investigate teachers' implicit beliefs of wisdom in different cultures and contexts. Outcomes from the results will enable cross-cultural comparison of wisdom and identification of barriers to promoting wisdom instruction. Teaching and cultivating wisdom in educational settings can be accomplished, but teachers' attitudes toward such an endeavor are critical, as one of the determining factors affecting the efficacy of a learning program is teachers' perceptions. A need exists for development of empirically grounded interventions aiming to promote wisdom-related processes in schools, work settings,

and daily life (Grossmann, 2017). Based on my previous research, I will design and validate interventions that promote wisdom in classroom. I will also design online and face-to-face workshops for in-service and preservice teachers to address the misconceptions of wisdom and ways of promoting it in their classrooms. Finally, I will validate the POWER Scale with specific populations such as higher education professors, policy makers, and educators in various contexts to explore their implicit beliefs of wisdom and addressing their misconceptions. By identifying the importance of wisdom in relation to these groups, perhaps wisdom instruction in schools, colleges, and society at large can be achieved and the world will benefit from its practice in every facet of society.

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# APPENDIX A: SCALE INSTRUCTION

## INSTRUCTION

We are asking you to help us understand how you define **wisdom and what characteristics are necessary for a person to be considered wise**.

This survey **IS NOT** asking if you consider yourself a wise person, but based on your own understanding of wisdom, please rate the importance of each item that characterizes wisdom.

You have these options:
Essential; Very important; Important; Moderately important; Not very important; Unimportant.

Please read each item separately and indicate your rating by selecting one choice from these 6 options.

**For Example:**
If you consider that acquiring knowledge is very important for a person to be considered wise, you would respond:

Acquiring knowledge-> Very important.

## APPENDIX B: CONTENT VALIDITY INSTRUCTION

An important phase in the development of any instrument is that of content validation. By offering your expertise, you are contributing to the development of an instrument that is content valid. Your assistance in this phase of instrument development is sincerely appreciated. Thanks in advance for your time and help.

Instructions:
Each of the following items is being considered for inclusion in Perception of Wisdom Exploratory Rating Scale (POWER Scale): An Instrument to Examine Teachers' Perception of Wisdom. You will be providing three ratings for each item. The conceptual definitions of the constructs these items are supposed to reflect are written in each page.
Please indicate how relevant you believe each item is to the construct.

1 Completely Irrelevant
2 Somewhat Relevant
3 Highly Relevant

Please feel free to add any additional thoughts or comments below.
Do the items appear to cover the full range of content within each construct?
Do you have any suggestions for improving content coverage?
Do you have any suggestions for items that you would add?

# VITA


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**EDUCATION**

**Purdue University**, West Lafayette, IN, USA — 2020
Ph.D., Educational Psychology; Gifted, Creative, and Talented Studies
Advisor: Dr. Marcia Gentry
Dissertation Project: Development and Validation of Perception of Wisdom Exploratory Rating Scale (POWER Scale): An Instrument to Examine Teachers' Perception of Wisdom

**University of British Columbia**, British Columbia, Canada — 2013
M.A., Teaching and Learning
Advisor: Dr. Lynn Bosetti

**University of Tehran,** Tehran, Iran — 2008
M.A., Psychology
Advisor: M. A. Besharat

**University of Tehran,** Tehran, Iran — 2005
B.A., Clinical Psychology
Advisor: M. A. Besharat

**National Organization for Development of Exceptional Talents,** Tehran, Iran — 2001
Diploma, Experimental Sciences

**CERTIFICATE**

**Quantitative Research, Assessment, and Evaluation in Education Certificate,** — 2020
College of Education, Purdue University

**Qualitative Research Certificate,** — 2020
College of Education, Purdue University

**ACADEMIC APPOINTMENTS**

**Head Teaching Assistant** 2017-present
Purdue University, West Lafayette, IN
EDPS 235: Learning and Motivation

- Coordinating other Teaching Assistants
- Developing the syllabus
- Responsible for Blackboard Database Management
- Teaching Classes
- Communicating with Students
- Grading Students

2015-2019

**Residential Summer Camp Administrative Assistant,**
Gifted Education Research and Recourse Institute, Summer Residential Youth Program,
Purdue University, West Lafayette, IN 2015-2017

**Certificate and Licensure Program Coordinator**
Gifted Education Research & Resource Institute
Purdue University, West Lafayette, IN

- Coordinating application process 2014-2016
- Managing Blackboard Database
- Contributing to revision of the courses' Syllabi

**Assistant Coordinator of GERI's Summer Residential Program** 2014-2015
Gifted Education Research & Resource Institute
Purdue University, West Lafayette, IN

**Teaching Assistant**
Purdue University, West Lafayette, IN
EDPS 235: Learning and Motivation

**K-12 EDUCATION APPOINTMENTS**

**Head of Research and Extra-curricular Programs Department,** 2005-2010
Iranian Gifted School, National Organization for Development of Exceptional Talents (NODET), Tehran, Iran

**Coordinator of Scientific Competition,** Chief Examiner, and Marker of Students' Project in Psychology, National Organization for Development of Exceptional Talents (NODET), Iran — 2006-2010

- Duties included inventing long-term project-based competitions, examining students' projects, assigning examiners, analyzing examiners' decisions.

**Teacher of Creative writing,** Iranian Gifted School, National Organization for Development of Exceptional Talents (NODET), Tehran, Iran. — 2000-2010

**Chief Editor of Gifted Middle School internal bulletin**, Iranian Gifted School, National Organization for Development of Exceptional Talents (NODET), Tehran, Iran. — 2005-2010

## REFEREED PUBLICATIONS

### Journal Publications

Sternberg, R. J. & **Karami, S**., (In review). A Unified Model of Wisdom and Giftedness in Wisdom.

**Karami, S.,** & Parra-Martinez, F (In press). Foolishness of Covid-19: Applying the Polyhedron Model of Wisdom to Understand People Behaviors in Time of Crisis. *Roeper Review*.

**Karami, S.**, Ghahremani, M., Parra-Martinez, F., & Gentry, M., (In press). A polyhedron model of wisdom: A systematic review of the wisdom studies in three different disciplines. *Roeper Review*.

Gentry. M, Desmet. O, **Karami, S.,** Lee, H., Green, C., Sharp, A., Chowkase, A., & Gray, A. (In review). Terman's Enduring Legacy: IQ Testing, High Stakes Decisions, and Inequity in Gifted Education. (Equal contributions)

Lee, H., Karakis, N., Tuzgen, A., Akce, B., & **Karami, S**., (In review). Evaluating the effects of Naglieri Nonverbal Ability

Test (NNAT) as a measure of equitably identifying gifted students and its validity outcome with other measures.

Rubenstein, L. D., Ridgley, L. M., Callan, G. L., **Karami, S.**, & Ehlinger, J. (2018). How teachers perceive factors that influence creativity development: Applying a Social Cognitive Theory perspective. *Teaching and Teacher Education, 70,* 100-110.

Ghahremani, M., **Karami, S.**, & Balcaen, P., (2017). Pentagram of habits: Considering science teachers' conceptions of "habits of mind" associated with critical thinking in several of Iran's special gifted schools. *Gifted and Talented International,* 32(1), 3-26. DOI: 10.1080/15332276.2017.1397901

**Karami, S.**, & Ghahremani, M., (2017). Elaboration on the culturally informed Iranian hierarchical wisdom model: Comparison with Sternberg's ACCEL model. *Roeper Review,* 39(4), 234-238. DOI: 10.1080/02783193.2017.1362679

**Karami, S.**, & Ghahremani, M., (2016) Towards an Iranian conception of giftedness. *Gifted and Talented International,* 31(1), 4-18. DOI: 10.1080/15332276.2016.1194674

**Books**

**Karami, S.** & Ghahremani, M., (Accepted). Comparison of Iranian Hierarchical Model of Wisdom and Western Conception through Polyhedron Model of Wisdom. In *International handbook of adult development and wisdom*. Oxford University Press.

Sternberg, R. J. & **Karami, S**., (in preparation). Psychological theories of wisdom. In R. J. Sternberg & J. & Glueck, (Eds.). *Wisdom: An introduction*. Cambridge University Press.

Sternberg, R. J., Ambrose, D. & **Karami, S**., (Eds.) (in preparation). *Transformational Giftedness: Identifying and Developing Gifted Children Who Will Make the World a Better Place*. Palgrave Macmillan.

**Karami, S.** & Ghahremani, M., (in preparation). Starting Over: An Iranian Conception of Giftedness and How It Can Transform Societies and the World. In R. J. Sternberg, D. Ambrose, & S. **Karami,** (Eds.). *Transformational Giftedness:*

*Identifying and Developing Gifted Children Who Will Make the World a Better Place. Palgrave Macmillan.*

### Journal Publications (In Development)

Sternberg, R. J. & **Karami, S**., (In progress). What is wisdom? A Unified Model of Wisdom.

**Karami, S.**, (In progress). Strategies to promote wisdom: A systematic review.

**Karami, S.**, Green, C., & Parra-Martinez, F., (In progress). Uncovering preservice teachers' strategies to enhance creativity and motivation in the classroom.

Parra-Martinez, F., **Karami, S.**, & Green, C., (In progress). Understanding preservice teachers' beliefs of creativity and underachievement.

Desmet, O., Ghahremani, M., **Karami, S.**, (In progress). Fostering creativity in k-8 enrichment.

## PRESENTATIONS

### National and International Presentations

Green, C., Parra-Martinez, F., & **Karami, S.**, Froiland, J., (2020, April). Preservice teacher perceptions of creative, underachieving students. Session will be presented American Educational Research Association (AERA), San Francisco, CA.

Parra-Martinez, F., Green, C., & **Karami, S.**, (2019, August). Uncovering Preservice Teacher Beliefs Regarding Underachievement, Motivation and Giftedness. Session presented at American Psychological Association (APA), Chicago, IL.

**Karami, S.**, & Ghahremani, M., (2019, Jun). Wisdom: Taking giftedness forward in the 21st century. Session presented at World Council for Gifted and Talented Children, Nashville, TN.

Ghahremani, M., & **Karami, S.**, (2018, November). Critical/creative thinking: Applying Sternberg's Theory of Mental Self-government. Session presented at the Research & Evaluation Network, 65th Annual Convention of the National Association for Gifted Children, Minneapolis, MN.

**Karami, S.**, & Ghahremani, M., (2018, November). An octahedron model of wisdom: What is wisdom? Poster presented at the 65th Annual Convention of the National Association for Gifted Children, Minneapolis, MN.

**Karami, S.**, & Ghahremani, M., (2018, November). Why isn't wisdom more important in educational settings? Poster presented at the 65th Annual Convention of the National Association for Gifted Children, Minneapolis, MN.

**Karami, S.**, (2017, November). Why isn't wisdom more important to educational settings? Poster presented at the 64th Annual Convention of the National Association for Gifted Children, Graduate Students Research Gala, Research and Evaluation Network, Charlotte, NC.

Ghahremani, M., & **Karami, S.**, (2017, November) Building mechanical mechanisms to create semi-2D rube Goldberg machines: A proposed curriculum. Session presented at the 64th Annual Convention of the National Association for Gifted Children, Charlotte, NC.

Ghahremani, M., & **Karami, S.**, (2016, November). Experts' attitudes regarding "critical versus creative" thinking tension. Poster presented at the 63nd Annual Convention of the National Association for Gifted Children, Graduate Students Research Gala, Research and Evaluation Network, Orlando, FL.

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**Karami, S.**, & Ghahremani, M., (2016, April) Towards an Iranian conception of giftedness. Poster presented at the Annual meeting of American Educational Research Association (AERA), Washington, DC.

**Karami, S.**, (2015, November). Towards an Iranian conception of giftedness. Poster presented at the graduate student research gala of annual meeting of the National Association for Gifted Children, Phoenix, AZ.

**Other Presentations**

Ghahremani, M., & **Karami, S.**, (2019, January). Group-level variables in collaborative design-thinking: Applying an IPO model. Session presented at Indiana STEM Conference, Purdue University, West Lafayette, IN.

**Karami, S.**, (2018, May). An octahedron model of wisdom: A systematic review of the wisdom studies in three different disciplines. Poster presented at the Office of Interdisciplinary Graduate Programs (OIGP) Spring Reception, Purdue University, West Lafayette, IN.

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**PROFESSIONAL DEVELOPMENT & WORKSHOP SESSIONS**

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How to Promote Creative Problem Solving at Home (2019, February 15th), Parent education workshop, presented at 2019 Gifted Education Research and Resource Institute Super Saturday, Purdue University, West Lafayette, IN.

Design Mode: Developing Curriculum Materials to Support Students' STEM Interests (2018, February), Session presented at STEM Professional Development for Middle and High School High Ability Teachers, Tippecanoe School Corporation, IN.

**HONORS**

| | |
|---|---|
| The Carolyn Callahan NAGC Doctoral Student Award, National Association for Gifted Children (NAGC) | 2019<br>2018 |
| Certificate of Award, Completed Research at the Doctoral Level, Graduate Students Research Gala, National Association for Gifted Children (NAGC), Research and Evaluation Network (Third Place) | 2018 |
| The Feldhusen Doctoral Student Fellowship Award in Education for 2018-2019, College of Education ($2000), Purdue University, IN | 2015 |
| Certificate of Award, Completed Research at the Non-Doctoral Level, Graduate Students Research Gala, National Association for Gifted Children (NAGC), Research and Evaluation Network (Second Place) | 2012<br>2012 |

University Graduate Fellowship ($3000), University of British Columbia

International Partial Tuition Award ($3500), University of British Columbia

**GRANTS**

Dinosaur Station at Imagination Station- Learning Projects Grant ($1500) Office of Engagement, Purdue University, West Lafayette, IN — 2019

Aerospace Station at Imagination Station- Learning Projects Grant ($1500) Office of Engagement, Purdue University, West Lafayette, IN — 2018

Gifted Education Research & Resource Institute (GER2I) Graduate Student Travel Award ($4750), Purdue University — 2014-2019

College of Education Graduate Student Travel Award ($2000), Purdue University — 2015-2019

Summer Graduate Student Research Grant ($3000) College of Education, Purdue University, West Lafayette, IN — 2018

**SERVICE**

**Committee work**

College of Education Undergraduate Research Committee Member Purdue University, West Lafayette, IN — 2019-present

Education Committee Member at Imagination Station (Local Science Centre) Lafayette, IN (http://www.imagination-station.org/) — 2018-present

Member of the award committee for the Gifted Education Research & Resource Institute (GER2I) Sidney Marsh Moon Teacher Award for outstanding teaching — 2018-present

in GERI's youth programs, Summer Residential Youth Program
Purdue University, West Lafayette, IN 2018-2019

Mentor at College of Education's Peer Mentoring Program
Purdue University, West Lafayette, IN 2012-2013

Graduate students' representative on Faculty of Education
University of British Columbia, Canada

**Editorial/Reviewer**

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| Gifted Child Quarterly | 2020 – present |
| AERA annual conference proposal submissions | 2018 – present |
| Gifted and Talented International | 2018 – present |
| Journal of Advanced Academics | 2015 – present |
| NAGC annual conference proposal submissions | |

**Judging**

Judge for the College of Education posters at the Undergraduate Research Conference,
Purdue University, West Lafayette, IN 2019

Examiner of prospective students for the Iranian gifted middle and high school, National Organization for Development of Exceptional Talents (NODET),
Tehran, Iran 2006-2010

Chief Examiner and Judge for Students' Project in Psychology, National Organization for Development of Exceptional Talents (NODET),
Tehran, Iran 2006-2010

**Membership in Academic, Professional, and Scholarly Societies**

American Educational Research Association (AERA) 2012 – present

| | |
|---|---|
| Division D: Measurement and Research Methodology<br>Division H: Research, Evaluation, and Assessment in Schools SIG: Research on Giftedness, Creativity, and Talent<br>Division K: Teaching and Teacher Education | 2012 – present |
| National Association for Gifted Children (NAGC) | 2012 – present |
| Creativity | 2018-present |
| Research and Evaluation | |
| Computer and Technology | |
| The Foundation for Critical Thinking | |
| World Council for Gifted and Talented Children (WCGTC) | |

**Volunteering**

| | |
|---|---|
| Arranged fundraising at UBC for recent earthquake in Tabriz-Iran | 2012 |
| Instituted a non-profit group in Farzanegan middle school in order to support students who live and study in conditions of extreme poverty | 2005 |


**CONTACT INFORMATION**

100 N. University Ave,
West Lafayette, IN 47906

Email:skarami@Purdue.edu
Phone: (+1) 765-491-8861


**EDUCATION**

**Purdue University**, West Lafayette, IN, USA — 2020
Ph.D., Educational Psychology; Gifted, Creative, and Talented Studies
Advisor: Dr. Marcia Gentry
Dissertation Project: Development and Validation of Perception of Wisdom Exploratory Rating Scale (POWER Scale): An Instrument to Examine Teachers' Perception of Wisdom

| | | |
|---|---|---|
| | **University of British Columbia**, British Columbia, Canada<br>M.A., Teaching and Learning<br>Advisor: Dr. Lynn Bosetti | 2013 |
| | **University of Tehran,** Tehran, Iran<br>M.A., Psychology<br>Advisor: M. A. Besharat | 2008 |
| | **University of Tehran,** Tehran, Iran<br>B.A., Clinical Psychology<br>Advisor: M. A. Besharat | 2005 |
| | **National Organization for Development of Exceptional Talents,** Tehran, Iran<br>Diploma, Experimental Sciences | 2001 |
| **CERTIFICATE** | **Quantitative Research, Assessment, and Evaluation in Education Certificate,**<br>College of Education, Purdue University | 2020 |
| | **Qualitative Research Certificate,**<br>College of Education, Purdue University | 2020 |
| **ACADEMIC APPOINTMENTS** | **Head Teaching Assistant**<br>Purdue University, West Lafayette, IN<br>EDPS 235: Learning and Motivation<br>• Coordinating other Teaching Assistants<br>• Developing the syllabus<br>• Responsible for Blackboard Database Management<br>• Teaching Classes<br>• Communicating with Students<br>• Grading Students | 2017-present |
| | **Residential Summer Camp Administrative Assistant,**<br>Gifted Education Research and Recourse Institute, Summer Residential Youth Program,<br>Purdue University, West Lafayette, IN | 2015-2019<br>2015-2017 |
| | **Certificate and Licensure Program Coordinator** | |

Gifted Education Research & Resource Institute
Purdue University, West Lafayette, IN

- Coordinating application process
- Managing Blackboard Database
- Contributing to revision of the courses' Syllabi

2014-2016

**Assistant Coordinator of GERI's Summer Residential Program** 2014-2015
Gifted Education Research & Resource Institute
Purdue University, West Lafayette, IN

**Teaching Assistant**
Purdue University, West Lafayette, IN
EDPS 235: Learning and Motivation

## K-12 EDUCATION APPOINTMENTS

**Head of Research and Extra-curricular Programs Department,** 2005-2010
Iranian Gifted School, National Organization for Development of Exceptional Talents (NODET), Tehran, Iran

**Coordinator of Scientific Competition,** 2006-2010
Chief Examiner, and Marker of Students' Project in Psychology, National Organization for Development of Exceptional Talents (NODET), Iran

- Duties included inventing long-term project-based competitions, examining students' projects, assigning examiners, analyzing examiners' decisions.

**Teacher of Creative writing,** Iranian Gifted School, National Organization for Development of Exceptional Talents (NODET), Tehran, Iran. 2000-2010

**Chief Editor of Gifted Middle School internal bulletin**, Iranian Gifted School, National Organization for Development of Exceptional Talents (NODET), Tehran, Iran. 2005-2010

## REFEREED PUBLICATIONS

### Journal Publications

**Karami, S.,** & Parra-Martinez, F (In review). Foolishness of Covid-19: Applying the Polyhedron Model of Wisdom to Understand People Behaviors in Time of Crisis.

**Karami, S.**, Ghahremani, M., Parra-Martinez, F., & Gentry, M., (In press). A polyhedron model of wisdom: A systematic review of the wisdom studies in three different disciplines. *Roeper Review*.

Gentry. M, Desmet. O, **Karami, S.,** Lee, H., Green, C., Sharp, A., Chowkase, A., & Gray, A. (In review). Terman's Enduring Legacy: IQ Testing, High Stakes Decisions, and Inequity in Gifted Education. (Equal contributions)

Lee, H., Karakis, N., Tuzgen, A., Akce, B., & **Karami, S**., (In review). Evaluating the effects of Naglieri Nonverbal Ability Test (NNAT) as a measure of equitably identifying gifted students and its validity outcome with other measures.

Rubenstein, L. D., Ridgley, L. M., Callan, G. L., **Karami, S.**, & Ehlinger, J. (2018). How teachers perceive factors that influence creativity development: Applying a Social Cognitive Theory perspective. *Teaching and Teacher Education, 70,* 100-110.

Ghahremani, M., **Karami, S.**, & Balcaen, P., (2017). Pentagram of habits: Considering science teachers' conceptions of "habits of mind" associated with critical thinking in several of Iran's special gifted schools. *Gifted and Talented International,* 32(1), 3-26. DOI: 10.1080/15332276.2017.1397901

**Karami, S.**, & Ghahremani, M., (2017). Elaboration on the culturally informed Iranian hierarchical wisdom model: Comparison with Sternberg's ACCEL model. *Roeper Review,* 39(4), 234-238. DOI: 10.1080/02783193.2017.1362679

**Karami, S.**, & Ghahremani, M., (2016) Towards an Iranian conception of giftedness. *Gifted and Talented International,* 31(1), 4-18. DOI: 10.1080/15332276.2016.1194674

## Books

**Karami, S.** & Ghahremani, M., (Accepted). Comparison of Iranian Hierarchical Model of Wisdom and Western Conception through Polyhedron Model of Wisdom. In *International handbook of adult development and wisdom*. Oxford University Press.

Sternberg, R. J. & **Karami, S**., (in preparation). Psychological theories of wisdom. In R. J. Sternberg & J. & Glueck, (Eds.). *Wisdom: An introduction*. Cambridge University Press.

Sternberg, R. J., Ambrose, D. & **Karami, S**., (Eds.) (in preparation). *Transformational Giftedness: Identifying and Developing Gifted Children Who Will Make the World a Better Place*. Palgrave Macmillan.

**Karami, S.** & Ghahremani, M., (in preparation). Starting Over: An Iranian Conception of Giftedness and How It Can Transform Societies and the World. In R. J. Sternberg, D. Ambrose, & S. **Karami,** (Eds.). *Transformational Giftedness: Identifying and Developing Gifted Children Who Will Make the World a Better Place. Palgrave Macmillan.*

## Journal Publications (In Development)

Sternberg, R. J. & **Karami, S**., (in preparation). A Unified Model of Wisdom and Giftedness in Wisdom.

**Karami, S.**, (In progress). Strategies to promote wisdom: A systematic review.

**Karami, S.**, Green, C., & Parra-Martinez, F., (In progress). Uncovering preservice teachers' strategies to enhance creativity and motivation in the classroom.

Parra-Martinez, F., **Karami, S.**, & Green, C., (In progress). Understanding preservice teachers' beliefs of creativity and underachievement.

Desmet, O., Ghahremani, M., **Karami, S.**, (In progress). Fostering creativity in k-8 enrichment.

**PRESENTATIONS** **National and International Presentations**

Green, C., Parra-Martinez, F., & **Karami, S.**, Froiland, J., (2020, April). Preservice teacher perceptions of creative, underachieving students. Session will be presented American Educational Research Association (AERA), San Francisco, CA.

Parra-Martinez, F., Green, C., & **Karami, S.**, (2019, August). Uncovering Preservice Teacher Beliefs Regarding Underachievement, Motivation and Giftedness. Session presented at American Psychological Association (APA), Chicago, IL.

**Karami, S.**, & Ghahremani, M., (2019, Jun). Wisdom: Taking giftedness forward in the 21st century. Session presented at World Council for Gifted and Talented Children, Nashville, TN.

Ghahremani, M., & **Karami, S.**, (2018, November). Critical/creative thinking: Applying Sternberg's Theory of Mental Self-government. Session presented at the Research & Evaluation Network, 65th Annual Convention of the National Association for Gifted Children, Minneapolis, MN.

**Karami, S.**, & Ghahremani, M., (2018, November). An octahedron model of wisdom: What is wisdom? Poster presented at the 65th Annual Convention of the National Association for Gifted Children, Minneapolis, MN.

**Karami, S.**, & Ghahremani, M., (2018, November). Why isn't wisdom more important in educational settings? Poster presented at the 65th Annual Convention of the National Association for Gifted Children, Minneapolis, MN.

**Karami, S.**, (2017, November). Why isn't wisdom more important to educational settings? Poster presented at the 64th Annual Convention of the National Association for Gifted Children, Graduate Students Research Gala, Research and Evaluation Network, Charlotte, NC.

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## HONORS

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| | Certificate of Award, Completed Research at the Doctoral Level, Graduate Students Research Gala, National Association for Gifted Children (NAGC), Research and Evaluation Network (Third Place) | 2018 |
| | The Feldhusen Doctoral Student Fellowship Award in Education for 2018-2019, College of Education ($2000), Purdue University, IN | 2015 |
| | Certificate of Award, Completed Research at the Non-Doctoral Level, Graduate Students Research Gala, National Association for Gifted Children (NAGC), Research and Evaluation Network (Second Place) | 2012<br>2012 |
| | University Graduate Fellowship ($3000), University of British Columbia | |
| | International Partial Tuition Award ($3500), University of British Columbia | |
| **GRANTS** | Dinosaur Station at Imagination Station-Learning Projects Grant ($1500) Office of Engagement, Purdue University, West Lafayette, IN | 2019 |
| | Aerospace Station at Imagination Station-Learning Projects Grant ($1500) Office of Engagement, Purdue University, West Lafayette, IN | 2018 |
| | Gifted Education Research & Resource Institute (GER2I) Graduate Student Travel Award ($4750), Purdue University | 2014-2019 |
| | College of Education Graduate Student Travel Award ($2000), Purdue University | 2015-2019 |
| | Summer Graduate Student Research Grant ($3000) College of Education, Purdue University, West Lafayette, IN | 2018 |

## SERVICE

### Committee work

College of Education Undergraduate Research Committee Member
Purdue University, West Lafayette, IN — 2019-present

Education Committee Member at Imagination Station (Local Science Centre) Lafayette, IN (http://www.imagination-station.org/) — 2018-present

Member of the award committee for the Gifted Education Research & Resource Institute (GER2I) Sidney Marsh Moon Teacher Award for outstanding teaching in GERI's youth programs, Summer Residential Youth Program
Purdue University, West Lafayette, IN — 2018-2019

Mentor at College of Education's Peer Mentoring Program
Purdue University, West Lafayette, IN — 2012-2013

Graduate students' representative on Faculty of Education
University of British Columbia, Canada

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| AERA annual conference proposal submissions | 2018 – present |
| Gifted and Talented International | 2018 – present |
| Journal of Advanced Academics | 2018 – present |
| NAGC annual conference proposal submissions | 2015 – present |

### Judging

Judge for the College of Education posters at the Undergraduate Research Conference,
Purdue University, West Lafayette, IN — 2019

Examiner of prospective students for the Iranian gifted middle and high school, — 2006-2010

National Organization for Development of Exceptional Talents (NODET), Tehran, Iran — 2006-2010

Chief Examiner and Judge for Students' Project in Psychology, National Organization for Development of Exceptional Talents (NODET), Tehran, Iran

**Membership in Academic, Professional, and Scholarly Societies**

American Educational Research Association (AERA) — 2012 – present
Division D: Measurement and Research Methodology
Division H: Research, Evaluation, and Assessment in Schools SIG: Research on Giftedness, Creativity, and Talent — 2012 – present
Division K: Teaching and Teacher Education

National Association for Gifted Children (NAGC) — 2012 – present
Creativity
Research and Evaluation — 2018-present
Computer and Technology

The Foundation for Critical Thinking

World Council for Gifted and Talented Children (WCGTC)

**Volunteering**

Arranged fundraising at UBC for recent earthquake in Tabriz-Iran — 2012

Instituted a non-profit group in Farzanegan middle school in order to support students who live and study in conditions of extreme poverty — 2005

**SKILLS**

**Data Analysis and Statistics Packages**

NVivo Qualitative Data Analysis Software
IBM SPSS Statistics Software
STATA Software for Statistics and Data Science
LISREL Scientific Software International
RStudio Open Source and Professional Software