

DETERMINATION AND VALIDATION OF THE “WHAT’S MY SCHOOL
MINDSET?” INSTRUMENT FACTOR STRUCTURE

by

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DEDICATION

I dedicate this paper to my mother, children, Aaron, Chip, and Maryrose, and to the loving memory of my father. The support of my family and the constant steadfastness of their belief in the possible provided an assurance that I could persist to completion of my dissertation program. The result is a product that I hope will be a worthwhile accomplishment and a reward for both my efforts and their love. I also dedicate this work to Leslie, Grace, and Faith, who provided a home away from home, friendship, and support during my time in Bozeman at Montana State University. The time we spent outside on horseback, in the beautiful Montana countryside, and sharing movie time together provided many hours of peaceful diversion and renewal that contributed immeasurably to my ability to complete this project.

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TABLE OF CONTENTS

1. INTRODUCTION	1
Problem Statement	6
Purpose Statement	7
Research Question	8
Significance of the Study	8
Overview of Methods	9
Limitations	10
Delimitations	13
Definition of Terms	14
Summary	17
2. REVIEW OF RELEVANT LITERATURE	19
Background of Mindset Theory	19
Historical Foundations	19
Cognitive Social Theory and Agency	21
Three Types of Agency	22
Influence of Social Systems	22
Criticisms of Cognitive Social Theory	23
Alternative Theories	24
Organizational Learning	25
The Organization as an Entity	26
Synthesis of Theory and Practice	28
Framework of Organizational Learning	29
Systems Thinking	29
The Five Disciplines	30
Open Systems Model	31
Enabling School Structures	33
Collective Efficacy	33
Work Locus of Control	34
Individual Mindset	37
Connection to Cognitive Social Theory	37
Seminal Studies	39
Criticisms of the Mindset Theory	40
Alternative Theories	41
Academic Mindset	41
Group Mindset	42
Mindset Concepts Compared	44
Influence of Mindset on Organizations	45

TABLE OF CONTENTS - CONTINUED

Connections of Mindset and Organizational Learning	49
Connections of Mindset and School Climate.....	53
Effects of Mindset on School Transition Success.....	54
Measurement of School Mindset	56
Rationale for School Mindset Scale	57
Conceptual Framework for the What's My School Mindset? Scale	59
Instrument Development	60
Individual Mindset Scale	61
Academic Mindset Scale.....	61
Group Mindset Scale.....	61
Summary	62
Conclusion	63
 3. METHODS	 66
Research Problem	66
Purpose of the Study	67
Research Question	67
Research Design.....	68
Participants and Sample.....	68
Data Collection Instruments	71
Procedures and Data Collection.....	72
Data Analyses	73
Evaluating Assumptions	74
Representativeness.....	74
Exploratory Factor Analysis	75
Confirmatory Factor Analysis.....	76
Summary	77
 4. RESULTS	 79
Answering the Research Question and Testing the Null Hypothesis	79
Data Analysis.....	80
Evaluating Assumptions	81
Sample Size.....	84
Criteria for Conducting the Exploratory Analysis.....	84
Criteria for Selecting the Number of Factors.....	85
Test of Data Multicollinearity.....	86
Goodness of Fit	87
Factor Rotation Method	87

TABLE OF CONTENTS - CONTINUED

Exploratory Factor Analysis	88
Interpretation of the EFA	89
Factor 1	89
Factor 2	90
Factor 3	90
Factor 4	91
Confirmatory Factor Analysis	93
Steps in the Analyses	97
Validity Evidence	98
Convergent Validity	100
Discriminant Validity	100
Discriminant Validity between Factors	102
Answering the Research Question	103
Testing the Null Hypothesis	103
Summary	103
 5. DISCUSSION	 105
Introduction	105
Growth Mindset	106
Four-Factor Model from EFA and CFA	107
Factor 1	110
Factor 2	110
Factor 3	112
Factor 4	116
Discriminant Validity	119
Summary	121
Implications	121
Recommendations for Further Research	124
Conclusions and Recommendations	126
 REFERENCES CITED	 129
 APPENDICES	 148
APPENDIX A: Subject Consent Form	149
APPENDIX B: Individual Mindset Scale	151
APPENDIX C: Online Individual Mindset Scale	154
APPENDIX D: PERTS Academic Mindset Scale	156
APPENDIX E: What's My School Mindset? Scale	158

LIST OF TABLES

Table	Page
1. Levels of learning in a learning organization and their factors.....	32
2. Table of percent of public schools by size categories and number of faculty responses proposed by category.....	70
3. Table of percent of public schools by size categories and number of faculty responses collected by category.....	82
4. Participants by education level.....	82
5. Participants by gender.....	82
6. Participants by years at current school.....	83
7. Number of participants by school level.....	83
8. Participants by total years' experience teaching at all schools.....	83
9. Individual item factor loadings, significance, percentage of variance, and eigenvalues for items on the WMSM scale continued.....	94
10. ANOVA results and Pearson Correlations between school building levels.....	101
11. Components correlation matrix for WMSM scale.....	102
12. Comparison and contrasting items of 4-factor structure with Mindset Works, Inc. five key features of a growth school mindset.....	108

LIST OF FIGURES

Figure	Page
1. A simplified model of collective faculty efficacy.....	35
2. Comparable and contrasting concepts with mindset constructs.....	58
3. Proposed factor model from EFA for CFA statistical analyses.	96
4. Theoretical factor structure model and results of CFA using Lisrel 8.72	99
5. WMSM means plot at school level (one-tailed test).....	101

ABSTRACT

This study used exploratory and confirmatory factor analyses to explore the factor structure of the What's My School Mindset? (WMSM) scale (Mindset Works, 2008-2012c). Blackwell (2012) asserted that the concept of a growth school mindset culture was operationalized in the WMSM scale using five key features. However, the reliability and validity of this instrument had not been fully explored (S. Rodriguez, personal communication, March 31, 2015). This was the first empirical study that attempted to validate the underlying constructs the WMSM scale is purported to assess by Mindset Works, Inc (Blackwell, 2015). No research was found that had explored the factor structure of the WMSM scale. Without empirical research supporting the factor structure of this instrument its use in interpreting the measurement of school culture may be confounded (Hopko, 2003; Netemeyer, Bearden & Sharma, 2003). Results of the Exploratory Factor Analysis revealed a four-factor structure. In addition, a Confirmatory Factor Analysis (CFA) was conducted to further verify the fit of the four-factor model. The four-factor model produced a root mean square error approximation (RMSEA) of .063. The 90% confidence interval (.049 - .076) surrounding the RMSEA result indicates that the proposed four-factor model identified by the EFA was a "fair" fit to the estimated population model (Browne & Cudek, 1993; MacCallum, Browne & Sugawara, 1996). The accuracy of this fit to the population model was strengthened by a CFI of .96 and a NNFI of .95 (Kim, 2005). The results of this study added to the body of mindset research and are useful for school leaders and researchers who seek to use the WMSM scale to measure growth mindset within a school's culture (e.g. Hoy, Tarter & Kottkamp, 1991; Kearney, 2007; Murphy & Dweck, 2010; Farrington, Roderick, Allensworth, Nagaoka, Seneca-Keyes, Johnson & Beechum, 2012; Delaney, Dweck, Murphy, Chatman & Kray, 2015; Walton, 2014).

CHAPTER ONE

INTRODUCTION

A Psalm of Life
Not enjoyment, and not sorrow,
Is our destined end or way;
But to act, that each to-morrow
Find us farther than to-day.
(Henry Wadsworth Longfellow, 1839, p. 5)

Longfellow poetically sought to inspire his readers to believe that they could make progress toward their goals through their actions. Dweck (2008) described a similar concept of the belief in personal growth in her book, *Mindset: The New Psychology of Success*. The concept of mindset contributes to the field of educational leadership by conceptualizing a paradigm premised on an empirically based description of belief systems that may impact the success of each of our 50 million students, enrolled in over 98,300 public schools across the United States. However, government organizations, educational leaders, and researchers continue to debate what variables constitute reliable and accurate evidence of school and student growth (Tarter & Hoy, 2004; Yeager & Dweck, 2012; Farrington et al., 2012; Briceno, 2013; Department of Education, 2014; Adams, 2014; Shannon & Bylsma, 2004 & 2007).

In a review of the literature on mindset and organizational learning, many articles can be found reporting the importance of providing equitable resources to ensure all students receive a quality education. These resources usually refer to such items as better facilities and improved school budgets. For example, Gamoran (2001) wrote,

“Policymakers increasingly recognize that unequal school financing across school districts is unfair, and some are taking steps to reduce these inequalities” (para 12). Gajja, Puckett & Ryder (2014) wrote of the importance of equity in education funding and the “proposed redistribution of local property taxes to help...school districts,” (p. 1). However, fewer studies report the importance of providing equity in psychosocial factors that have been shown to "have a striking impact on students' achievement" (Dweck 2010, p. 26). Increasingly researchers have explored the importance of student growth mindsets on grades and academic behaviors leading to improved achievement on test scores (Blackwell, Trzesniewski & Dweck, 2007). A growth school mindset culture is defined as one with a “common vision, sharing knowledge, support, and resources” (Blackwell, 2012, para. 4). Psychosocial factors influence student learning and play a key role in schools where educational leaders work to create learning environments that prepare students for college and career readiness in the increasingly complex 21st Century (Farrington et al., 2012). A faculty’s beliefs in their school’s ability to help all students learn and grow were shown to develop improved learning behaviors in the students they served. For example, mindset beliefs were shown to have large influences on the levels of persistence and choices of strategies teachers and students used to reach their learning goals (Dweck, 2008, Briceno, 2013). As Blackwell (2012) explained, schools that develop a growth mindset also develop students who "show greater motivation in school, [have] better grades, and higher test scores" (para. 5), and “narrow[ed] the gender gap in mathematics" and "the racial achievement gap" (para.8-9).

Bandura's (1977, 1986 & 2001) cognitive social theory laid the foundation for the psychosocial mindset theories developed by Dweck (1986). Cognitive social theory emphasized the importance of human agency and the reciprocal influences of the environment and social interactions on human learning. Bandura's theory has become one of the most influential on research and educational practices in schools to this day (Martin, 1979; Haggbloom, 2002). In 1977, Bandura wrote *Social Learning Theory*, in which he also explained the influence of self-efficacy on learning. By 2008, Bandura and his colleagues, including Dweck, began to focus research on the self-efficacy of students in schools. Additional areas of research included the interaction of individual beliefs, behaviors, the social environment, and the behaviors of others (Spector, 1988; Bandura, 2001; Eccles & Wigfield, 2002; Tarter & Hoy, 2004; Dweck, 2012; Farrington et al., 2012).

Dweck's (1986) foundational research with mindset was mostly quasi-experimental and experimental studies using small sample sizes (Farrington et al., 2012). She began by exploring the relationships between an individual's mindset and goal setting. Additional studies framed the construct of mindset within cognitive social theory, attributional theory, self-efficacy, expectancy theory, and locus of control theory (Rotter, 1954; Bandura, 1977, 1986, 2001; Weiner, 1986; Dweck & Leggett, 1988; Esses, Haddock & Zanna, 1993; Taylor & Gollwitzer, 1995). Dweck (1986, 2006, 2010 & 2012) wrote that the social context strongly influenced individual beliefs: mindsets were found to be malleable, subject to contextual influences, and respond to interventions. Thus, Dweck expanded her research to explore the group construct of mindset. She

worked with a team of researchers to quantify and operationalize a growth school mindset construct (Blackwell, Trzesniewski & Dweck, 2011). Blackwell, Trzesniewski & Dweck co-founded Mindset Works, Inc. to develop and distribute interventions that "enable a world in which people seek and are fulfilled by ongoing learning and growth" (Mindset Works, 2008-2012a, para. 1). The current cross-disciplinary research in the area of mindset includes the domains of education, psychology, sociology, organization, business management, and marketing. Dweck is currently researching organizational mindsets in schools and in Fortune 1000 companies (Dweck, Chiu, & Hong, 1995; Nisbett & Miyamoto, 2005; Thomas, 2005; Ruedy & Schweitzer, 2011; Spencer-Rogers, Williams & Peng, 2012; Blackwell, 2012; Farrington et al., 2012; Adams, 2014; Harvard Business Review Staff, 2014; Walton, 2014; Delaney et al., 2015).

A review of the literature on organizational learning models revealed variables similar to those described by Blackwell (2012) in the mindset literature. The five key features of a growth school mindset were similar to the variables used in Tarter & Hoy's (2004) Open Systems learning organization model that explained improved school outcomes. The construct of growth school mindset seems also to be imbued by Senge's (1990 & 2000) systems thinking model. For example, the influences on organizational learning include the administrator's behavior, the feedback loop, and collective goal setting. In sum, a review of the literature revealed school mindset culture compared with cognitive social theory, learning organization theory, and themes found in the literature on improving schools (Murphy & Dweck, 2010; Shannon & Bylsma, 2004 & 2007; Farrington et al., 2012; Delaney et al., 2015).

School leaders and stakeholders are increasingly interested in the influence of psychosocial factors, such as mindset, on school cultures. Therefore, researchers seek to answer whether these factors are malleable to influence by school administrators for improving organizational outcomes. Increasingly educational research is seeking to develop measurement tools for these psychosocial factors (Netemeyer et al., 2003; Guskey, 2007). The research on mindset theory shows potential to influence improved student outcomes in schools. Researchers are developing growth markers for meeting accountability requirements using psychosocial factors of individual and school learning (Dweck, 2010; Farrington et al., 2012; Adams, 2014). In 2013, the Federal government awarded an unprecedented waiver from the strictly cognitive-based accountability testing required under the No Child Left Behind Act of 2001 to 10 California school districts. Researchers collaborate with school districts to explore the potential for using psychosocial markers, such as school mindset, to indicate school improvement and student growth (Adams, 2014).

Therefore, the purpose of this research study was to explore the factor structure of the WMSM scale purported to operationalize the five key features of a school mindset culture. The results of this study were used to contribute to the literature, develop conclusions, describe implications for the use of WMSM scale, and to recommend potential areas for future studies. Next, follows a description of the problem that was the focus of this study. A hole in the literature on school mindset was identified and confirmed via a personal communication with the Director of Research & Implementation Sylvia Rodriguez at Mindset Works, Inc., (March 31, 2015).

Problem Statement

Up to the present time, assessment measures in schools have largely focused on cognitive variables demonstrating learning outcomes of student and school effectiveness. However, Weschler (1943), developer of the famed IQ measurement scale stated, "there are also definite non-intellectual factors which determine intelligent behavior" (p. 103). The challenge for measuring such factors begins with the development of operational definitions that are quantified on a scale that is valid and reliable. Duckworth and Yeager (in press) explained, "Scientific inquiry and organizational improvement begin with data collection" (p. 29). Interventions based on reliable psychosocial data that supports improved school cultures, and all students in their efforts to succeed, could be useful to PK-12 public school administrators. Recent studies support this trend and have focused on expanding the domain of faculty and student variables that contribute to successful learning including psychosocial factors. Currently, there exist few measures to assess the quantity and quality of these factors (Netemeyer et al., 2003; Blackwell, 2012). New areas of research seek to define and quantify non-cognitive factors in schools and to operationalize them on a scale. If researchers show psychosocial variables of school cultures influence learning, the information could be useful. New interventions in this area could support faculty and students in the belief they can grow and learn (Hoy et al., 1991; Kearney, 2007; Dweck, 2010; Mindset Works, 2008-2012; Panorama Education, 2014).

A "team of researchers, curriculum specialists and educators with experience in mindset and its application" worked to develop the WMSM scale (S. Rodriguez, personal

communication, March 31, 2015). The new instrument operationalized five key features of a school growth mindset culture described by Blackwell (2012). The 20-item Likert-style survey is available on the Mindset Works website (2008-2012c). Educators and school administrators use the WMSM scale to assess their school's mindset culture. Mindset Works (2008-2012) then uses the results of the survey to make recommendations for a "motivational intervention curriculum" (para. 1-11). Dweck and her cofounders at Mindset Works, Inc., also provide training and products directed at developing a growth mindset culture in schools. The factors purported to be operationalized in the WMSM scale compared favorably with variables of learning organization models that explained improved school outcomes (Tarter & Hoy, 2014). Additionally, the WMSM factors were similar to themes found by Shannon & Bylsma (2004) in a meta-analysis of 80 studies of improved school districts. However, no information was available on the reliability and validity of the WMSM scale. There were no reports found of studies exploring the factor structure. Without a clear understanding of the factor structure of this instrument faulty conclusions may be made by those using the scale's results to understand and shape a school's organizational culture. Furthermore, the internal validity of any empirical studies that use the WMSM may be confounded (Hoy et al., 1991; Hopko, 2003; Kearney, 2007; Murphy & Dweck, 2010; Farrington et al., 2012; Delaney et al., 2015).

Purpose Statement

This study proposes to explore the factor structure of the What's My School Mindset scale used by Mindset Works, Inc. (2008-2012c). The results of the WMSM

survey are used to assess school cultures and to provide recommendations to improve the growth mindset of schools (Blackwell, 2012). This research hopes to add to the understanding of the relationships between items on the scale that operationalize the school mindset culture construct and to identify the factors they comprise. The results of this study may provide insights into variables that contribute to improved school cultures and additional paths for administrators to help faculty develop the belief they can help all students learn and grow.

Research Question

The overarching research question of this study was “What is the underlying factor structure of the WMSM scale?”

H_0 = The five-factor structure of shared leadership, open communication, professional collaboration, clear goals and school plan, and support for and belief that all students can grow and learn does not represent the underlying factor structure for the WMSM scale.

H_a = The five-factor structure of shared leadership, open communication, professional collaboration, clear goals and school plan, and support for and belief that all students can grow and learn does represent the underlying factor structure for the WMSM scale.

Significance of the Study

The proposed factor structure of the WMSM instrument for use in quantifying a school’s growth mindset culture has not been statistically explored and analyzed (S. Blackwell, personal communication, October 14, 2014). The use of an instrument that

does not have well documented psychometric properties may adversely influence the internal validity of empirical studies that use the WMSM scale as an outcome measure. Furthermore, without well-documented psychometric properties, school administrators using the instrument as a tool to identify perceptions of their school faculty may misinterpret the impact of systemic interventions related to the development of a school growth mindset. A valid and reliable instrument designed to measure school mindset could help educational leaders understand the unique psychosocial variables within their school culture. The appropriate use of data and interpretation of results from the WMSM scale may help to shape a school's organization's potential to grow and learn (Hoy et al., 1991; Kearney, 2007; Gay, 2010). Results from this research study may provide baseline and intervention impact information needed to gauge implementation efforts for school change. Research based evidence is necessary to challenge assumptions and to provide sound reasons for new practices (Sanders & Sheldon, 2009; Marzano, Waters & McNulty, 2005; Sergiovanni, 2014).

Overview of Methods

This study included a quantitative research design using SPSS version 22 analytical software (IBM, 2013) and Lisrel 8.72 analytical software (Joreskog & Sorbom, 2001) to perform descriptive statistics analysis, an exploratory factor analysis, and a confirmatory factor analysis. Data collection used a combination of paper-based and online Likert-style surveys distributed to a stratified random sample of approximately 15 PK-12 schools districts across Montana. The survey used in this study included a brief

demographic questionnaire and 20-items from the WMSM scale. The data was collected and then participant responses were split randomly into two subgroups. The first subgroup of participant responses underwent an exploratory factor analysis to identify the underlying constructs representing the WMSM scale. The factor structure identified by the exploratory analysis was then subject to a confirmatory factor analysis. A null hypothesis was the basis for the analysis and results from the responses from the second subgroup were compared to the model and fit against the hypothesized population model (Soerboom & Joereskog, 1982; Reitveld & Van Hout, 1993).

Limitations

The sample data was collected during the 2014/2015 school year. The study used a combination of paper and pencil and online surveys. School district's administration made the decision of which delivery method they used. The research methods used in this study included statistical analysis to identify and adjust for any difference in the responses between online (n=30) and paper-based surveys (281). This study was a dissertation research project and the limited time prevented a test-retest design, and no longitudinal data was collected. A variety of survey administrators delivered the paper surveys on-site using standardized instructions provided by this researcher in an email, in the mail, or in person. This researcher also provided clarification of instructions, as needed during the process of follow-up telephone conversations. A limitation of survey research includes the voluntary nature of the self-selection process. Human-subject survey research may contribute to reporter bias resulting in a more positive self-report

rating. The subsequent effect could provide a slight left-hand skew to the data. Onsite observations were not performed to confirm the validity of faculty and administrator self-reports regarding their perceptions of a growth school mindset culture in their school context. This study had a limited pool of participants that include mostly rural areas in a large northwestern state. The results may not generalize to larger more diverse populations. Another limitation included a change in the protocol of paper and pencil survey administration at school sites. The procedures for delivering the surveys varied among schools based upon central administration's needs and preferences. Some schools followed the survey administration protocol provided. However, some administrators expressed difficulty in administering the survey in a faculty meeting due to the timing of the data collection. Some administrators explained there were no more staff meetings for the faculty for the remainder of the year and therefore distributed the survey to staff in school mailboxes and collected the surveys over a period of several days. Various other factors delayed data collection and reduced the number of participants including faculty participation in the end-of-year SMARTERbalanced testing, multiple demands from external sources on faculty and administrators' time, district-level trainings, and year-end procedures. Next, psychosocial and cognitive variables are difficult to quantify and measure due to the latent constructs the observed variables are intended to represent. For this study the researcher used Likert-style surveys with teacher and administrator self-reports to capture the organizational climate of a school defined as:

...the relatively enduring quality of the school environment that is experienced by participants, affects their behavior, and is based on their collective perceptions of behavior in schools, or openness of an organization, using a personality metaphor and defined as the health of the

interpersonal relationships within the organization (Hoy & Miskel, 2005; Hoy et al., 1991, p. 10).

Blackwell (2012) described, “To survive and thrive, school communities need to work together with a common vision, sharing knowledge, support, and resources. In other words they need a growth mindset” (para. 4). Collecting self-reports from Likert-style surveys about underlying psychosocial constructs has inherent limitations (Ogden (2003). Further, operationalizing psychosocial factors of mindset that are not observable presents difficulties. Some critics suggest that measuring a psychosocial construct may actually create it or change it in the process. Additional validated and reliability studies should be performed to support the reliability and validity of participants reported beliefs about behaviors and dispositions of students, faculty, and administrators in their school buildings. Also, validated and reliable surveys that have similar constructs could be run with the mindset survey in a future study to identify correlations between validated self-reported psychosocial constructs and constructs purported to be operationalized on the WMSM scale. Constructs are cognitive theories and therefore cannot be tested. Emphasis was put on the abstract nature of cognition and perception; that it is itself a construct of the mind (Gowin, 1981; Bandura, 2001). Ogden (2003) wrote that the research methods of survey instruments, questionnaires, or written responses from participants can actually change or create cognitions in the subjects the researcher is testing. To confirm what faculty report is actually happening in schools would require onsite observations of the behaviors of participants in schools. Due to limitations of time and resources this study did not perform confirmatory onsite observations or test and retest of the participant responses (Gollwitzer & Wallnau, 2014). These limitations must

be taken into consideration when interpreting the results of this study. Finally, a deeper understanding of the specific behaviors that contribute to the underlying psychosocial constructs on the WMSM scale may be necessary to operationalize definitions that capture distinct factors contributing to the construct of growth school mindset.

Delimitations

This research was bounded to the study of PK-12 educators in Montana public schools. This study collected demographic and attitude data, then performed cross-tabs statistical analysis to identify any covariates influencing the correlation data. According to national US Census data (2013/2014 school year), 15% of educators are male and 84% female. The mean years of experience is 19.6. The percentages of highest degree earned for educators nationally is; 43% Master's degree, 44% bachelor's degrees, and 1% doctoral. This study included 311 participants, the percentage of educators in the Montana school sample was 27.3% male and 71.7% female. The highest degree earned was 41.3% had master's degrees, 49.8% bachelor's degrees and 1.3% had doctoral degrees; the mean years of teaching experience was 4.03 years (Feistritz, 2011; United States Census Bureau, 2015). This result showed Montana demographics had a greater proportion of male educators, approximately similar education levels, and significantly fewer number of years' experience than the national average. According to Wilson, Plane, Mackun, Fischetti & Goworowska's (2012) 2010 census, only 6.3% of the U.S. population lives in metro areas with a population of less than 1.0 million. The Montana school district population used in this sample may not provide results that generalize to

the 93.7% of the U.S. population based upon urbanity demographics. Regarding ethnic diversity, the state of Montana differed significantly from national diversity. The state's less diverse population was overwhelmingly white. The dominant minority group in Montana was Native American. The only urban location identified in Montana was Billings.

Definition of Terms

A concise study requires clear definitions of the constructs used in the research (Netemeyer, et al., 2003). The following section provides operational definitions included in the instruments used to capture the constructs for statistical analysis as well as the definitions of key terms.

Cognitive Social Theory (CST): This theory provides a framework to explain the way individuals learn and behave through a triad of reciprocal influences from observing the behavior of others, influences in their social environment, and their own internal factors (Bandura, 2001).

Individual Mindset: This construct was developed in the foundational research of Dweck (1986). Individual mindset is defined as a psychosocial concept of attitudes, or beliefs, about how the world works that resultantly influence the individual's behaviors and decisions.

Academic Mindsets: This construct was described by Farrington et al. (2012) as “beliefs, attitudes, or ways of perceiving oneself in relation to learning and intellectual work that support academic performance” (p. 28). The four distinct academic mindsets include

beliefs of belonging; the ability one can grow through effort; that one can succeed; and the work required has value.

Growth School Mindset Culture: This concept describes a culture with a, "common vision, sharing knowledge, support, and resources," (Blackwell, 2012, para. 6 -10).

Blackwell wrote the five key features of a growth school mindset culture operationalized on the WMSM scale include: shared leadership where the school provides opportunities for all faculty to practice leadership roles; tapping into expert skills and knowledge; shared accountability; and developing team capacities, open communication such as when members of the school community receive open feedback on "what is working and what is not" in an atmosphere that is perceived as helpful and non-judgmental, professional collaboration in a culture of adult learning where the school provides opportunity to learn from colleagues; investing time and resources such as scheduling time for developing clear goals and a plan with professional collaboration; peer observations, feedback, and rewards, clear formative feedback, effective models, transparent expectations, chunking, and appropriate professional development, and support for and belief in growth includes the belief in the potential of the entire faculty to "overcome challenges and work purposefully toward that goal" to help all students succeed (para. 6 – 10).

Five Key Features of a Growth School Mindset: Blackwell (2012) identified key features of a growth school mindset as those behaviors of school communities that help schools grow and thrive. These features are compared and contrasted with the factors identified in this study.

Enabling School Structures: Hoy & Sweetland (2001) explained these structures provide “places where professional relations are open, collegial, supportive, and empowering” (p. 317).

Collective Efficacy: Collective efficacy is a concept comprised of two constructs: 1) the faculty perceptions of their group competence in teaching methods, skills, training, and expertise; and 2) task analysis, influenced by the abilities and motivation of students, and the support provided by the various contexts of home, school, and community (Goddard, 2002, p. 100).

Observed variable: This term is also called measured variable or manifest variable. This type of variable is measured directly through self-report Likert scores on the WMSM survey. Observed variables are rectangles on the models. Two-way arrows may include correlation values between survey items or covariances between factors (Field, 2000 & 2009; Schreiber, Nora, Stage, Barlow & King, 2010).

Latent variable: This term is also called unobserved variable, factor, or construct. The latent variables are the subject of this dissertation project. Factors are measured indirectly through the exploratory and confirmatory factor analysis. Factors are ovals on the models. Regression coefficients or residuals label one-way arrows on the models.

Correlation: The first step in an exploratory factor analysis is calculating the correlations between items on the survey and developing a correlation matrix that shows the relationships between items.

Factor Loadings: SPSS statistical software calculates the shared variations of observed variables in the unobserved variables (variance and covariance). The pattern matrix

shows the factor loadings, which are used to determine how much each item contributes to each factor.

Factor Extraction: This is a statistical procedure used in the identification of the unobserved variables operationalized in the items of a survey. Identifying the latent constructs underlying the items of the survey requires a combination of theory, statistical analysis, and logic. The terms factors in this study will be used to refer to the results of the exploratory factor analysis extraction. These factors will be compared to the five key features of a growth school mindset identified above, which are theoretical constructs that have not been statistically tested.

Summary

Psychosocial factors have been shown to “have a striking impact on students’ achievement” (Dweck 2010, p. 26; Duckworth & Yeager, in press). A valid and reliable instrument designed to measure psychosocial factors would be useful to school administrators and may help identify the unique variables within their schools to improve student outcomes. The results from a scale such as the WMSM may be useful to help shape a school organization's potential to help all students grow and learn (Hoy et al., 1991; Kearney, 2007; Gay, 2010). The research team at Mindset Works, Inc. explored the psychosocial construct of school mindset and worked with a team of researchers to quantify and operationalize the construct on the What’s My School Mindset (WMSM) scale; yet, no empirical research on the factor structure of the scale seems to exist in the social science or education literature (S. Rodriguez, personal communication, March 31,

2015). This study explored the factor structure of the WMSM scale. This research seeks to add to the understanding of the relationships between items on the scale and identify the factors they comprise. The use of an instrument that does not have well documented psychometric properties may adversely influence the internal validity of empirical studies that use the WMSM scale as an outcome measure. Administrators using the instrument as a tool to identify perceptions of their school faculty may misinterpret the impact of school improvement interventions. School administrators would benefit from research-based evidence that challenges faculty assumptions, provides sound reasons for new practices, and emphasizes hard work as a key element to good outcomes (Blackwell, 2012). A valid scale quantifying psychosocial factors could be used to engage faculty in productive discussions about their school mindset (Sanders & Sheldon, 2009). The next chapter will review the literature regarding the mindset model as situated within the framework of cognitive social theory.

CHAPTER TWO

REVIEW OF RELEVANT LITERATURE

This chapter reviews the literature on the concept of mindset, developed by Dweck (1986) with a theoretical foundation of cognitive social theory (Bandura, 1977). Throughout the review, research on the construct of mindset is compared and contrasted with organizational learning models (Bandura 2001; Hoy et al., 1991; Senge, 1990 & 2000; Tarter & Hoy, 2004; Dweck, 1986, 2010 & 2012). Highlighted topics include the influences of the school context on mindset, the measurement scales for mindset, and the five key features of a growth school mindset (Blackwell, 2012). A section will compare and contrast three constructs of mindset, cognitive social theory and learning organization model factors. Finally, a summary and synthesis of the literature will explain how these theories and constructs are used in schools (Senge, 1990 & 2000; Blackwell, 2012; Mindset Works, 2008-2012a; Delaney et al., 2015).

Background of Mindset TheoryHistorical Foundations

Advances in theoretical learning models provided the foundation for the study and development of mindset theory. The following is a list of influential researchers and models they developed to explain individual learning processes: Watson (1924), Skinner (1938, 1953, 1954, 1971, 1978 & 1987), and Pavlov's (1927, 1928, 1932 & 1934) work in Behaviorism; Piaget's (1952 & 1959) theory of cognitive development using the

clinical interview process; Vygotsky's (1962 & 1978) cognitive sociocultural learning model and zone of proximal development; and Bandura's (1977 & 2001) cognitive social theory.

Historical views of the mind were conceptualized at the individual level (Sirotnik, 1980). For example, Kant (1787/1999) declared that the mind constructed the individual's reality creating the dawn of the constructivist viewpoint. However, Hegel (1807/1967) broached the topic of the influence of the social group on individual thought. Marx (1867) followed by advancing a theory including the social context in the creation of the individual's thought. Theorists in the field of education, such as Dewey (1938/1997) and Vygotsky (1930), later advanced the concept of reciprocity of the social environment on individual learning (Stahl, 2013). Similarly, Hong, Morris, Chiu & Benet-Martínez (2000) described implicit "ways of knowing" resulting from cultural differences; "individualistic as opposed to collectivist value orientations" (p.709). René Descartes (1633/1999 & 1988) was most influential in describing a distinction between the mind and the body. Yet, current organization theories describe an organic model as opposed to a reductionist model, or mechanistic, model. Collinson and Cooke (2007) called this change "new ways of thinking" and "new ways of learning" that include learning as socially constructed and dependent on both implicit and explicit processes of knowing (p. 3 - 9). The distinction becomes a foundation for understanding Bandura's social cognitive theory and its triadic model of reciprocal influence of human cognition, one's environment, and the influence of social modeling on the behavior of the learner (Bandura, 2001). A seminal work in social cognitive theory was a collection of

experiments by Bandura referred to as the bobo doll experiment. Bandura observed the research subject acting aggressively toward a doll after observing an adult model inadvertently model that behavior. His conclusions emphasized the social influence of individual learning through imitation and self-monitoring (Bandura, Ross, Ross & Webb, 2013). Dweck's (1986) development of the concept of mindset is deeply rooted in the framework and history of cognitive social theory. Similarly, organizational learning theories such as the Hawthorne Experiments increasingly describe the reciprocal influence of the individual and social group. These influences affect individual and group beliefs, choices, and behaviors (Senge, 1990 & 2000; Hoy et al., 1991; Tarter & Hoy, 2004, Collinson & Cook, 2007).

Cognitive Social Theory and Agency

Bandura (2001) explained, "...the essence of humanness" is one's personal agency to operate within a context of sociocultural influences (p. 1). In his cognitive social theory he explained that to be "agentic" means to be able to "make things happen by one's own actions" (p. 2). Self-efficacy and collective efficacy play a large role in explaining individual agency and the development of the individual. Rather than responding unconsciously to stimuli, Bandura explained that an individual's internal thoughts, affect, and biology influenced how one responds. He described how the individual created an idiosyncratic representation within his mind of his experiences. The core features of agentic action included: the ability to plan (intentionality), goal setting (forethought), motivation and self-monitoring (self-reactiveness), and efficacy (self-reflectiveness). A marked and integral element of human agency is one's ability to manage fortuitous

events; socially mediated events that happen by chance. Bandura explained that an individual's beliefs, attributes, interests and competencies influence how one behaves and the choices one makes in response to fortuitous circumstances. Bandura identified three types of human agency including personal, proxy, and collective (p. 13).

Three Types of Agency. Individuals act socially to accomplish their objectives. Acting by proxy, or collectively, is also considered a part of human agency. This ability of humans to act collectively, or in another's behalf, lifts the burden of individual responsibility and expands the human agency construct to collective agency (Bandura, 1977). As individuals act transactionally within a social system, an "emergent" concept of collective efficacy emerges. Collective efficacy is not the sum of the individuals' self-efficacy but a separate independent group construct. The group's belief in its collective efficacy serves the group functionally in a like fashion as self-efficacy does the individual (p. 14). Research on collective efficacy showed that collective efficacy of the group increased the groups' willingness to set higher goals, persist in the face of setbacks, have increased motivation, and greater levels of accomplishments. Individual and group efficacy beliefs are key components in the literature explaining mindset and organizational learning theories (Blackwell, 2012; Murphy & Dweck, 2010; Hoy et al., 1991; Tarter & Hoy, 2004). The next section describes the intricate involvement of the individual and the social system. Bandura did not consider them as separate.

Influence of Social Systems. Bandura (2001) joined the ranks of Marx (1867), Dewey (1938/1997), and Vygotsky (1962) when he declared, "...human functioning is

rooted in social systems." He explained the structure of a system is a model of reciprocal causality and "a dynamic interplay between individuals and those who preside over the institutionalized operations of social systems" (p. 15). Therefore, his research demonstrated that the structure of the system and the individual's psychological qualities are not divided into discrete and separate components. Rather, "people achieve the greatest personal efficacy and productivity when their psychological orientation is congruent with the structure of the social system" (p. 17). Bandura warned that collective efficacy is being eroded by rapid technological advancements that have changed the way individuals and nations relate to their world. The external environment influenced by media, mobility, and transnational economic and political interdependencies has changed our social future. He wrote that it is vital we recognize the role individual agency and collective agency have in shaping the group's environment for the betterment of all (p. 23).

Criticisms of Cognitive Social Theory. Some criticisms of the cognitive social theory model suggest that the theory cannot be tested. Behaviorists and recent social psychological theory developments in the rapidly advancing biotechnological sciences emphasize the abstract nature of cognition; that it is itself a construct of the mind (Gowin, 1981; Bandura, 2001). Though many research studies explore the pragmatic outcomes of cognitive theories, little research has been done to test the theory itself. Ogden (2003) wrote that the research methods of survey instruments, questionnaires, or written responses from participants can change, or create, cognitions in the subjects the researcher is testing. For example, when researchers question a subject during an

interview they consider this a means to obtain relevant data to verify a hypothesis. The same method of questioning, set in another experimental study, was shown to "prime" or influence the individual's cognition and subsequently influenced the choices and behavior of the subject. Recent psychological interventions in schools use individual cognition, or one's intentions, to change their behavior. When the researcher asks the individual participant to write his understanding in a positive, intentional way, the subject's future behavior was shown to change (Yeager & Walton, 2011; Walton, 2014). The next section discusses alternative theories to cognitive social theory.

Alternative Theories. Under the behaviorism model, seminal researchers such as Pavlov, Watson, and Skinner, worked to identify variables used to change the behavior of animals. The stimulus-response approach, lacked learner agency, though was later applied in psychological research with humans. These models directed student behaviors in rote-learning tasks in school settings. The theories promoted external control over the learner. In progressive models, human cognition became increasingly in focus. Piaget's earlier cognitive theory focused more on human information processing models than Bandura's social psychological research. Ausubel's (1963 & 2000) cognitive meaning making proposed interventions for classroom learning that focused on the individual's internal construction of knowledge and one's mental map. His research suggested pre-evaluations of individual's to determine how they view a topic before teaching new information. In contrast, Bandura emphasized self-efficacy, agency, and modeling to improve learning. Human agency became central to the study of cognitive social theory, though at that time, the independent variables were observable behaviors (Bandura, 1986;

Zimmerman, 1989). These models emphasized increasing learner agency though lacked construct development in the area of the influence of social interactions on the learner's choice to engage new knowledge.

As the computer advanced in complexity, a mechanistic model of the brain was forwarded in Weiner's (1986) information processing model though his model excluded considerations of human affect. Affect was an element important to Bandura's (2001) cognitive social theory. More recent studies focus on psychosocial factors of learning that result in meaningful learning (Farrington, 2013). Gowin's (1981) Knowledge Vee was closely related to Novak's work founded on Ausubel's model. Gowin suggested the usefulness of evaluating an individual's cognitive development using mind maps that were shown to support corrections in individual hierarchal propositions. Bruner referenced the concept of idiosyncratic cognitive structures in his model and described three stages of cognitive ability not based on age, as were Piaget's development stages. Bruner's model included enactive, ability to use manipulatives; iconic, recognizing images; and symbolic, with the use of abstract language and reasoning. The next section describes the concept of organizational learning and its relationship to the group mindset construct.

Organizational Learning

For this review, the topic of mindset was situated in the relevant and influential context of the school as a learning organization. Social, interpersonal, and cultural factors interact with the individuals in a school to create an organizational entity that can

reciprocally influence the individual as described by Bandura (2001) in his model of cognitive social theory. This perspective is viewed as systemic thinking (Senge, 1990 & 2000). Collinson & Cook (2007) explained, systemic thinking refers to the individual's ability to see "the whole rather than its parts" (p. 5). Previous organizational models used a mechanistic systems view, founded on reductionism, or breaking the whole into parts and focusing on isolated problems and solutions. More recently organizational models are being replaced with an organic, or human systems, analogy that emphasizes inter-relationships and the development of collective consciousness or shared mental models. The concept of shared mental models compares with Dweck's (2012) school mindset concept of mutual support and shared knowledge making (Ruff, 2002; Kofman & Senge, 2003; Flood, 1999; Hong et al., 2000; Kiedrowski, 2006; Mindset Works, 2008-2012b & c; Blackwell, 2012). Yeo (2005) claimed organizational learning occurred in three stages: 1) the individual level involving non-routine tasks and is resistant to change, 2) at the team level involving non-routine problem-solving with opportunities for action, and 3) the organization level involving complex solutions by the collective through changing the external environment (p. 379).

The Organization as an Entity

Though organizations are a collective of individuals, the collective actions of the individuals together can be abstracted and viewed as a single entity with its own separate characteristics. An organization can be viewed as distinct from the individuals within it. Research models suggested an organization becomes identifiable as a unique entity when the individuals that work within it have adopted and agreed to a characteristic set of

shared values, actions, and assumptions within the organization (Sanders & Sheldon, 2009). Importantly, these characteristics can be, and often are, different from the individual's personal beliefs. Two behaviors of organizations demonstrate organizational learning. First, the individuals within the organization learn from organizational experience. Secondly, the individual learning then becomes part of the organization's culture and part of the organizational memory. However, not all organizations are learning organizations. The key to organizational learning is the opportunity for individuals to practice new learning in context (Senge, 2000; Bolman & Deal, 2008). Organizational learning is demonstrated by the persistent actions of the individuals within the organization (Barnden & Darke, 2000; Senge, 1990 & 2000).

Educational leaders play a key role in influencing the culture of the schools they lead by "supporting its primary values and aims," (Collinson & Cook, 2007, p. 136). Developing shared visions and beliefs among its members is accomplished by holding the focus of the individuals on the goals of the school until new learning has occurred. Another important aspect of organizational learning is providing a structure where the individuals can self-organize and practice the new learning in the unique context of their community and school. School principals can support organizational learning in the following ways: effective use of resources, developing employee perceptions of control over their work, developing collegial relationships; providing clear expectations and feedback; and the appropriate use of rewards for performance (Hoy et al., 1991; Hong, Chiu, Dweck & Sacks, 1997; Hong, Chiu, Dweck, Lin, & Wan, 1999; Kouzes & Posner, 2002; Tarter & Hoy, 2004; Freitas, Gollwitzer & Trope, 2004; Evans, 2013).

Synthesis of Theory and Practice

The study of organizational learning diverges into two streams, the theoretical (epistemological) and the practical (empirical). The theoretical stream tends to be researchers focused on understanding the processes of organizational learning, or how meaning is constructed and integrated into knowledge structures in the individuals and the organization. The second stream tends to be practitioners attempting to develop prescriptive practices, or answers, to how to create a learning organization. However, a review of the literature suggests that the creation of learning and the creation of a learning organization occur reciprocally. Research revealed individuals project their identity in the social environment and learn from the consequences of how this influences the organization, which, in turn, develops the organization's identity. Resultantly, in successful learning organizations, individuals demonstrate behaviors from their embodiment of the collective's values, beliefs, and goals (Collinson & Cook, 2007).

A critical question in the theoretical framework of learning organizations and organizational learning is, "What is the relationship between individual/organizational learning and the development of a learning organization at the juncture of the empirical and theoretical perspectives?" Mindset research, viewed through this lens, attempts to contribute variables, malleable to influence, that bridge the gap between research theory and practice (Tourangeau, Rasinski, Bradburn & D'andrade, 1989; Dweck, 2012). Key research in the area of psychosocial factors, such as academic mindset, focuses on developing interventions to improve school learning, structures, and practices. The Fifth Discipline (Senge, 1990 & 2000) and Open Systems organizational models (Hoy et al.,

1991; Tarter & Hoy, 2004) provide a framework for comparison and contrast with school mindset theory within a context of organizational learning.

Framework of Organizational Learning

A variety of researchers have developed models contributing to improved organizational outcomes: the Fifth Discipline (Senge, 1990); Bertalanffy's Open Systems (Tarter & Hoy, 2004); Argyris & Schon's (1996) Theory-of-Action, Organizational Ecology, Action Learning Perspective, single and double-loop learning; Checkland's Soft Systems model and thought-in-use; and Beer's Viable Systems model and participatory structure (Flood, 1999). A review of the literature of these models provided a variety of variables shown to correlate with improved organizational outcomes. The literature on school mindset showed similar constructs with the organizational learning model factors—especially the construct variables linked with systems thinking and open systems model.

Systems Thinking

Yeo (2005) described organizational learning as the result of individuals working together and developing a shared consciousness as a result of that work. He described a "new form of labor" that takes place while doing the work as opposed to learning a task separately such as in a classroom (p. 371). He further explained the significance of systems thinking. Senge (1990) described the process of organizational learning as developing shared mental models. Shared mental models compared favorably with school mindset constructs of professional collaborations when faculty believes they are

able to help all students learn and grow (Blackwell, 2012). Similarly the Open Systems model used constructs that include collaborative decision-making, collegial relationships, and collective efficacy as key to organizational learning and explained improved organizational outcomes (Hoy et al., 1991). Taken together, these models include three levels of engagement in organizations that contribute to individual and organizational learning.

The Five Disciplines. In the Five Disciplines model, a learning organization included the following key disciplines: personal mastery, mental models, shared vision, team learning, and systems thinking. Senge defined a discipline as those ideas and insights that individuals practiced until integrated as part of their personal behaviors. Under the Five-Disciplines the primary activity of the leader was to provide interventions that promoted the development of the school as a learning organization. Senge (1990) explained:

...people are agents, able to act upon the structures and systems of which they are a part. All the disciplines are, in this way, 'concerned with a shift of mind from seeing parts to seeing wholes, from seeing people as helpless reactors to seeing them as active participants in shaping their reality, from reacting to the present to creating the future' (p. 69).

This review identified Senge's 2nd Discipline, mental models, as similar to Dweck's (2006, 2012) model of mindset. Senge (2000) explained individuals generate their beliefs, from inference, through experience. He recommended the processes of reflection and inquiry as necessary for individuals to continually reconstruct and correct their mental models. Senge explained that without reflection and inquiry an individual's

mental model might result in bias and incorrect constructs through a process he described as the “ladder of inference” (p. 68 & 69).

In a learning organization, leaders ... are responsible for building organizations w[h]ere people continually expand their capabilities to understand complexity, clarify vision, and improve shared mental models – that is they are responsible for learning... (Senge, 1990, p. 340).

Organizational learning in this model is the development of improved shared mental models. The concepts of individual mental models, the use of reflection, and a collaborative network within the organization are consistent with the concepts of individual and school mindset and yet different.

Open Systems Model. The Open Systems model identified the unit of analysis as the organization, not the individual. Researchers used Likert-style surveys with faculty self-reports to capture the organizational climate of a school defined as:

...the relatively enduring quality of the school environment that is experienced by participants, affects their behavior, and is based on their collective perceptions of behavior in schools, or openness of an organization, using a personality metaphor and defined as the health of the interpersonal relationships within the organization (Hoy & Miskel, 2005; Hoy et al., 1991, p. 10).

The Open Systems model identified four organizational elements shown to influence organizational outcomes. These include the structure of the system; the qualities the individuals bring to the system; the culture and symbols of the system; and the conflict or tension between the individual's and the organization's goals. An "open climate" in an organization is when individuals demonstrate cooperation, respect, and openness between the individual faculty members and the faculty and the principal. Researchers tested the validity of the Open Systems model by showing certain critical internal elements of an

organizational system positively correlated with school effectiveness. The model included the factors of an enabling school structure. One factor included principals and faculty working together as colleagues. Another factor was the individual's desire to gain control over his work environment and the influence this had on motivation. Next, the culture of the organization related to the leadership style of the principal. Finally, the way administrators made decisions influenced individuals and the group (Leithwood, Anderson, Louis & Wahlstrom, 2004; Tarter & Hoy, 2004, p. 540; Strahan, Spencer & Zanna, 2002; Spencer-Rogers et al., 2012). School mindset correlated significantly with variables shown to influence positive organizational outcomes. School mindset included elements of Open System models within the purported operationalized constructs of a school mindset culture on the WSM scale (Blackwell, 2012). Table 1 provides a comparison of the levels of learning and factors of a learning organization.

Table 1. Levels of learning in a learning organization and their factors.

Stages of Learning	Level I	Level II	Level III
Senge's Disciplines	Individual mental models and personal mastery	Team learning changes how people think The focus is on the manager	Systems thinking, developing a shared vision, and creating a way of life.
Open Systems	Individual control over environment, individual's belief in the group's ability	Collegial teams with open communication	System changes include group decision making and culture changes supported by the leader
School Mindset Culture	Individual belief in the faculty's ability to help all students grow and learn	Team collaborations with open communication	System changes through shared leadership, common goals, and a school-wide plan to get there

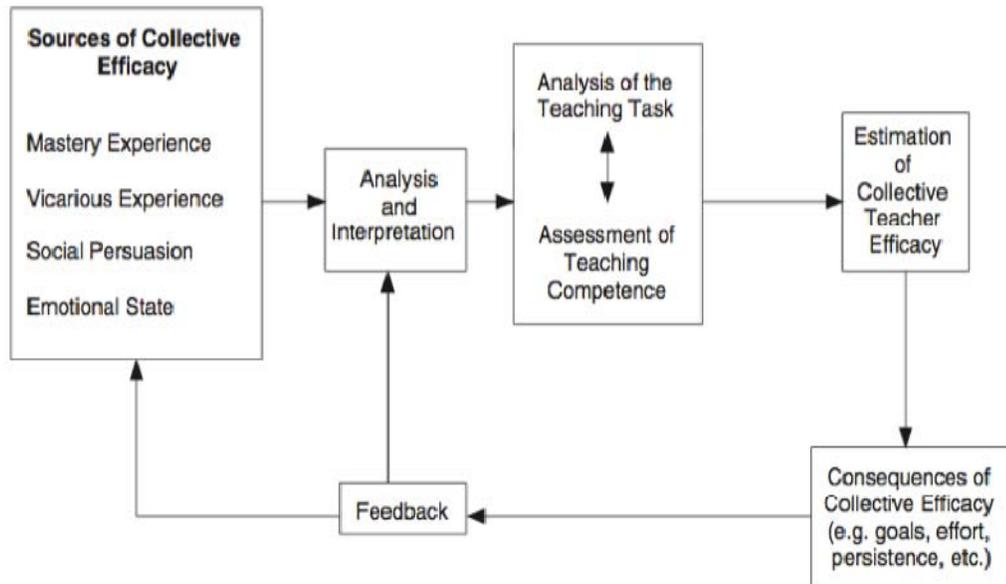
Enabling School Structures were shown to facilitate and guide the organization toward goal attainment. An enabling school structure focused on the importance of the principal's relationship with the faculty. The principal's behavior influenced the group's motivation to work together toward common goals (Tarter & Hoy, 2004, p. 540). In an enabling school structure the system consists of shared beliefs that unite the people, provide a common identity, increases the commitment of the faculty, and increases their beliefs in the general effectiveness of the school. Tarter & Hoy confirmed their hypothesis that "school performance improves as the school structure becomes more enabling" (p. 542). A pilot study by this researcher examined the influence of principal and faculty beliefs in the effectiveness of their school. The pilot study surveyed principal and faculty perceptions their school's mindset culture using the WMSM scale. The Faculty Change Orientation scale collects faculty self-reports of faculty openness to change and principal openness to change. Faculty perceptions of their work locus of control were quantified using the Work Locus of Control scale (Kearney & Smith, 2008; Plaks, Grant & Dweck, 2005). Statistical analysis using SPSS software showed the independent variables explained .69 of the variation in the dependent variable of school mindset culture. The literature also showed significant individual dispositions of openness and conscientiousness had a significant correlation to a growth mindset (Burnette & Pollack's, 2013, p. 370).

Collective Efficacy. Collective efficacy is grounded in cognitive social theory and has been demonstrated to be "an important predictor of the differences between schools and student achievement" (Goddard, 2002, p. 98; McGuigan & Hoy, 2006; Hoy,

Tarter, & Woolfolk Hoy, 2006). The collective efficacy model includes two constructs: group-teaching competency and task analysis. Group-teaching competency refers to perceptions of the faculty's "teaching methods, skills, training, and expertise." Task analysis refers to perceptions of the characteristics of the actual task, motivations and abilities of students, and support from home and community (p.100). In school cultures, collective efficacy is the faculty's belief about the capacity of the entire staff to work together to achieve positive effects on students. Collective efficacy as described by Bandura, and discussed earlier in this paper, included influences from the social group, culture, and individual responses to social situations. The following Figure 1 shows variables that comprise the collective efficacy construct and have been shown to contribute to higher goals, persistence in the face of challenges, and willingness to increase effort (Bandura, 2001). This concept will be discussed further in this paper as it relates to the five key features of a growth school mindset and to the factors identified in this study.

Work Locus of Control. Bandura (2001) demonstrated the individual's need to gain control over his environment and to have a personal choice (Plaks, et al., 2005). Tarter & Hoy (2004) confirmed this hypothesis. Research revealed the positive correlation between control and school effectiveness. Persistence, motivation, and effort toward goal attainment increased with an increase in the individual's perception that their actions would produce the desired outcome. The Work Locus of Control Scale captures and quantifies this concept through participant self-report responses (Spector, 1988;

Figure 1. A simplified model of collective faculty efficacy, Goddard (2002) p. 101.



Maurer, Wrenn, Pierce, Tross & Collins, 2003; Smith, Wigboldus & Dijksterhuis, 2008).

The literature review revealed the significance of the individual agency as a foundational factor in improved student outcomes. Work locus of control is domain specific and captures job-related variables such as job performance, satisfaction, behavior, and organizational commitment (Wang, Bowling & Eschleman, 2010, p. 762). The higher the respondent's score, the higher the external locus of control. External locus of control was considered less favorable and suggested the individual felt their work environment was influenced more by others than by their efforts. Research revealed one's view of their control over relationships in their environment influenced an individual's work locus of control (Furnham & Drakeley, 1993). The better relationships with their supervisors and co-workers the greater the belief the individual could favorably influence the others' behaviors, and this increased his or her sense of work locus of control (Spector, 1988).

Learner agency is an important factor in the development of meaningful learning. Cognitive social theory describes the important influence of the individual's environment on cognition. The influences of social experience and psychosocial factors are consistent with mindset theory features (Ponton, Derrick, Carr & Hall, n.d.; Zimmerman, 1989; Farrington, 2013). Thus, meaningful student learning is a sound dependent measure to evaluate the quality of the school context. A variety of variables contribute to the quality of the school context and therefore to student learning including organizational learning and the concept of mindset.

As previously mentioned Ausubel (1963, 1968, and 2000) explored ways to improve student learning. He identified two distinct types of learning, rote and meaningful. Rote learning was defined as new knowledge arbitrarily and unsubstantially acquired by the learner; identified within a specific context; and, because of the passive nature of the learning, does not transfer to a new context. Therefore, rote learning has been referred to as situated learning. Meaningful learning required learner choice, or agency, to engage the new knowledge. The learner actively incorporates new knowledge into his existing knowledge structure, creating new networks and new meanings (Novak, 2002, p. 549; Ponton & Rhea, 2006). This learning is meaningful because it is transferrable to new contexts for use in creating new constructs and solving problems. Schunk (2012) explained, "The basic processes involve setting goals, judging anticipated outcomes of actions, evaluating progress toward goals, and self-regulating thoughts, emotions, and actions" (pp. 118 & 119). This process just described can also be used as a definition of a feedback loop. A feedback loop is comparable to the definition in

cognitive social theory for human agency factors (Bandura, 2001), and similar to Senge's (1990) Five Disciplines, and compares to features of Tarter & Hoy's (2004) Open System constructs of enabling school structures and collective efficacy. Strategies promoting the development of faculty and student agency in schools were found useful in promoting growth mindsets (Farrington, et al., 2012; Dweck, 2010; Blackwell, 2012). The same strategies are related to school practices, grading and the feedback loop (Farrington et al., 2012; Farrington, 2013; Burnette, O'boyle, Vanepps, Pollack & Finkel, 2013).

Individual Mindset

Connection to Cognitive Social Theory

Mindset theory is situated in the cognitive social model of motivation and learning. Implicit theories of fixed or incremental mindset have been shown to predict self-regulatory processes of goal setting, similar to constructs of human agency (Hong et al., 1999; Baumeister, Masicampo & Vohs, 2011). Current research revealed the social context strongly influenced learner agency (Spector, 1988; Wang et al., 2010; Blackwell, 2012). The group has a powerful influence on whether the learner experiences internal or external locus of control as described in Bandura's cognitive social theory. Researchers are currently exploring the usefulness of psychosocial supports within the school environment that will produce learner choice to engage new knowledge. These supports included goal alignment, feedback, resources, and skill development (Rottschaefter & Knowlton, 1979; Martin, 1979; Novak & Gowin, 1984; Dweck, 1986; Bandura, 1986, 2001; Zimmerman, 1989; Dweck & Leggett, 1988; Farrington et al., 2012). These

psychosocial supports were consistent with the five features of a growth school mindset culture (Blackwell, 2012; Mindset Works, 2008-2012a-c). These variables were also consistent with the research on academic mindset in the Five Categories of Non-Cognitive factors (Farrington et. al, 2012). These were also factors used in interventions to develop effective school cultures for supporting all students toward developing meaningful learning outcomes. The concept of learner agency, or control over one's environment, was central to the psychological and socio-cognitive processing model of mindset. Mindset theory explained the learner's need for a belief in "establishing and maintaining...[a] subjective sense of prediction and control" over one's experience in the world (Plaks, et al., 2005, p. 245).

Bandura (2001) explained that the well-being of the individual depended on individual goal alignment with the system's goals. Effective school leaders, using mindset interventions, understand the importance of goal alignment between individuals within the organization (Woike, 2008; Burnette et al., 2013). For example, research in the area of the concept of mindset showed influences on individual behaviors resulted from one's belief in personal control. This belief was shown to influence the individual's subsequent choices and behaviors used during the decision-making processes. Individuals with fixed mindsets selected performance goals more often than mastery learning goals. This was the result of an effort to obtain a positive social judgment or avoid negative evaluations. Kang, Scharmann & Noh (2004) wrote, "motivational constructs, such as mastery goal orientation, adoption of a constructivist belief about learning, higher levels of personal interest, self-efficacy, and personal control, should be

potential mediators of the process of conceptual change" (p. 91). For example, students shifted to a fixed mindset when they received negative feedback toward goal attainment. Resultantly, some students changed their major or dropped out of college (Thornton & Mcentee, 1995; Dai & Cromley, 2014; Thornton & Mcentee, 1995; Dai & Cromley, 2014). In sum, changes in school climate were shown to leverage improvements in school outcomes. These changes included individual agency, collaborative decision-making, recognition of the individual nature of meaning-making, openness to change, and psychosocial supports, such as mindset interventions. Key aspects of cognitive social theory are a foundation of mindset theory (Senge, 2000; Bandura, 2001; Tarter & Hoy, 2004; Dweck, 2012; Farrington et al., 2012, Job, Walton, Bernecker & Dweck, in press).

Seminal Studies. Dweck's (1975) foundational research was in learned helplessness in children. She noticed during her research that some children viewed difficult problems as challenges and persisted, using mastery strategies, while others gave up and viewed themselves as failing. She found students held theories of their intelligence that influenced their behaviors. Students who felt their intelligence was unchangeable gave up easily while students who felt they could improve through effort sought out academic challenges. Dweck labeled these beliefs as implicit self-theories of intelligence called "entity" and "incremental" (Dweck, 1995; Dweck & Leggett, 1988). Subsequently she found that faculty who praised students for their intelligence rather than their effort sent a message to students that they did not have control over their learning. She began to create interventions that taught faculty to praise students for their effort and found it changed students' behavior (Dweck, 1999). Later, Dweck changed the unwieldy

terms of “entity” and “incremental” to fixed and growth. An individual with a fixed mindset believed his intelligence was a trait that did not change. Individuals with growth mindset beliefs felt that they could improve and grow through effort and practice. Dweck showed mindset beliefs were malleable and explained variations in student choices of behaviors and strategies used to meet learning goals (Dweck, 2002 & 2008).

Criticisms of the Mindset Theory. Dweck’s (1986) model may be considered too narrow by some researchers and educational leaders (Farrington et al., 2012). Her instruments use only brief questionnaires to identify beliefs of individuals. She uses the results to create fixed categories that label individual beliefs. She then uses these labels to explain variations in individual choices and behaviors that result from these beliefs. Further, the mindset research often excluded the population of individuals who indicated neither fixed nor growth mindsets. Additionally, current mindset theoretical models may be too simplistic and exclude other relevant factors related to goal setting and goal attainment (Plaks et al., 2005). Other research results for individual mindset interventions showed only modest gains (on average .3 GPA points) for subcategories of the student population. Mindset intervention benefits were limited to students with low performance, of a minority race, or of the female gender (Aronson, Cohen & McColskey, 2009). Further, when students became aware of the purpose of the interventions, the results were compromised (Farrington et al., 2012, p. 36). Therefore, interventions in the area of mindset at the individual level showed less potential for school improvement than those focused at the level of the organization.

Alternative Theories. Dweck & Leggett's (1988) goal theory, Kirshner & Whitson's (1998) situated learning and Senge's mental models and Five Disciplines (1999) all viewed individual agency and learner choice over goals as critical elements in learning. Hong et al.'s (1999) meaning framework and the setting, operating, monitoring and attainment (SOMA) model incorporated mindset research. Researchers explored the influence of implicit theories such as mindset on the feedback loop in goal attainment through self-regulation. Researchers found that individuals' implicit (growth mindset) theories explained an ability to self-regulate and to gain progress toward goals (Burnette, et al., 2013). Gollwitzer (1990) added to the literature by describing goal theory. Mindset is similar but Gollwitzer focused on two stages in the goal attainment process; decision making and implementation, instead of the individual's beliefs about one's intelligence. The implicit learning theories of Burnette et al. (2013) suggested that the content and structure of one's memory differed depending on one's level of awareness and the purpose of his motives, or goals. Bandura's (2001) foundational work in cognitive social theory is a foundational concept for these models and will be shown to be both similar and different from Dweck's mindset theory.

Academic Mindset

Researchers described academic mindsets as ways students think of themselves that make them want to learn (Farrington et al., 2012, p. 9). The concept of academic mindset adds to the individual mindset construct. Academic mindset includes a student's belief that he belongs, relevance of the tasks required of him, and a belief that he can

perform the tasks (self-efficacy). Students with academic mindset demonstrate academic behaviors of study, attendance, and homework completion. The Five Categories of Non-Cognitive Factors includes the concept of academic mindset as well as academic behaviors, academic perseverance, learning strategies, and social skills. These factors incorporate many familiar concepts in educational leadership preparation programs and taught in faculty professional development. A few of the concepts are: persistence, resilience, grit, goal setting, collaboration, self-efficacy, self-control, self-discipline, motivation, mindsets, effort, and learning strategies (Farrington et al., 2012, p. 8; Freitas, Gollwitzer & Trope, 2004). This paper discusses here factor 3, academic mindsets. Academic mindsets are associated with behaviors that have large effects on student learning. Osterman (2000) found variables within the school context and instructional methods that can be influenced by administrators and faculty and shown to develop academic mindsets in students (Blackwell et al., 2007). The next section provides examples of how researchers have studied the influence school context has on academic mindset. The Project for Education Research that Scales (PERTS) provides an example of how the influence of school context on academic mindset was studied (PERTS, 2014a).

Group Mindset

Murphy & Dweck (2010) explored the dynamic concept of the self and the influence of the organization on individual beliefs, behaviors, and motivation. Dweck hypothesized that the individual need to be valued and accepted would influence how

people display themselves in a group. Dweck found significant and large effects on individual behaviors depending on the organization's theory of intelligence. The concept of a growth school mindset culture compares and contrasts with organizational and learning organization factors. These factors are consistent with recent motivational theory research expanding on the individual concepts of fixed and incremental mindset begun by Dweck (2006). Dweck's current research explores the influences of group mindset on individual and group behavior. For example, Senn Delaney participated with Dweck and her collaborators to perform interview and survey research with Fortune 1000 companies. The two-year study showed an organization's mindset was a key factor in developing positive behaviors within the organization. These behaviors included resilience, innovation, collaboration, engagement, commitment, and trust (Delaney et al., 2015). Additionally, Murphy & Dweck (2010) performed experimental studies with university students to determine the effects of group-level mindset on individuals. The research revealed an organization's environment and norms, or the embodied shared perceptions, of a fixed versus entity view of intelligence affected the individuals' self-perceptions, motivation, and behavior toward others. Such studies have implications for schools as organizations.

For example, the research showed group-level mindset theories influenced the way people in the group perceived what the organization valued (Delaney et al., 2015). The group mindset influenced how individuals displayed themselves to the group to gain acceptance and avoid negative judgment. Further, there were "sticky" effects resulting in shifts in the individual's values as they internalized the group values. Then "downstream"

effects influenced how the individuals later evaluated themselves. Further, "spillover" effects resulted in shifts in how the individual's evaluated and treated others in unrelated contexts (Murphy & Dweck 2010, pgs. 292-294). Finally, research showed that because the organization and individual's mindsets were malleable they reciprocally influenced the choices of goals, the level of persistence in the face of challenge, and the level of collaboration with others. This process is comparable to organizational learning and learning organization models showing the reciprocal influence of the group on individuals in developing meaningful learning and cultures that influence positive organizational outcomes. These results have significant implications for school administrators. Variables shown in organizational learning and school mindset may help improve school cultures that promote faculty perceptions of their school culture that include a belief that all faculty can help all students learn and grow (Hoy et al., 1991; Collinson & Cook, 2007; Kearney, 2007; Sanders & Sheldon, 2009).

Mindset Concepts Compared

Individual, academic, and group mindset concepts are similar and different. Each level of mindset includes a belief in the ability of the individual or group to grow and learn. If the individual does not believe an individual's intelligence or trait can change through one's effort, they are considered to have a fixed mindset. A fixed mindset orientation has been shown to influence the behaviors of both the individuals and the organization as a whole (Delaney et al., 2015). The concept of academic mindset includes additional factors of belonging, relevance, self-efficacy, and motivation.

Academic mindsets focus on psychosocial factors of students in schools (Farrington et al., 2012). However, the concept of a school mindset refers to a shared belief in the collective consciousness of a school's faculty. The school's mindset is measured through self-report ratings from 1-6 by individual faculty for items on a Likert-style scale. The items list variables purported by Mindset Works, Inc. to develop a growth mindset culture in a school. The five key features of a growth school mindset purported to be operationalized on the WMSM scale include shared leadership, open communication, professional collaboration, clear goals and a plan, and support for students and belief in growth (Blackwell, 2012). Learning organization theory suggested an organization could act as a single entity with its own goals, values, and organizational behaviors (Hoy et al., 1991; Hoy & Tarter, 2004). The mindset of the organization has consequences for the behaviors and perceptions of the group and individuals.

Influence of Mindset on Organizations

Individuals experience their world situated within the organizational context. As individuals interact in the social group they create unique mental representations of how they perceive their experiences. Individuals want to control and predict what will happen (Senge, 1990; Dweck & Leggett, 1988; Novak, 2002). Because of limited experience and cognition, and subject to various psychological and emotional influences, individual models of the world incorporate limited or inappropriate hierarchical propositions. This process is individual and influences individual learning. The process of reciprocal projection is used to correct and improve the individual understandings of how the world

works. The organization learns from the individual in the same way and improves the collective understanding of the individuals in the group. Schools can promote engagement and meaningful learning by having an open culture. Open cultures provide opportunities for individuals to project their beliefs and to receive positive feedback. Open school cultures produce improvements in the construction and reorganization of the individual and group mental models. Ultimately open school cultures result in effective adaptation to the changing environment and move the school forward in improvement (Chui, Dweck, & Sacks, 1996; Senge, 1990; Bandura, 2001; Novak, 2002; Collinson & Cook, 2007; Dweck, 2012; Burnette et al., 2013). The feedback loop of projection and re-evaluation is a leverage point for developing individual motivations, affects, and beliefs. Individual beliefs influence the individual's perceptions, such as their mindset theory. A person's mindset theory influences his choices in goal setting, and the behaviors used as strategies to achieve goals. When negative feedback occurs in an unsupportive context, such as, if the school fails to provide adequate support, clear expectations, achievable goals, resources, monitoring, appropriate tasks, psychosocial and metacognitive skills, safety, and opportunity to practice new learning in realistic settings, the individuals may lose the belief that goals are attainable. This results in a reduced internal locus of control, a shift to a fixed mindset, and emotional or physical withdraw from school engagement. Though the individual may outwardly continue to conform to the group norms, lack of engagement results in failure to develop meaningful learning or shared meaning making. The result is the individuals use rote learning or compliance. The purpose is to meet expectations of normative assessments, grading

processes, and standardized goals. Rote learning lacks useful individual cognitive restructuring. When no corrections and improvements occur in the individual cognitive structure, there is no meaningful learning. Meaningful learning is necessary to transfer to new contexts (Tourangeau et al., 1989; Novak, 2002; Farrington et al., 2012; Brandstatter, Herrmann & Schuler, 2013).

Based upon their research in the area of mindset, Mindset Works, Inc. (2008-2012a-b) provides mindset resources for interventions that align closely with the implicit theories, goal setting, and feedback loop within a community. Mindset Works, Inc. provided a variety of recommendations to improve school cultures including reflection on one's mindset, growth mindset mentoring, focused instruction, allowing others to make mistakes and creating a safe environment for learning and practice (Blackwell, 2012, para. 11–15; Carver & Scheier, 2002). The interventions of a growth school mindset culture align well with Open Systems and The Five Discipline models. The focus is on the development of collegiate relationships, a supportive environment, and individual agency. This contrasted with hierarchal external authority models where external authority dictates the goals (Senge, 1990; Hoy et al., 1991; Tarter & Hoy, 2004; Mindset Works, 2008-2012a & b). Developing a growth mindset culture in a school influences the individuals in the school. Research has shown that promoting the factors of a growth school mindset also developed a growth mindset in the faculty and students. The impact of a growth mindset in schools was shown to improve student motivation and achievement. Growth mindset interventions increased math achievement in female gender students and improved achievement for individuals in minority racial categories

(Aronson, Fried & Good, 2002; Good, Aronson & Inzlicht, 2003; Yeager, Purdie-Vaughns, Garcia, Apfel, Brzustoski, Master, Hessert, Williams & Cohen, 2014). Students with growth mindsets improved resilience and even increased the density of neurons in the brain areas accompanied by an increase in IQ-performance (Mindset Works, 2008-2012). Mindset research in companies showed increased worker satisfaction, improvements in self-reports of organization culture, increased collaboration and innovation, ethical behavior, and improved supervisor views of employees (Delaney et al., 2015). Improving organizational learning through mindset interventions requires healthy organizational relationships that are open to change. Research suggested that reciprocal projections of individual beliefs, values, and behaviors co-create shared meanings within a zone of proximal development.

Administrators may use the information on mindset to promote improved school cultures. The administrator must first reflect and develop a personal growth mindset and belief in the importance of integrating psychosocial skills into the learning strategies of the school. The results of the mindset survey tools can be used to open dialog to discover the zone of proximal development of faculty. Discussion can begin about how to develop an openness to change. Administrators can work with faculty to provide training in psychosocial skills at the identified level of need. Administrators can provide support and a belief that the recommendations for change and growth are achievable through hard work. The focus is to develop a school wide belief that the school organization can develop practices that will help all students be successful (Murphy & Dweck, 2010; Blackwell, 2012). In sum, the school administrator must believe in the importance of

organizational learning. Organizational learning showed the potential for influencing the individuals in the organization. Openness to learning and a growth school mindset were shown to promote perseverance in the face of challenges. An openness to change is necessary during the development of organizational practices that produce improvement. Schools with teachers and administrators that believe in the potential to grow and learn were shown to promote student academic mindsets and behaviors. As concisely expressed by Robert Fritz, the researcher who developed the concept of mastery learning, “It’s not what the vision is, it’s what the vision does” (Senge, 1990, p. 142; Fulmer & Keys, 1998, p. 35).

Connection of Mindset and Organizational Learning

The overarching goal for organizational learning in schools is to help faculty help students in the process of a continuous construction, and reconstruction, of their individual conceptual frameworks; and to develop attitudes that result in their ability to become effective lifelong learners, who can meet the challenges of a rapidly changing, globally influenced, 21st Century world (Novak, 2002; Dweck, 2012). The challenge for school leaders has always been to develop learning organization cultures that demonstrate a belief that all students can grow and learn. This belief, called growth mindset, was identified as one of Five Categories of Non-Cognitive Factors that are key to developing student agency, was demonstrated in behaviors of academic engagement, and was required to build effective and accurate knowledge structures in students. Under the educational philosophy of individual academic mindset, an individual’s belief that he can

improve and grow through his own efforts influenced the individual's subsequent choices and behaviors. For example, individuals who expressed a belief that traits are fixed tended to helplessness in the face of challenges, or failure, and chose to withdraw. In contrast, individuals who expressed a belief that traits are malleable tended to choose mastery goals and persisted in the face of challenges. The belief that one's actions will be successful to obtain a future goal is included in the concept of a successful learning organizations, in the Five Non-Cognitive Factors of learning, and in learning theory models that explain the importance of student agency, or control, over the learning process as key to meaningful learning (Bandura, 2001; Novak, 2002; Farrington et al., 2012; Spencer-Rogers et al., 2012). Senge's description of mental models as "deeply ingrained assumptions, generalizations, or even pictures and images that influence how we understand the world and how we take action" corresponds to the definition of mindset (Senge, 1990, p. 8). Dweck's (1986) research showed an individual's mindset influenced perceptions in a cognitive-social processing model of experiential learning similar to Senge's ladder of inference. In contrast, mental models incorporate the individuals' cognitive mental frameworks, not just the individuals' beliefs about their traits, as described in the concept of individual mindset (Senge, 2000, p. 68). A discussion follows situating these organizational and individual learning concepts within the school context and their implications to student academic behaviors.

In review, the process of knowledge construction occurs through the creation of cognitive meaning from a change in an individual or organization's knowledge foundation occurring within a "bounded context" that includes emotional connotations

(Novak, 2002, p. 551). Woike (2008) explained, “[m]otives interact with situations to modulate the encoding and the later retrieval of the autobiographical knowledge that forms specific autobiographical memories” (p. 101). Similarly, Vygotsky (1962) emphasized the influence of the physical and social context in meaning construction and the co-creation of meaning within a zone of proximal development such that individual knowledge structures must be substantially similar in order to promote an affect that is open to learning from others. This is demonstrated in the fact individuals learn best in collaborative environments with their peers. Collaborative learning is an important concept in mindset research. Growth mindsets were shown effective because they increased openness to new information, willingness to collaborate, student choice to pursue academic goals, and persistence toward goals in the face of setbacks (John-Steiner & Mahn, 1996; Murphy & Dweck, 2010; Dweck, 2012; Lindle, 2014).

Improvements in research models of the learning process are not physical products. Individual mental constructs are mental models developed through the meaning making process within the researchers themselves as they participate in the research context. In order to promote organizational learning in schools and to create schools as learning organizations the research information must be provided in a relevant context to faculty who are supported in their own choice to engage the information and create their idiosyncratic understanding within their unique school context. This includes the importance of recognizing the need for faculty and student participation in setting school level goals and aligning them with individual goals. A review of the relevant research in mindset theory, learning organizations, organizational learning, and the

processes of meaningful learning suggested research-based practices transfer to school organizations when the administrator engages the faculty through dialog. This process can begin by surveying the staff in a supportive environment to identify specific needs in their particular school. Then the administrator can provide sufficient resources, demonstrate her own belief in the ability of each staff and student to grow and learn, and provide opportunities to practice the new learning. The review of the literature suggested that this process would result in increased openness to change, faculty choice to engage new information, and meaningful individual and organizational learning (Hoy et al., 1991; Senge, 2000; Tarter & Hoy, 2004; Sergiovanni, 2009). Farrington et al., 2012; Dweck, 2012). One-time interventions, new curriculum purchases, external mandates, directives through hierarchal authority, and annual, normative, cognitive assessments do not change collective consciousness, nor do they promote individual engagement in meaningful learning (Popkewitz, 1998; Evans, 2013; Behizadeh, 2014). As Novak (2002) wrote:

We know in principle why learning...is so ineffectual for most students and how to remediate this problem. What we lack is the commitment, resources, and the political strategies to change schooling...that requires uncompromising commitment to meaningful learning for all students in all subjects” (p. 568).

In sum, a review of the literature suggests that developing schools as learning organizations would result in improved faculty and student learning behaviors. This requires the recognition of the importance of the psychosocial non-cognitive factors in learning such as those proposed through the development of growth mindset school cultures (Mindset Works, 2008-2012a-c).

Connections of Mindset

and School Climate. The difference between the processes of acquiring rote

versus meaningful learning becomes the leverage point in creating learning organizations and organizational learning that results in improved outcomes for all students. Arguably, rote learning has met the expectations of normative outcome-based assessment tools such as end of year accountability assessments. Situated learning has provided the advantage of expedience in standardization of time and product-based pedagogies, curriculum, and learning-product definitions. In additions, there may be a reciprocal benefit of expedience resulting from the purity of rote learning because situated learning does not involve integration into the conceptual framework of the individual. By avoiding the engagement of individual learning differences in the learning environment, the school can avoid the individual ways student create their understandings. This so-called benefit can be suggested as a major contributor to the continuation of a school system that falls short of consistent meaningful learning for all students (Novak, 2002, p. 553).

One conclusion from this review of the literature might suggest that the methods of evaluation currently used focus more on the products of learning than the individualistic process of learning. This may be one reason individual learning in schools has been shown to be non-transferrable rather than meaningful. As Novak explained, “Thus much of this “high achievement” is really fraudulent or inauthentic” (p. 549). Behizadeh (2014) emphasized the importance of the assessment model in driving organizational behaviors, “for instruction to change, assessment needs to change” (p. 133). Novak (2002) wrote that innate intelligence, maturity levels, and quality of instruction, though significant, are not the most important factors in learning. He

recommended developing pedagogies to help students build meaning structures, allowing for the idiosyncratic process of learning, providing the appropriate framework, strategies, tools, and recognition of the emotional disposition of individual learners (p. 555). He explained, “[o]nly the learner can choose to learn meaningfully” (p. 557). Creating learning organizations requires promoting faculty and student agency, or their choice to engage new learning using an internal locus of control. These concepts are consistent with school mindset research, organizational learning, and the Five Categories of Non-Cognitive Factors describing psychosocial factors of learning such as academic mindset (Hoy et al., 1991; Senge, 1990; Tarter & Hoy, 2004; Dweck, 1989; Dweck et al., 1995; Burnette et al., 2013). Following is a discussion of how mindset beliefs can help in school transition success.

The Effects of Mindset on School Transition Success. One hypothesis resulting from the research review is that rote learning, or situated learning, in schools would result in reduced success during periods of student transitions from elementary to middle school or from middle school to high school, etc. In fact, mindset researchers have performed studies and revealed this to be the case. Research showed that individual students who expressed fixed mindset beliefs showed reduced achievement over the transition periods from elementary to middle school and middle school to high school (Heyman & Dweck, 1998). Blackwell, Trzesniewsk & Dweck (2007) performed a two-year study that followed hundreds of New York City students during their transition to seventh-grade. The students took self-report surveys at the beginning of the study identifying whether they held fixed or growth

beliefs. The results of the study showed students with growth mindsets outperformed those with fixed mindsets. Students with growth mindsets showed resilience in the face of challenges; believed their hard work and effort would improve their outcomes; and took more learning risks. Students with fixed mindsets showed less resilience, were fearful about taking risks and not looking smart, and said they would consider cheating on tests. Teacher behaviors were also shown to influence student mindset. Several replication studies agreed that 9th grade faculty demonstrated reduced monitoring, lack of feedback to students, and had insufficient skills to address the psychosocial factors needed to develop student engagement in school. The results were students' withdrawal behaviors during the transition year including: increased student absenteeism; incomplete homework; and failure to study (Harrington et al., 2012; Dweck, 2002). Researchers reported faculty used behaviorist strategies to motivate disengaged students:

From the faculty perspective, frustration with student behavior is compounded by their own lack of effective strategies to turn things around. Under deteriorating conditions, the threat of failure too often becomes the faculty' primary tool for addressing students' poor academic behaviors (p. 64).

In contrast, faculty with a growth mindset were shown more likely to see growth potential in struggling students, to support persistence to mastery, to praise students for effort rather than traits, and to support school change efforts (Mueller & Dweck, 1998; Bryant, 2013; Yeager, Johnson, Spitzer, Trzesniewski, Powers & Dweck, 2014). These studies revealed the benefits of applying growth mindset theory to develop growth mindset cultures in schools resulting in improved psychosocial skills in faculty and a belief all students can grow and learn. Faculty with growth mindset behaviors promoted

students with academic mindsets who were more likely to use effective academic behaviors and to persevere through school transitions (Dweck, 1989; Hong et al., 2000; Novak, 2002; Maurer et al., 2003). Additionally, researchers reported students developed a fixed mindset prior to dropping out of STEM majors in college or leaving school all together (Thornton & Mcentee, 1995; Dai & Cromley, 2014). This is consistent with the previous discussion supporting the use of psychosocial factors, such as mindset, that develop student agency and student choice to engage and persistent toward goals (Farrington et al., 2012). Recommendations include focusing interventions at the school level, teaching faculty the use of psychosocial skills that support student engagement, and including growth mindset factors in school improvements. Mindset interventions recognize the importance of identifying the unique individual and school needs in context providing information at the time the need is presented. Figure 2 shows a chart comparing and contrasting the concepts discussed so far with growth school mindset.

Measurement of School Mindset

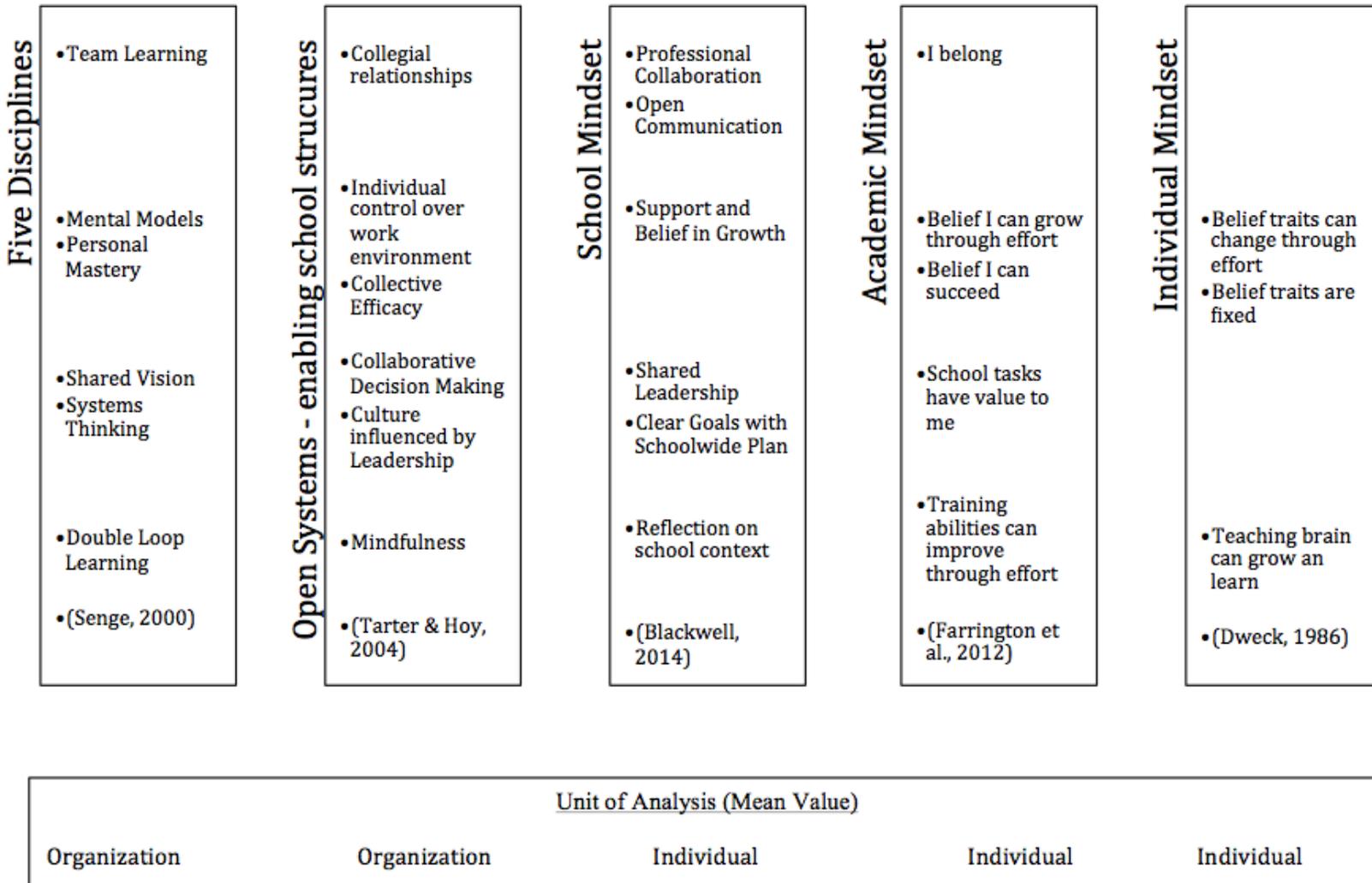
The concept of a growth school mindset culture became increasingly relevant in the education literature as researchers sought to identify variables of a model that promoted faculty working together to help all students grow and learn. Following is a discussion of the rationale for developing an instrument to measure mindset, the theoretical foundation of the measurement variables, development of the instruments, and a summary of the discussion.

Rationale for Growth Mindset Scale

There are potential benefits to school leaders to have evidence that the WMSM instrument is a reliable and valid scale. Administrators that use the WMSM scale to measure teachers' perceptions of their school culture want to know if the instrument is reliable. Administrators need good data to know how to help improve their schools (Kouzes & Posner, 2002; Novak, 2002; Collinson & Cook, 2007; Senge, 1990; National Policy Board for Educational Administration, 2008; Farrington et al., 2012). This study proposed to explore the factor structure of the WMSM scale. The literature on school mindset suggested five key features of a growth school mindset purported and operationalized in the WMSM scale of shared leadership, open communication professional collaboration, clear goals and a plan, and support for students and belief in growth (Blackwell, 2012). These variables were shown in a review of the literature on learning organizations and organizational learning to exert influences on school outcomes.

To ensure all students receive an equitable education takes more than an equitable distribution of physical resources such as facilities and funding. The beliefs of administrators, faculty, and students have been shown to have a significant impact on student achievement. A key goal of researchers in the area of psychosocial factors is to develop instruments that operationalize, quantify, and measure beliefs that increase student motivation and academic behaviors. The federal government has provided exemptions to several school districts from the strictly cognitive-based accountability testing required under the No Child Left Behind Act to collaborate with researchers.

Figure 2. Comparable and contrasting concepts with mindset constructs.



Together they seek to explore the potential for using psychosocial markers, such as school mindset, to indicate school improvement and student growth. For example, the California Office to Reform Education focuses on the social-emotional factors that promote improved student learning; including using growth mindset as a competency indicator for school improvement (Rotter, 1954; Bandura, 1977, 1986, 2001; Weiner, 1986; Dweck & Leggett, 1988; Esses et al., 1993; Taylor & Gollwitzer, 1995; Farrington et al., 2012, p. 9; Briceno, 2013; Adams, 2014).

Conceptual Framework for the What's My School Mindset? Scale

The factor structure of the WMSM scale, the current instrument for use in quantifying a school's growth mindset culture, has not been statistically explored and analyzed (S. Blackwell, personal communication, October 14, 2014 and March 31, 2015). Researchers using the scale may have problems with the internal validity of empirical studies (Hopko, 2003). Administrators using the instrument as a tool to identify attitudes of their school faculty that are malleable to influence will not be certain of the underlying factors they are measuring. The results could be errors in the interpretation of the data when trying to make changes that improve their school cultures. A valid and reliable instrument with a good fit to the data could help educational leaders understand the unique variables within their school that could be influenced to develop positive engagement in school-wide change. Administrators could promote participation in innovative and challenging organizational goals using accurate variables of faculty perceptions. Establishing a parsimonious model of the factor structure of the WMSM

scale could add to the body of mindset research and help identify recommendations for future study (Hoy et al., 1991; Kearney, 2007; Murphy & Dweck, 2010; Farrington et al., 2012; Delaney et al., 2015). Mindset culture variables of shared leadership, open communication, professional collaboration, clear goals and a plan, and support for students and belief in growth compared closely with the core features of cognitive social theory's agentic action, the ability to plan (intentionality), goal setting (forethought), motivation and self-monitoring (self-reactiveness), and efficacy (self-reflectiveness) (Bandura, 2001). Additionally, Bandura explained collective efficacy was the direct result of transactional interactions of the individual with the group. This reciprocal learning explained the group's ability to choose challenging goals, work together toward the goal, and achieve higher outcomes. Bandura wrote that an individual's beliefs, attributes, interests and competencies influence how one behaves and the choices one makes. Cognitive social theory and individual agency were shown to be a foundational theoretical base for mindset research (Hoy, Tarter & Kottkamp, 1991; Tarter & Hoy, 2004; Senge, 1990; Blackwell, 2012; Farrington et al., 2012).

Instrument Development

Blackwell, Trzesniewski & Dweck (2011) were motivated to develop ways to help faculty help students develop growth mindsets. They researched, developed, and co-founded the Mindset Works, Inc. research and educational training organization. Mindset Works, Inc. develops tools and instruments that assess individual, classroom, and school level mindset. Mindset Works, Inc. uses the results of these self-report surveys to recommend "motivational intervention curriculum" (Mindset Works, 2008-2012b, para.

1-11). Mindset Works, Inc. is in partnership with the U.S. Department of Education Institute of Education Sciences, Scholastic, Vision Network, Character Education Partnership, EdCaliber, St. John's University, and Meta-LUCID, an organization that provides training to companies to foster a growth mindset culture in the workplace.

Individual Mindset Scale. The first instrument developed to measure mindset constructs was the individual entity and incremental questionnaire to identify whether an individual believed his intelligence was fixed or whether it could be changed through one's effort. The initial surveys used have been validated and shown reliable (Dweck, 1999). Appendix B & C show two versions including the short form Intelligence – Fixed or Growth which has a Cronbach's alpha = .90; M = 3.31; SD = 1.04. Dweck, Chiu & Hong (1995) provide a construct validation study for the instrument.

Academic Mindset Scale. The academic mindset survey developed by PERTS (2014a) can be found on their website. The Likert-style survey instrument has 15-items and asks students to rate their beliefs on a scale from 1 - 6 about four factors shown to profoundly influence student learning. The factors include intelligence mindsets, sense of belonging, task relevance, and individual self-efficacy. Appendix D contains the questions of the scale. This scale is currently being given the 10,000 students in an ongoing study of the influence of academic mindsets on student transition success (PERTS, 2014b).

Group Mindset Scale. Mindset Works, Inc. developed a group level survey instrument to measure the level of faculty participation in leadership and decision-making

at their school, their openness to feedback, ability to accept change as a normal condition of the school, sharing knowledge, continuous improvement, communities of practice, beneficial professional development, and faculty's commitment to work to identify students' needs and ways to meet them (Blackwell, 2012, para. 5-10; Mindset Works, 2008-2015b). These variables are purportedly operationalized in five key features on the 20-item, Likert-style WMSM scale. The survey is available free of charge on the Mindset Works, Inc. website. The results of individual faculty self-reports are used to place the school in one of three categories; either fixed, neither or growth mindset. Mindset Works, Inc. then provides suggestions for improving the growth school mindset by offering intervention materials and training (Blackwell, 2012, para. 4; Dweck, 1986 & 2012; Dweck, Chiu, & Hong, 1995; Tarter & Hoy, 2004). No reported studies were found or provided that explored the psychometric properties or factor structure of the scale. A detailed description of the instrument is included in Chapter Three of this paper. Appendix E provides the items on the instrument (Mindset Works, 2008-2012c).

Summary. Several instruments have been developed to measure factors of individual and group mindset. A comparison and contrast of mindset theory with the Five Non-cognitive Factors (Farrington et al., 2012), the Five Disciplines (Senge, 1990), Open Systems model (Tarter & Hoy, 2004), and with cognitive social theory (Bandura, 2001) showed strong relationships between the factors that explain improved school outcomes. These variables of learning organization models compared favorably to the five key features purported as operationalized in the WMSM scale. The variables included collective efficacy, engaging school structures and work locus of control

(Furnham & Drakeley, 1993; Blackwell, 2012). The proposed factor structure of the current instrument for use in quantifying a school's growth Mindset culture has not been statistically explored and analyzed (S. Blackwell, personal communication, October 14, 2014). The use of an instrument that does not have well documented psychometric properties may adversely influence the internal validity of empirical studies that use the WMSM scale as an outcome measure. Administrators using the instrument as a tool to identify perceptions of their school faculty with an eye toward developing interventions would benefit by having a valid and reliable instrument designed to measure school mindset. Reliable scale are needed to help educational leaders understand the unique variables within their school that could be influenced to develop a multicultural view in schools where all students can learn and grow (Netemeyer et al., 2003).

Conclusion

Faculty perceptions, or more precisely the group mindset of the faculty, seem to influence students' mindsets, or the way students view their world. Students' mindsets are important because they define their identities as learners (Popkewitz, 1998; Johnston, Woodside-Jiron & Day, 2001). Faculty perceptions are reciprocally influenced by the school context and culture (Senge, 1990; Hoy et al., 1991; Tarter & Hoy, 2004; Collinson & Cook, 2007). Organizations with growth mindsets had happier employees, took more learning risks, and produced more innovations. Dweck (2010) and Delaney et al., (2015) suggested that it takes hard work and dedication to develop individuals that believe in an organization's capacity for growth, and a preponderance of supporting research revealed

the importance of developing a growth mindset in individuals and organizations (Heslin, Wanderwalle & Latham, 2006; Heslin & Wanderwalle, 2011).

Improving growth mindsets in organizations can be accomplished by designing organizational structures that question our assumptions, make explicit the tacit assumptions of the organization and individuals, create spaces for dialog and working together, and build trust. This results in increased collective efficacy, which was shown to improve school outcomes (King & Shuford, 1996; Bandura, 2001; Goddard, 2002; Tarter & Hoy, 2004; Gay, 2010). Organizations that invest in the development of their employees reap a multitude of rewards. For example, schools with a growth mindset developed growth mindsets in teachers and students. (Blackwell et al., 2007) Students with growth mindsets have been shown to display improved academic behaviors, have higher motivation, and choose more challenging goals than students reporting beliefs of fixed mindsets (Farrington et al., 2012). Academic mindsets include students' feelings of belonging, beliefs that effort will produce a good outcome, valuing the tasks assigned, and beliefs that their intelligence can grow through effort and learning (Dweck, 2010; Farrington et al., 2012). School administrators can develop growth mindsets in their schools that produce similar outcomes to individual benefits of growth mindset (Dweck, 2002; Heslin, Wanderwalle & Latham, 2006). Organizations with growth mindsets were shown to improve the administrator's view of the employees. Steps recommended to follow for improving school mindset include surveying the faculty, sharing information about a belief that all faculty and students can grow and learn, providing time and resources to support faculty in shared planning, providing targeted feedback, clear goals

and expectations, realistic tasks, targeted professional development, opportunities for shared leadership, and support for faculty in the belief that they can help all students learn and grow (Blackwell, 2012; Delaney et al., 2015). Research-based evidence is necessary to challenge assumptions and to provide sound reasons for new practices (Sanders & Sheldon, 2009; Marzano, Waters & McNulty, 2005; Sergiovanni, 2014). A valid and reliable instrument designed to measure school mindset could help educational leaders understand the unique psychosocial variables within their school culture. The appropriate use of data and the interpretation of results from the WMSM scale may help to shape a school's organization's potential to grow and learn (Hoy et al., 1991; Kearney, 2007; Gay, 2010). Results from this research study may provide baseline and intervention impact information needed to gauge implementation efforts for school change.

CHAPTER THREE

METHODS

This chapter provides a description of the methods used to answer the overarching research question of this study and includes: the research question, problem, purpose, data collection, sample, survey instruments, and the statistical data analysis procedures used. This study explored the factor structure of the WMSM scale. According to Mindset Works, Inc., the WMSM instrument assesses five underlying dimensions called key features of a growth school mindset and include shared leadership, open communication, professional collaboration, clear goals and a plan, and support for students and belief in growth (Blackwell, 2012).

Research Problem

The factor structure of the WMSM scale has not undergone empirical studies that provide validity evidence to support the underlying constructs proposed by Mindset Works, Inc. (S. Rodriguez, personal communication, March 31, 2015). Not understanding the underlying constructs representing the WMSM scale may lead to misinterpretation of results, leading to faulty conclusions by those using the results from the instrument with the intent to understand and shape a school's organizational culture. Lack of information about the WMSM's psychometric properties also presents a problem for the internal validity of empirical studies that use this instrument in research to investigate school culture factors that contribute to or explain improved school outcomes

(Hoy et al., 1991; Hopko, 2003; Kearney, 2007; Murphy & Dweck, 2010; Farrington et al., 2012; Delaney et al., 2015).

Purpose of the Study

The purpose of this study was to explore the factor structure of the WMSM scale. Developing an understanding of the underlying factor structure of the WMSM scale could provide a better understanding of the variables that may be useful to school administrators as they interpret WMSM results in their efforts to develop improved cultures at their schools. Although the What's My School Mindset? (WMSM) scale developed by Dweck and associates (Blackwell, Trzesniewski & Dweck, 2011) has been used to assess a mindset culture in schools, there have been no empirical studies providing validity evidence for its use (S. Rodriguez, personal communication, March 31, 2015).

Research Question

The overarching research question of this study was "What is the underlying factor structure of the WMSM scale?" The hypothesis proposed for the basis of the analyses performed in this study included:

H_0 = The five-factor structure of shared leadership, open communication, professional collaboration, clear goals and school plan, and support for and belief that all students can grow and learn does not represent the underlying factor structure for the WMSM scale.

H_a = The five-factor structure of shared leadership, open communication, professional collaboration, clear goals and school plan, and support for and belief that all students can grow and learn does represent the underlying factor structure for the WMSM scale.

Research Design

This quantitative study explored the factor structure of the WMSM scale using self-report responses on Likert-style survey by faculty and administrators. The items developed for the WMSM scale were designed to operationalize five key underlying latent features, or constructs related to school culture (Blackwell, 2012). Survey data was collected from faculty and administrators in a stratified random sample of Montana PK-12 (n =25) schools using a combination of paper and pencil surveys (n=281) administered in staff meetings, or distributed to staff in teacher mailboxes, and by staff and administrator participation using the online Qualtrics survey administration tool (n=30) during the 2014/2015 school year. All identifying data was coded for confidentiality. Survey data was kept for analysis on a secure computer and paper and pencil responses were kept in a locked office. Survey data was destroyed when the research study was completed. The data results of the survey were statistically analyzed using SPSS and Lisrel path analysis software.

Participants and Sample

The participants included in this study were faculty and administrators (n=311) from a random, stratified sample of 25 PK-12 schools across Montana. The minimum

participant response number determined for an adequate sample size to perform exploratory factor analysis for the study was set at 200 and was derived from a review of the literature on determining sample size for instrument development research, calculated from a 10:1 ratio of responses to survey item (Guilford, 1954; Zhao, 2009). This number was also used as the minimum total for calculating the distribution of responses from four category sizes of schools developed for the stratified random sample discussed in the previous paragraph. The sample was selected from 417 school districts in Montana including 10,153 teachers and 142,349 students during the 2014/2015 school year. Approximately 82% of Montana schools are identified as qualifying for Title I status (Faul, Erdfelder, Buchner & Lang, 2009; Meador, 2015). Urban, suburban, and rural classifications were considered to coincide with size categories of the schools for the purposes of this study (Office of the Federal Register, 2012). An approximate stratified random sample of Montana schools by class size was selected through random number generator to obtain a representative sample. A calculation was performed to obtain a sample that would closely represent the distribution of public schools across Montana by school size. First, categories were created for the different school sizes that approximated the classification by size categories designated for high school athletic participation in the state. A list of school districts in Montana was obtained from the Montana High School Association that also included their student population from OPI enrollment figures for fall of the 2013/2014 school year. Second, the percentage of total student population was calculated for each category. Third, the percentage was used to calculate the minimum number of faculty responses from each category needed for a

representative sample. Fourth, a random number generator was used to select the schools from each of the four categories of school sizes. Finally, the randomly selected list of schools was over-selected to ensure adequate teacher and administrator sample sizes for conducting both the exploratory and confirmatory factor analyses. Table 2 shows the distribution of the indices used for this study of a minimum stratified random sample (n=200). This sample size would provide a 95% confidence level that results of the study will generalize to the total population with a confidence interval of 6.86. The total number used for the population of teachers in Montana during the 2014/2015 school year was 10,153 as reported by the National Center for Education Statistics (Meador, 2015). This study attempted to collect an approximate similar proportion of participant responses as the percentage of schools in each of four categories of school sizes listed in the table (based on total student population).

Table 2. Table of the percent of public schools by size categories and number of responses needed by category.

School size	Categories by Student Enrollment				Total	CL	CI
	< 150	150 to 500	501 to 1000	> 1000			
Percent of total	17%	12%	23%	48%	100%		
Number of teachers per category based upon percentage required	1726	1218	2335	4873	10,153		
Minimum number of responses needed	34	24	46	96	200	95%	6.86

Data Collection Instruments

The WMSM scale used in this study was obtained from the Mindset Works, Inc. website (Mindset Works, 2008-2015c). No psychometric properties of reliability statistics or information on validity testing using the WMSM survey were reported by the authors in the literature, nor were available through communication with Director of Research & Implementation Sylvia Rodriguez at Mindset Works, Inc. (October 14, 2014 and March 31, 2015). Therefore, an exploratory factor analysis was warranted to investigate the number of underlying factors represented. The WMSM scale includes 20-items that respondents rated on a Likert-style scale ranging from 1= Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Somewhat Agree, 5 = Agree, and 6 = Strongly Agree. Mindset Works, Inc. (2015) wrote the WMSM scale measures teacher perceptions of the level of faculty participation in leadership and decision-making, openness to feedback, accepting change as a normal condition of the school, sharing knowledge, continuous improvement, communities of practice, beneficial professional development, students' needs met or working to identify ways to meet them, and a school-wide pride (Blackwell, 2012). Respondents in this study expressed their level of agreement to items about their school culture by selecting a scale level on the survey. The data was entered into SPSS (IBM, 2013) software for analysis. The negatively worded items, 6, 8, 10, and 19 were reversed scored. Variable means were calculated for each item and an overall mean was calculated for each participant's responses. The higher the mean score on the survey the more the individual respondent was considered to perceive his school as demonstrating the characteristics of a growth mindset

(Netemeyer et al., 2003). A pilot study, conducted by this researcher with PK-12 teachers and administrators ($n = 72$) from four rural schools in Montana, found a Cronbach's alpha of .902 for the scale used. The mean teacher response using the Strongly Disagree to Strongly Agree scale was: 3.795 ($SD = .735$) on a scale of 1 – 6.

Procedures and Data Collection

For the purposes of this study a “teacher” was defined as an individual recognized as a teaching professional who attends regular faculty meetings, or is considered a certified faculty member. The survey included a question for self-identification of the teacher designation. Any individuals taking the survey that were not designated as faculty or administrators would be identified and removed from the statistical analyses. The survey was administered either by the researcher at the school site, a school district representative provided with a standardized protocol, or through the online Qualtrics survey software program. Participating school district central office administration provided permission to the researcher prior to distribution of all surveys to the participants. Central office personnel, such as superintendents and principals, were contacted directly, by letter, telephone, face-to-face, or through a representative at the school district. The superintendent of each participating school district received a letter of introduction and instructions for a standardized distribution protocol for the survey. The school district representatives, or researcher by advance appointment, distributed the surveys and provided information to the faculty including a brief description of the purpose of the study and a Human Subjects Research Consent Form. The consent form

included information for participants that described the purpose of the survey, the voluntary nature of the study and the right to not participate, to not answer any questions and that they could stop at any time, the length of the survey, and the confidentiality of their responses. Subjects received a signed copy of the consent form and were required to confirm their understanding and willingness to participate in the study by signing and returning a copy of the consent form, or by clicking the “Next” button on the Qualtrix online survey. All participant responses were maintained confidential and were destroyed at the completion of this study.

Data Analysis

The WMSM survey responses collected were entered into the statistical software program SPSS version 22 for analyses (IBM, 2013). The results of the exploratory factor analysis were used to propose a model that could be tested against an estimated population model using with a confirmatory factor analysis using Lisrel 8.72 analytic software (Joreskog & Sorbom, 2001). The following section includes a brief description of the statistical analyses performed in this study. Before performing exploratory statistical procedures, the data collected was examined to evaluate the assumptions of normality, multicollinearity, and for missing data. The purpose of these analyses was to identify issues with the data that may adversely impact the exploratory and confirmatory factor analysis, (Jöreskog, 1999; Netemeyer et al., 2003; Gravetter & Wallnau, 2014). The methodology used in this study included multiple steps. Theory, logic, and a review of peer-reviewed articles guided the decisions made in the choice of statistical analytical

procedures used. The research study found no prior research data, or study, which previously tested the underlying factor structure of the WMSM scale. Therefore, no a priori model was tested in this study. Data analyses for this study consisted of three phases described following.

Evaluating Assumptions

The first phase was to analyze the normality of data distributions, multicollinearity among variables, and to calculate descriptive statistics. Statistical analysis was performed on the results of the WMSM survey sample data to determine if the data fit a normal distribution and was considered reasonable for parametric analyses. Means and standard deviations for each variable were also explored for outliers that may influence the usefulness of the data for drawing valid conclusions that generalize to the population from which the data was drawn (Tabachnick & Fidell, 2001; Lüdtke, Robitzsch, Trautwein & Kunter, 2009). Tests for symmetry (skewness) and flatness (kurtosis) were tested using indices for acceptable limits of ± 2 (Trochim & Donnelly, 2006; Field, 2000 & 2009; Gravetter & Wallnau, 2014). All items tested were within acceptable limits and a further discussion is provided in a future section of this paper.

Representativeness

Next, a cross-tabs statistical analysis was performed to explore the interdependence of the demographic data variables and to identify statistically significant differences ($p < .05$). One-way ANOVA analysis was used to compare the category means and determine any significant differences between groups that may affect the

ability to generalize the results. Significant variations in the sample data were noted between WSMS mean score of participants from elementary building levels compared to middle and high school respondents. The mean of the elementary school participant responses ($n=111$) was 4.5565 ($SD = .75617$, $p<.001$), middle school ($n=34$) was 3.8235 ($SD=.70623$, $p<.001$), and high school ($n=91$) was 3.7438 ($SD=.58504$, $p<.001$). This is consistent with Blackwell, et al., (2007) in their research on student transition success from elementary to middle and high schools. No significant differences were found between the participant group means of gender, years teaching, position, or school size. Results of the descriptive statistical analyses are presented in Tables 3 - 8 located in Chapter Four.

Exploratory Factor Analyses

The second phase consisted of conducting an exploratory factor analysis using SPSS version 22 (IBM, 2013) with the first half of the randomly selected data ($n = 156$). A purpose of these EFA analyses was to attempt to determine groups of variables, or in this case, items, which best represented the underlying latent traits of the WMSM scale. Exploratory factor analyses is a variable reduction technique which identifies the number of latent constructs and the underlying factor structure of a set of observed variables. The researcher then developed a name for the factors based on a review of the literature, theory and an analysis of the language of the survey items loading on unique factors (Tarter & Hoy, 2004; Senge, 2000; Blackwell, 2012; Farrington et al., 2012). An EFA analysis seeks to obtain a "simple factor structure" defined as high loadings of items on one unique factor and very low loadings on each of the other factors. The ideal factor

structure would be factor loadings for each item on only one distinct factor and zeroes loading on all the other factors. This is rarely the case in social sciences research though the goal is to obtain a factor structure through the various choice of analyses that comes as close to a simple structure as possible (Billings, R. S., & Wroten, 1978; Fornell & Larcker, 1981; Kline, 2002; Netemeyer et al., 2003; Brown, 2009; Lüdtke, Robitzsch, Trautwein & Kunter, 2009; George & Mallery, 2010; Marsh, Lüdtke, Nagengast, Trautwein, Morin, Abduljabbar & Köller, 2012). To this end, the factor loadings from the exploratory factor analyses were used to identify extracted factors. The items of the correlating variables were also evaluated and compared to the literature on school mindset, organizational learning, and social cognitive theory. Factors, as latent traits, were interpreted and named based on the mindset literature (Blackwell, 2012).

Confirmatory Factor Analyses (CFA)

During the third phase of analysis, the second random half of the data was used to test the fit of the proposed factor model identified by the exploratory analysis. Research on social science construct measures, or latent variables, are performed indirectly. This requires methods to capture the responses and validate the construct reported in the literature. Confirmatory factor analysis provides a test of repeatability to determine the reliability of the instrument (Jöreskog, 1977; Muthén & Muthén, 2008; Hair, Hult, Ringle & Sarstedt, 2014). The CFA was used as a repeat measure to test the proposed model from the EFA hypothesized sample by creating two sets of data from the total sample. The hypothesized population model developed from the first half of the data (n=156) was tested for model fit using the replication sample data (n=155). The CFA analyses used

explored the relationship between the observed variables and the underlying latent variables. A model is developed by the researcher from a combination of theory, results of the statistical analysis of the research data and tested statistically. A variety of indicators were used as measures to determine if the model was a good “fit” to evaluate the model proposed from the EFA phase. Results from the CFA were used to test the null hypothesis:

H_0 = The five-factor structure of shared leadership, open communication, professional collaboration, clear goals and school plan, and support for and belief that all students can grow and learn does not represent the underlying factor structure for the WMSM scale.

Summary

The purpose of this study was to explore and test the model fit of the factor structure of the WMSM scale identified by the exploratory analysis. A stratified random sample was drawn from the PK-12 public schools in Montana in the effort to ensure a representative sample of the population tested. The distribution of school sizes in Montana by student population was the basis for determining the minimum number of responses per school category. A review of the literature revealed no previous exploratory factor analyses performed on the WMSM scale and no a priori model of the factor structure was provided for analysis except for the untested five key feature model proposed by Mindset, Inc. (S. Rodriguez, personal communication, March 31, 2015). A null hypothesis was developed as a basis for the analyses of the proposed model developed from the EFA and tested using CFA. The results of the analyses were

compared to the five key features of a growth school mindset culture including shared leadership, open communication, professional collaboration, clear goals and a plan, and support for students and belief in growth (Blackwell, 2012).

The methods to collect data for analysis and for developing conclusions and recommendations from the research included the distribution of WMSM surveys to faculty in a stratified random sample of PK-12 public schools in Montana, including a calculated minimum adequate sample size for the analyses of 200 faculty and administrator responses (Guilford, 1954, p. 533). Besides the previously described instruments, a demographic questionnaire and Human Research Subject Consent Form was provided to participants. Instructions included on the survey explained to participants that the survey was voluntary and that measures were taken to ensure the confidentiality of their responses. SPSS 22 (IBM, 2013) and Lisrel 8.72 (Joreskog & Sorbom, 2001) statistical analytic software programs were used to perform a variety of multivariate analyses and to develop conclusions based on the results. Results from the exploratory and confirmatory analysis were compared to the five key features of a growth school culture that were identified from a review of the literature (Netemeyer, 2003; Blackwell, 2012).

CHAPTER FOUR

RESULTS

The purpose of this chapter is to provide the results of the empirical and statistical analyses of the factor structure of the WMSM scale. For this study, the following three phases of analyses were used. First, the data was analyzed for normality and multicollinearity among variables by exploring the item descriptive statistics. Next, an exploratory factor analysis using maximum likelihood extraction methods was used with an oblique rotation to explore the underlying factor structure of the WMSM scale (Michael & Hunka, 1960; Brown, 2009). A proposed factor structure model was developed from the exploratory factor analysis results based on logic, theory, and a review of the results of the analysis. The hypothesized model was tested using confirmatory factor analysis with a replication sample (n=155) to determine its fit to a hypothesized population model. Confirmatory factor analysis (CFA) was used to test the model fit using fit indices recommended by the literature. Results from the CFA were used as the basis to accept or reject the null hypothesis proposed in this study as the basis for the analyses. Following is a summary of the results.

Answering the Research Question
and Testing the Null Hypothesis

The results of the EFA were used to develop a proposed factor structure model that was tested on the replication sample using the CFA. The results of the test were used as the basis to answer to the overarching question of this research study, “What is the

underlying factor structure of the WMSM scale?” and to accept or reject the null hypothesis in favor of the alternative.

The following hypothesis was used as a basis for the analyses in this study:

H_0 = The five-factor structure of shared leadership, open communication, professional collaboration, clear goals and school plan, and support for and belief that all students can grow and learn does not represent the underlying factor structure for the WMSM scale.

H_a = The five-factor structure of shared leadership, open communication, professional collaboration, clear goals and school plan, and support for and belief that all students can grow and learn does represent the underlying factor structure for the WMSM scale.

Data Analysis

The first step in the analysis was a screening of the responses for participants not included in the unit of analysis (teachers and administrators in PK-12 schools) and for missing data (Hair, Black, Babin & Anderson, 2010). Three respondents failed to complete the mindset survey, and these responses were eliminated. Several noncertified individuals were identified and their responses removed from the data set.

Approximately 12 cases had missing data points. The missing data appeared randomly and an imputation approach was used to complete the data set including entering the mean of the item value. After entering the data and adjusting for missing data the total data sample, including a stratified random selection of respondents from the four different school categories, included 311 usable, complete survey responses. This included 290 certified professionals designating themselves as faculty attending regular

meetings (93.4%) and 21 administrators (6.6%). The total sample would be divided into two groups for the exploratory and confirmatory factor analyses including an exploratory (n=156) and a replication sample (n=155). The next step in the exploration of the data sample was to determine the distribution characteristics of the total sample.

Evaluating Assumptions

Correlation analyses were conducted on the faculty self-report sample data. The data were found to meet the criteria for normality. Means and standard deviations for each variable were calculated and explored for outliers that may influence the usefulness of the data for drawing valid conclusions that generalize to the population from which the data was drawn. Tests for symmetry (skewness) and flatness (kurtosis) for each survey item and demographic data fell within acceptable limits of ± 2 (Field, 2000 & 2009; Netemeyer et al., 2003). These results were consistent with the literature on Mindset that explained characteristics of mindset were independent of demographic influence (Dweck, 2008, 2010 & 2012). A cross-tabs statistical analysis was performed to explore the interdependence of the demographic data variables and to identify statistically significant differences ($p < .05$). One-way ANOVA tests were run on the categorical data to determine any significant differences between the means of the categories that might affect the generalizability of the results to the population studied. Differences were identified and expected between groups by position. Administrators represented a separate category and the number appropriately represented a smaller proportion than faculty in the school population. The elementary building level mean was shown significantly different than the middle and high school means. The sample data were

noted including a statistically significant greater number of elementary building levels represented having a significantly higher WSMS mean score. Tables 3-8 show the results of the analyses used to test the normality of the data for use in the EFA and CFA. Total number of schools participating (n=25) (Gravetter & Wallnau, 2014).

Table 3. Table of the percent of public schools by size categories and number of responses collected.

Calculation	Categories by Student Enrollment				Total	CL	CI
	< 150	150 to 500	501 to 1000	> 1000			
Percent of total student population enrolled	17%	12%	23%	48%	100%		
Actual number of responses collected	41	71	125	74	311	95%	5.04
Percentage of total responses collected	13.2%	22.8%	40.2%	23.8%	100%		

Note: CL= confidence level, CI=confidence interval

Table 4. Participants by education level.

Education Level	Frequency	Percent
BA	157	49.8
MA	130	41.3
EdD	4	1.3
Other	1	1
Missing	19	7.6
Total	311	100

Note. School 4 did not have this question on their survey.

Table 5. Participants by gender.

Gender	Frequency	Percent
Male	86	27.3
Female	225	71.7
Total	311	100

Table 6. Participants by years at the current school.

Years of Service	Frequency	Percent
0-3	99	31.8
4-7	35	11.3
8-10	58	18.6
11-15	36	11.6
16-20	21	6.8
20+	48	15.4
No Answer	14	4.5
Total	311	100.0

Table 7. Participants by school level.

Factor	Frequency	% in the sample	% in the state
PK-12	22	7.1	
Elementary	112	36.0%	51%
Middle	34	10.9%	28%
High School	91	29.3%	20%
Elementary and Middle	25	8.0	
Middle and High School	27	27	
Total	311		

Table 8. Participants by total years' experience teaching at all schools.

Years of Service	Frequency	Percent
0-3	26	8.3
4-7	34	10.8
8-10	38	12.1
11-15	34	10.8
16-20	27	8.6
20+	80	25.4
No answer	71	23.8
Total	311	100.0

Sample Size

Three hundred and thirty participants returned the WMSM instrument and 311 surveys were found complete and useable for the study. The sample of participants represented a 95% confidence level and a ± 5.04 confidence interval for the population of teachers and administrators completing the WMSM instrument. A review of the literature revealed the following indices for sample sizes used in instrument development research. These indices were used in this study to evaluate the number of responses and its adequacy for the analyses: adequate=200, good=300, great=500, and excellent=1000. The ratio of responses to items on the survey was determined as follows: adequate=10:1, good=20:1 (Guilford, 1954; Zhao, 2009). Field (2000) stated sufficient sample size for a survey validation should include between 10-15 responses for each item on the scale. For this study, the minimum sample size to perform the analyses was considered 200 participants. Review of the literature suggested an adequate sample size for instrument validation is dependent upon the characteristics of the data such as magnitude and frequency of the factor loadings. Strong and frequent factor loadings require lower sample sizes (Costello & Osborne, 2007). The $n=311$ was a good sample size for a maximum likelihood exploratory factor analysis.

Criteria for Conducting the Exploratory Analysis

The method of maximum likelihood requires a large sample size. The sample size collected in this study was evaluated as a “good to a great size” for obtaining reliable factor extractions from the exploratory factor analyses ($n=311$) (Field, 2000). Results of

an initial EFA for the data collected from participants in 25 schools provided a Kaiser-Meyer-Olkin (KMO) test of sampling adequacy. For this study a KMO $>.5$ was the indicator that the sample size obtained was adequate for the statistical analyses. The SPSS software KMO resulted in a value of .908 and was considered excellent for continuing with the EFA. Values above .80 are sought (Netemeyer et al., 2003). Another predetermined indicator of sample size adequacy was all diagonal elements of covariance (indication of heterogeneity between factors) and correlation (indicates factors strength by association) on the anti-image matrix were $>.5$ (Introduction to SAS, 2015). A review of the tables revealed diagonal elements ranged from a low of .458 to .957. Only one, item 19 was just slightly below the range. A decision was made to consider this acceptable to continue the analysis. Finally, Bartlett's Test of Sphericity was used to test a null hypothesis established for this analyses that the data would produce an identity matrix; meaning the factors were all perfectly related and therefore not suitable for an EFA. The indices for an acceptable Bartlett's value for this study is $p < .0001$. The Bartlett's value for the data set provided from the WMSM survey yielded ($\chi^2_{171} = 1672, p < .0001$). The Bartlett's null hypothesis was rejected. The items of the scale were considered sufficiently related, and the data set useful for performing an exploratory factor analysis.

Criteria for Selecting the Number of Factors

After running the SPSS analytical software for the exploratory factor analysis using maximum likelihood extraction method and oblique rotation, the magnitude and

frequency of the factor loadings, number of eigenvalues with values ≥ 1.0 , communalities ($M \geq .50$), and a comparison of the extracted factors with their related items with the theory was performed. Indices for good factors included frequencies of item loadings per factor (≥ 3), magnitude of loadings on the factor ($\geq .32$), and low frequencies and low value loadings of the item on each of the other factors (minimal cross-loadings for a simple factor structure). An indices for this study is factor loadings of $.80 \leq \text{item} \leq .32$ (Gravetter & Wallnau, 2014; Field, 2000 & 2009; Brown, 2009; Albright & Park, 2009).

Test of Data Multicollinearity

Bartlett's Test of Sphericity determinant was $p < .0001$. Bartlett's tests the hypothesis that the correlation matrix of the data is an identity matrix. The Bartlett's test revealed issues could result in interpretation of the factors due to multicollinearity. Further analysis showed regression correlations between two factors were above the normal limits of .32 to .80 (Cohen & Cohen, 2002). This means the factors had items that contributed to more than one factor and would make it difficult to interpret the unique contribution of each item to the factors. An overrepresented model can cause multicollinearity. Omitting variables or adding different variables may help. The factor structure pattern and the contribution of the factors to the total scale results are stable even with multicollinearity. Only when attempting to determine the variation in the influence of each predictor variable on the dependent variable, in this case WMSM mean does multicollinearity need to be addressed. Various methods are available to reduce the influence of multicollinearity in the data and are beyond the scope of this study (Guilford, 1954; Greene, 2000; Netemeyer et al., 2003).

Goodness of Fit

The Chi-squared value is an indicator used to test the hypothesis the individual correlations from the matrix and the expected correlations would be significantly different. A review of the residuals followed. Residuals are the calculated differences between each correlation coefficient from the analysis and the anticipated coefficient. A review of the residuals revealed < 20% of the items had residuals > .50 (13%) therefore the next step in the analysis was to evaluate the significance of the Chi-squared calculation. The indices for rejecting the null of good fit was $p < .001$. The Approximate Chi-square=152.087, $df=101$, $p<.001$. Therefore the null was rejected and the data considered sufficiently correlated and further analyses could proceed (Mulaik, James, Van Alstine, Bennett, Lind & Stilwell, 1986; Field, 2000 & 2009).

Factor Rotation Method

Factors were rotated after the extraction method was performed in order to “make the factors more interpretable” (Netemeyer et al., 2003; Brown, 2009). Two criteria were used to select an oblique rotation for the exploratory factor analysis. First, orthogonal rotation assumes uncorrelated factors. The factors in the school mindset survey were anticipated, based upon theory, to be highly interrelated (Tarter & Hoy, 2004, p. 543); therefore the appropriate choice would be an oblique rotation. Oblique rotation is used when the factors are correlated. As Tarter & Hoy (2004) explained when describing the directional form of hypotheses testing of social science psychosocial constructs in schools, “all the relations are probably reciprocal,” and the variables “are [often] compatible and reinforce each other,” (p. 543). The statistical calculation used allows for

a rotation at any angle to fit the data. Second, an oblique rotation can also produce an orthogonal rotation but an orthogonal rotation does not produce an oblique result. The goal of selecting a specific rotation method is the same as for the factor extraction method, to obtain as close to a simple factor structure as possible. A simple factor structure is one where individual items load on one factor with a covariance of $\geq .32$ and with loadings of $\leq \pm .1$ on all other factors. A complex variable cross loads with values of $\geq .32$ on two or more factors (Thurstone, 1947; Gorusch, 1983; Field, 2000 & 2009; Brown, 2009). Oblique rotation allows for correlation between factors by using statistical methods, including an arbitrary constant value, to change the rotational values. According to Kim and Mueller (1978, p. 50) in Brown (2009), one benefit of this method is the EFA is easier to interpret.

Exploratory Factor Analysis

The results of the exploratory factor analyses yielded four interpretable factors accounting for a total of 53.894% of the variance. Nineteen of the 20 items from the WMSM were retained. Item 20, “There is a culture of continuous improvement where we are constantly looking at our current state and setting improvement goals year-to-year” was dropped because it had correlations that exceeded acceptable limits ($\geq .32$) on three factors. The covariance matrix was calculated using the SPSS analytical statistical software and used as indicators of how strongly the items on the WMSM scale were related to a particular factor. This study used the following indices for evaluating the loadings for retaining a factor: minimum $\geq .32$, good $\geq .4$, strong $\geq .5$, and if the value is $\geq .90$ there may be issues with multicollinearity (Costello & Osborne, 2005). Cronbach

alpha determinant used as a measure of how reliable the WMSM instrument was based on a single use. The Cronbach alpha for the 19 retained items was .894 (n=156).

Estimates of internal reliability were calculated using the standard deviation of the entire scale and the standard deviation of the individual items. Coefficient alphas were calculated for each factor and used as the measure of their reliability.

Interpretation of the EFA

The observed variables of the scale were grouped according to extracted factors and were compared to the literature and named (Costello & Osborne, 2008). Following is the interpretation the four factors extracted by the EFA including a list of the four factors extracted, names from the review of the Mindset Works, Inc. literature (Blackwell, 2012), and the variables associated with the factors of the WMSM scale. Figure 3 shows the proposed factor model from EFA for CFA statistical analyses.

Factor 1 - Shared Leadership included items 1-5 and contributed 40.851% to the variation in the data structure. This factor's Cronbach's alpha reliability was .911 and revealed a strong factor with a good frequency of items loading. The absolute magnitude of the loading values were strong (.761 to .828). The factor showed a near simple structure in the data matrix with only three loadings slightly above the .10 maximum for a simple structure of loadings on other factors (Brown, 2009). Item 2 loaded on factor 1 with the highest loading (.828) and above the indices of $\leq .80$ indicating a potential from some multicollinearity to occur between the factors.

Factor 2 - Open Communication and Peer Support (OCPS) included items 6, 8, 10 & 17, and explained 4.678% of the total variance in the items. Cronbach's alpha reliability was good (.738). A review of the mindset literature showed 6, 8 and 10 were included in mindset key feature 2 - open communication (Blackwell, 2012). Items 7 and 9 would have been expected to load on this factor as well. A review of the items 6, 8 and 10 descriptions included, "Staff members...support new...teachers," "We have exclusive cliques or 'camps' within our faculty," and "Our teachers protect lessons from one another," is consistent with the concept of being open to one another and willing to provide peer support in an informal structure. The name peer support was added to this factor name to distinguish the factor from structured professional collaboration as it appeared to represent an informal culture of supportive peer relations (Mintzberg, 1983).

Factor 3 – Clear Goals & a Plan with Professional Collaboration (CGPC) included items 7, 9, 11-16 and contributed 2.923% to the overall variance in the items. The Cronbach's alpha was .866, indicating a strong internal reliability for this factor. This factor included eight items, more than the ideal five loading; so some items appear redundant and may not add value to the factor. This factor represented all or parts of three separate key features discussed in the growth mindset literature (Blackwell, 2012) including key feature 3 - clear goals and a plan (items 11, 12 & 13), key feature 4 - professional collaboration (items 14, 15, & 16), and key feature 2 - open communication (items 7 & 9). A review of the mindset literature suggested items 11- 13 described administrator behaviors of providing teachers with clear expectations and feedback including definitions of observable behaviors, “expectations

are made clear...in advance,” “Teachers receive clear feedback,” and “work together to design goals and plans.” Items 14 – 16 reflect teacher behaviors of collaborating and working together to design...professional development...targeted to...needs and goals,” and “Time is provided ...for coaching, co-planning, co-teaching.” A review of the wording in items 7 & 9 included, “Teachers...give each other feedback,” and “Teachers collaborate ...to co-develop...work,” is consistent with the description of items of collaborating to develop clear plans and expectations within a formal hierarchy and school structure. Item 9, regarding teacher behaviors of collaboration and sharing lessons, loaded strongly on this factor (.448) and weakly on factor 2 - open communication and peer support (.216). These loadings were above the maximum $\leq .10$ for a simple factor structure. A review of the definition “Administrators communicate a sincere belief that staff members can develop their teaching skills with practice and feedback,” gave strong theoretical foundation for retaining the item in CGPC factor (Blackwell, 2012).

Factor 4 - Student Support included items 18 & 19 and contributed 7.714% to the overall variance in the items. The Cronbach's alpha reliability index for this factor was .799, indicating a reliable structure. A weakness of this factor was that only two items loaded, instead of the preferred five. An acceptable factor has a minimum of three items loading at values $\geq .32$ (Kline, 2002; Netemeyer et al, 2003; Brown, 2009). Item loadings included strong values (.886 and .751 respectively). This factor demonstrated a close to simple factor structure with item 18 having only two loadings slightly $> .1$ on other factors.

A brief discussion is warranted about the correlations of the loadings in the pattern matrix. As previously discussed a simple factor structure was sought. To this end, a review of the correlation values revealed the following. Factor 1 was a near simple factor structure with only items 1, 3 and 4 loading slightly above the $\leq .10$ indices on factor 4 - student support, 2- open communication and peer support, and 3 – clear goals & a plan with professional collaboration respectively. Next factor 2 – open communication and peer support shared some of the item variance with factor 3 and factor 1. Again the correlations were so close to the $\leq .10$ indices as to be considered possibly idiosyncratic. Item 17 contributed .229 to factor 3 – clear goals & a plan with professional collaboration. Item 17 had the highest mean next to item 20, which had been removed due to multiple high cross loadings. Item 17's standard deviation was low suggesting this item was slightly biased in the positive direction and may have contributed some error when interpreting the factors. The greatest departure from a simple factor structure in this EFA however was factor 3 – clear goals & a plan with professional collaboration. Three items, 11, 12, and 13 all shared variation in loadings with factor 1 – shared leadership. Items 12 cross-loaded (.386) and item 13 was on the borderline of a cross load (.308). Item 9 contributed variance to factors 2 – open communication and peer support and 4 – student support in a small measure (.216 and .122 respectively). Overall the item loadings can be anticipated to generate some multicollinearity between factor 1 – shared leadership and factor 3 – clear goals & a plan with professional collaboration.

In sum, the four-factor structure extracted using EFA and oblique rotation (direct oblimin) provided a good foundation for a proposed model that could be tested using

confirmatory factor analysis to determine if it was a good fit to the data of a replication sample (n=155). Further discussion of a review of the literature on the factors that emerged and that did not emerge will be included in Chapter Five of this paper. Table 9 provides the factor loadings by item, means and standard deviations, percent of variance, eigenvalues, and reliabilities for the four-factor model of the WMSM scale. The decision was made to test the model proposed in Figure 3.

Confirmatory Factor Analysis

Next, the CFA was performed to determine the validity of the proposed four-factor model developed from the exploratory factor analysis and the review of the literature. A replication sample was used and created by randomly dividing the full data set into two sets. Correlation analysis was performed on the data to determine any statistically significant differences between the sets that may interfere with the confirmatory analysis, the ability to draw valid conclusions from the data, or to generalize the results of the study. The replication data sample was also analyzed for normality using the limits of ± 2 for skewness and kurtosis (Hopko, 2003). Demographic categorical data factors of gender, years teaching, school size, position, and school level were within acceptable predetermined limits. No significant differences between groups were noted with the exception of buildings levels and an expected sample size difference between administrators and certificated faculty, which difference was considered representative of the population under study.

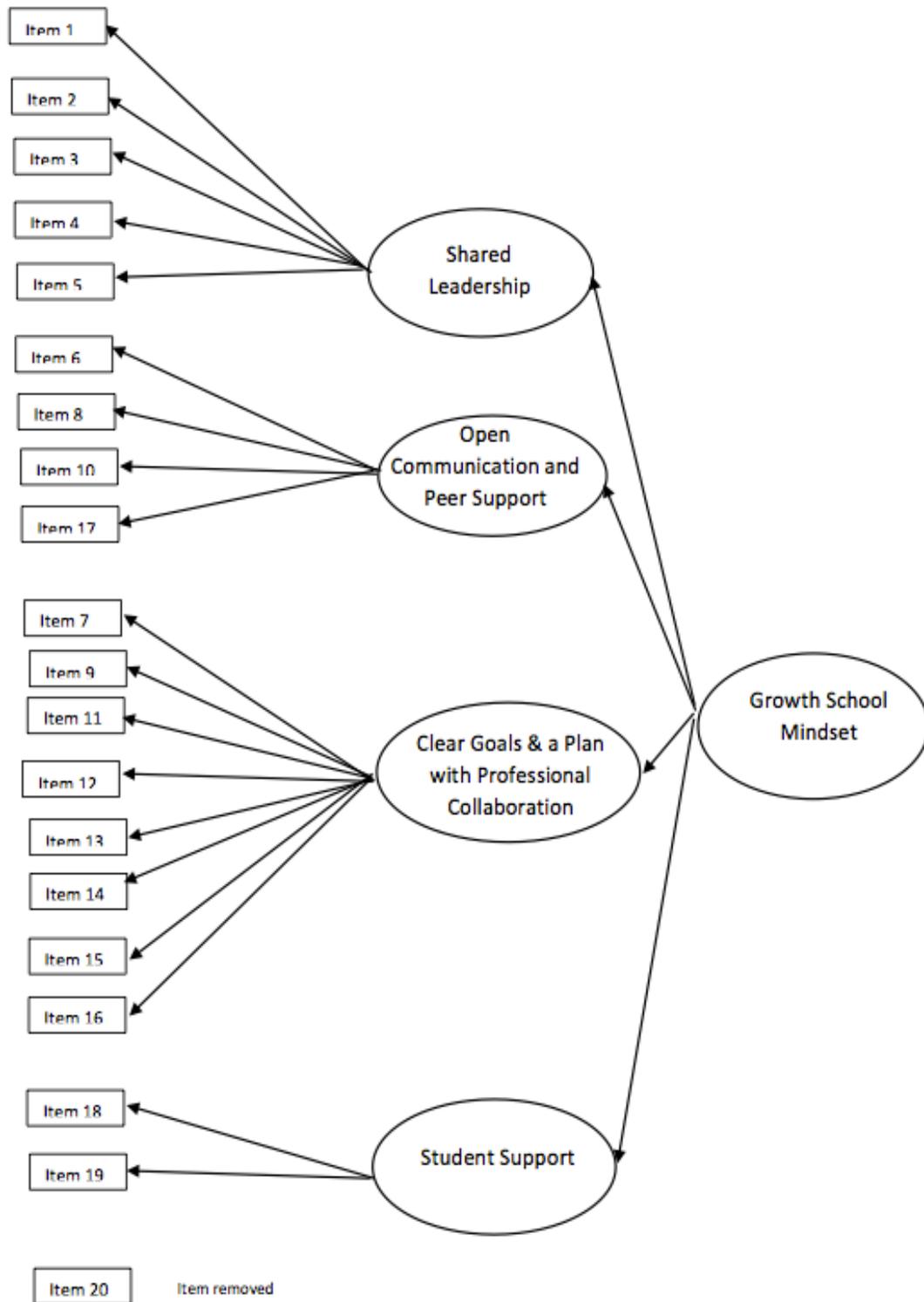
Table 9. Individual item factor loadings, significance, percentage of variance, and eigenvalues for items on the WMSM scale.

Item-Observed Variable (Mindset Works, 2008-2012c)	Factors				<i>M</i>	<i>SD</i>
	Shared Leadership	Open Communication and Peer Support	Clear Goals & Plan with Professional Collaboration	Student Support		
1. Leadership opportunities are open to all staff members and staff members are invited to participate periodically throughout the school day.	.761	.025	.018	.137	4.59	1.189
2. We have systems where teachers are directly involved and participate in decision-making and planning for site initiatives.	.828	.103	-.092	.035	4.68	1.136
3. Administration and leaders communicate decision-making strategies with staff and elicit their input.	.763	.182	-.007	-.049	4.37	1.257
4. Staff are able to put ideas "on the table" and "take them off" safely during planning, collaboration, and decision-making meetings.	.780	-.062	.174	-.046	4.59	1.140
5. Teachers are invited to give critical feedback about administrative practices and how they would like additional support.	.716	-.022	.080	.067	4.15	1.240
6. Staff members are reluctant to work with or support new or struggling teachers.	.128	.441	.072	-.027	4.79	1.271
8. We have exclusive clicks or "camps" within our faculty.	.020	.535	.083	-.070	3.28	1.449
10. Our teachers tend to protect or guard our lessons, strategies, tests, etc. from one another.	-.027	.853	-.037	.074	4.68	1.063
17. Administrators and faculty in our school truly believe that they can help all students to meet learning goals.	.149	.437	.229	-.010	4.87	1.048
7. Teachers observe one another and give each other feedback to develop the team's best practices	.000	.091	.515	-.024	3.35	1.314

Table 9 continued

Item-Observed Variable	Factors				<i>M</i>	<i>SD</i>
	Shared Leadership	Open Communication and Peer Support	Clear Goals & Plan with Professional Collaboration	Student Support		
9. Teachers collaborate several times a month, sharing or co-developing lessons, assessments, and student work.	.106	.216	.448	.122	4.21	1.481
11. Instructional expectations, standards, and evaluation protocols are made clear to faculty in advance	.218	.204	.422	-.036	4.47	1.118
12. Administrators communicate a sincere belief that staff members can develop their teaching skills with practice and feedback.	.386	-.008	.460	-.128	4.75	1.036
13. Teachers receive clear feedback on an ongoing support for their practice outside of formal evaluations.	.308	-.088	.611	-.079	4.26	1.264
14. Teachers, coaches, and administrators work together to design goals and plans for faculty development.	.130	.024	.734	-.013	4.06	1.213
15. Teachers receive professional development that is targeted to their professional needs and goals.	.062	.070	.535	-.123	4.19	1.207
16. Time is provided in the workday for coaching, co-planning/co-teaching, in structured professional learning.	-.079	.061	.475	.161	3.43	1.366
18. There are structures for faculty and administrators to share information and work together to meet the specific needs of individual students.	.099	-.125	.155	.886	3.67	1.704
19. There is an "us against them" feeling between teachers and students.	.032	.084	-.094	.751	3.99	1.599
20. There is a culture of continuous improvement where we are constantly looking at our current state and setting improvement goals year-to-year.			Would not run with EFA		4.95	.834
% Variance	40.851	4.678	2.923	7.714		
Eigenvalue	8.208	1.311	1.156	1.769		
Cronbach alpha	.911	.738	.866	.799		

Figure 3. Proposed factor model from EFA for CFA statistical analyses.



Steps in the Analysis. First, the four-factor model, identified by the exploratory analysis, was subjected to a confirmatory factor analysis using Lisrel 8.72 (Joreskog & Sorbom, 2001) to test the closeness of fit to a hypothesized four-factor population model using several indicators of model fit. The root mean square error of approximation (RMSEA) is currently recognized as an informative index of fit because it provides a value that describes the discrepancy or error between the hypothesized model and an estimated population model derived from the sample. RMSEA values less than .05 are indicative of a close fit, values ranging from .05 to .08 are indicative of a reasonable fit, with values $\geq .09$ considered a poor fit (Browne & Cudek, 1993; MacCallum et al., 1996). Both the CFI and the NNFI indexes developed by Bentler are also recommended for evaluating model fit because they consider both sample size and model complexity. CFI and NNFI values greater than .90 are indicative of a good model.

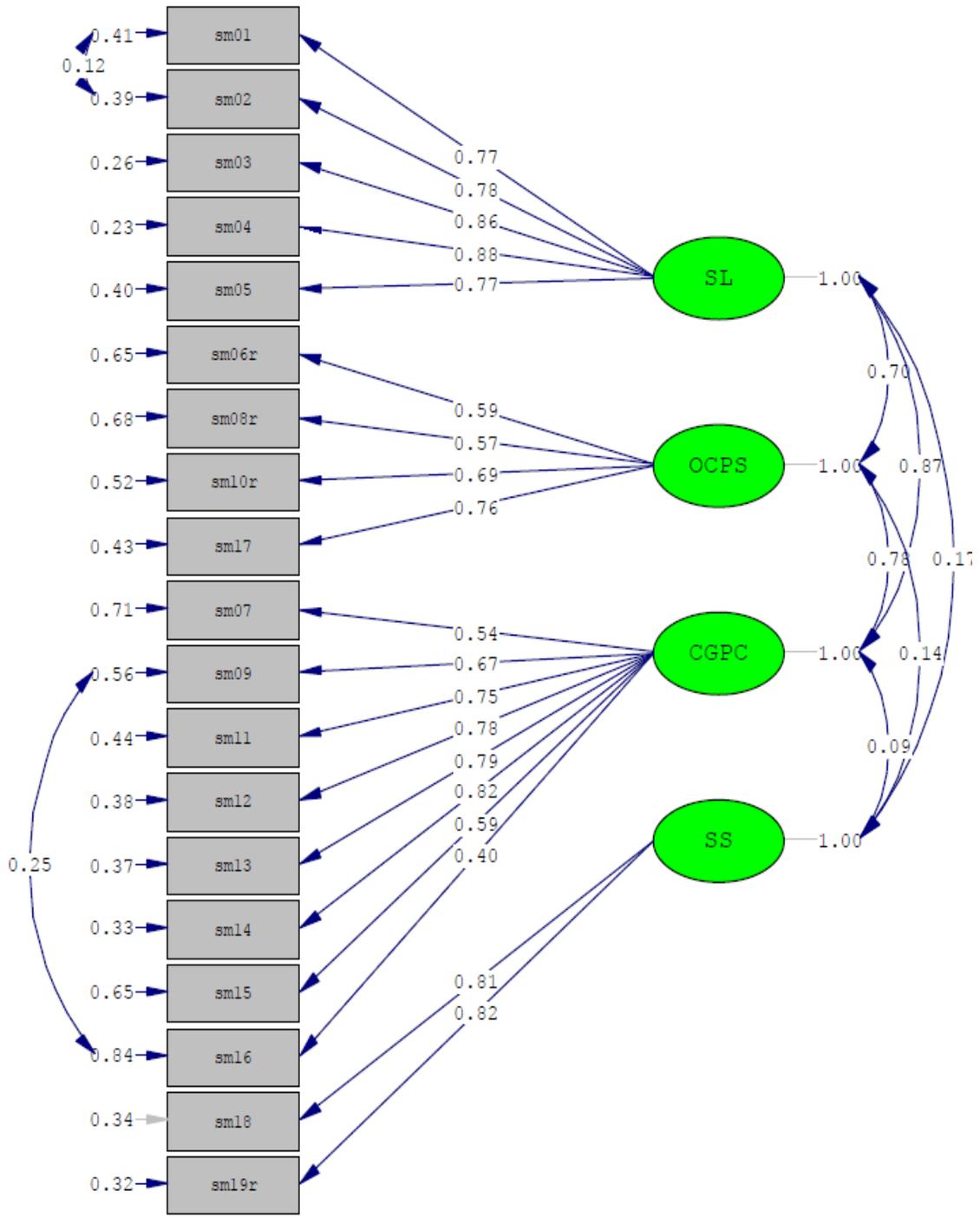
Next, after completing the exploratory analysis, a CFA was conducted using Lisrel 8.72 (Joreskog & Sorbom, 2001) with the second random subsample ($n = 155$). The purpose of conducting a CFA is to confirm a predicted pattern or one made apparent by previous analytics (DeVellis, 2003). In this research, the CFA was used to confirm the factor pattern (latent variable model) that arose from the exploratory analysis with maximum likelihood extraction (ML). Results from the CFA indicated that the independence model (which tests the hypothesis that all variables are uncorrelated) could be rejected ($\chi^2_{171} = 1774, \rho < .001$). Finally, the four-factor latent variable model that was developed from the exploratory analysis proved to be a superior fit for the subsample, ($\chi^2_{144145} = 238, \rho < .001$).

The four-factor model produced a RMSEA of .063. The 90% confidence interval (.049 - .076) surrounding the RMSEA result provided supporting evidence that the proposed model was a fair fit to the estimated population (Browne & Cudek, 1993; MacCallum et al., 1996). The accuracy of this fit was strengthened by a CFI of .96 and a NNFI of .95— degrees of freedom and the noncentrality parameter of 149 was determined to exceed .90 both well above the suggested threshold. The power of this model fit based on 225 when consulting tables published (Kim, 2005). Figure 4 shows the results of the CFA.

Validity Evidence

Convergent and discriminant validity of the WMSM scale were investigated using exploratory and confirmatory factor analysis. Participant responses were randomly assigned to two groups: a validation (n = 156) and a replication sample (n = 155). Exploratory factor analysis (EFA) resulted in factor loadings for the items 1-19 on the WMSM scale. The Confirmatory Factor Analysis used maximum likelihood (ML) factor extraction estimates of the observed correlations among variables to identify the most parsimonious factor structure. Maximum likelihood may be used when the sample is evaluated to be from a multivariate normal population; such as was determined for the sample collected from the certified teachers and administrators from the PK-12 school districts in Montana. The method of ML statistically calculates the correlations between factors, the statistical significance of the factor loadings, and the indices for goodness-of-fit evaluation of the observed variables to the factors (Fabrigar, Wegener, MacCallum & Strahan, 1999, p. 277; Brown, 2009).

Figure 4. Theoretical factor structure model and results of CFA using Lisrel 8.72



Chi-Square=238.43, df=145, P-value=0.00000, RMSEA=0.063

Convergent Validity. The purpose of the EFA was to explore the factor structure of the WMSM scale. The method of factor extraction uses statistical methods to compare the results of participant responses on each item of the WMSM scale and identify items that group together. Items that are theoretically related should have high correlation coefficients if the scale has convergent validity. A review of Table 9 correlation matrix revealed convergent validity between items of the extracted factors from the EFA. For example, Table 9 provided evidence of high correlation coefficients ($\geq .32$) of the items loading on factor 1 – shared leadership ranging from .716 to .828 (Brown, 2009; Gravetter & Wallnau, 2014). This relationship demonstrates empirical evidence of convergent validity of the WMSM scale for the theoretical and extracted factor 1 – shared leadership. A further review of Table 9 showed items loadings on each distinct extracted factor had relatively higher loadings for the factor and lower loadings on the other factors. Again this demonstrated the discriminant validity of the scale and added to the construct validity (Netemeyer, et al., 2003). Where the factors demonstrated lower correlations this would be described as discriminant validity and is discussed in the next paragraph.

Discriminant Validity. A one-way ANOVA comparing the school means was run to determine the ability of the WMSM data results to discriminate between groups at the school level. Table 10 shows the Pearson coefficient, mean of the WMSM scale, and standard deviation for categories of schools by school grade levels. The test revealed a significant ($p < .001$) for between-group differences in growth school mindset when comparing school mindset means between elementary level and middle and high schools.

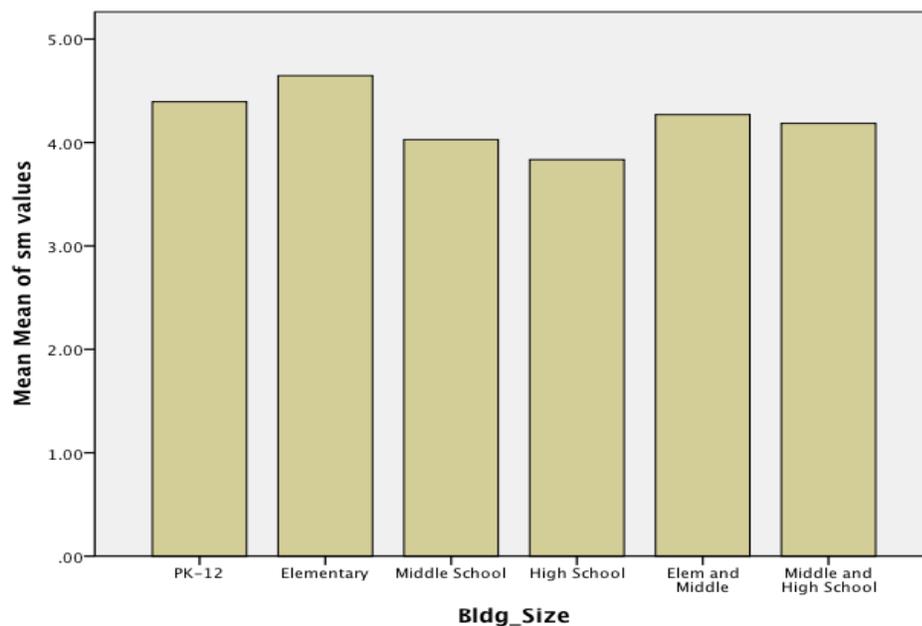
This is consistent with studies on school transition success discussed in a previous section of this paper (Mueller & Dweck, 1998; Dweck, 1989; Hong et al., 2000; Novak, 2002; Maurer et al., 2003; Bryant, 2013; Blackwell et al., 2007). Figure 5 shows a graph of the means.

Table 10. ANOVA results and Pearson Correlations between school building levels.

Factor	<i>M</i>	<i>SD</i>	<i>Pearson's Coefficient (one-tailed)</i>	<i>N</i>
Elementary**	4.6468	.72681	<.001	111
PK-12	4.3947	.82737	.637	22
Middle**	4.0279	.80638	<.001	34
High School**	3.8352	.65531	<.001	91
Elementary and Middle	4.2695	.68088	.148	25
Middle and High School	4.1852	.45095	.028	27
Total	4.2521	.75630		310

Note. ** $p < .001$, $R^2 = .075$, $\eta^2 = .192^*$, $F(5, 304) = 14.442$. Groups are not equal. The harmonic mean sample size = 34.904.

Figure 5. WMSM means plot at school level (two-tailed test).



Discriminant Validity between Factors. Discriminant validity is increased when factors are unidimensional, or have loadings = 1.0 on only one factor and with zeroes on all other factors. The goal of developing item descriptions that operationalize key constructs of the theory is to capture unique constructs. However, this is the ideal. Cross-loading may create issues of multicollinearity. The results of this study show that only three items in the WSM scale cross-loaded on two factors meaning loadings $\geq .32$. Therefore, multicollinearity between factors would not be expected to be high. An indices for this study is factor loadings in the range of $.80 \geq \text{item} \geq .32$ (Gravetter & Wallnau, 2015; Field, 2000 & 2009; Brown, 2009). Only two factors correlated with a value outside of these indices. Factor 1 - shared leadership and factor 3 - clear goals & a plan with professional collaboration correlated at .867. This would be reasonable considering the loadings from items 12 and 13 (.386 and .308 respectively) loaded on factor 1 – shared leadership and contributed to this higher factor correlation. Table 11 shows the correlations between factors and demonstrates how well the WSM scale is able to discriminate between constructs.

Table 11. Component correlations matrix for WSM scale.

Item - Observed Variable	Factors			
	Shared Leadership	Open Communication and Peer Support	Clear Goals & a Plan with Professional Collaboration	Student Support
Shared Leadership	1.00			
Open Communication and Peer Support	.704	1.00		
Clear Goals & a Plan with Professional Collaboration	.867*	.782	1.00	
Student support	.167	.145	.090	1.00

Note. Values greater than .80 suggest multicollinearity between factors.

Answering the Research Question

The overarching question of this research study, “What is the underlying factor structure of the WMSM scale?” was answered by the results from the EFA and confirmed by the CFA. The proposed model from the EFA was used as the basis for the CFA to answer to the research question. A four factor model was developed and included shared leadership, open communication and peer support, clear goals & a plan with professional collaboration, and student support. The decision was made to accept the factor pattern extracted by the EFA.

Testing the Null Hypothesis

The following null hypothesis was used as a basis for the analyses in this study:
 H_0 = The five-factor structure of shared leadership, open communication, professional collaboration, clear goals and school plan, and support for and belief that all students can grow and learn does not represent the underlying factor structure for the WMSM scale. The four-factor structure for the WMSM extracted using EFA was confirmed using the CFA and compared to the five key features of a growth school mindset. The null hypothesis was accepted.

Summary

This chapter provided a summary of the results of the statistical procedures used to explore the underlying factor structure of the WMSM scale. A stratified random sample of PK-12 faculty and administrators (n=311) provided data for exploratory and

a confirmatory factor analysis. Participant responses were randomly assigned to two groups: a validation ($n = 156$) and a replication ($n = 155$) sample. This study used the statistical factor extraction methods of maximum likelihood (ML) that estimated the most likely to be observed correlations. The results of the exploratory factor analyses yielded four interpretable factors accounting for a total of 56.166% of the variance in all the items. The factors interpreted were: shared leadership (items 1, 2, 3, 4 & 5), open communication and peer support (items 6, 8, 10, & 17), clear goals & a plan with professional collaboration (items 7, 9, 11, 12, 13, 14, 15, & 16), and student support (items 18 & 19). Interpreting the factors required analysis of the internal consistency reliability of the four-factor mindset scale. Cronbach alpha was used as a measure of how reliable the instrument is based on a single use. The Cronbach alpha for the WMSM scale from this extraction was .894 ($n=156$) for the 19 retained items. The four-factor model, identified by the exploratory analysis was subjected to a confirmatory factor analysis using Lisrel 8.72 (Joreskog & Sorbom, 2001) to test the closeness of fit to the hypothesized four-factor population model by calculating the RMSEA. The four-factor model produced a RMSEA of .063. The 90% confidence interval (.054 -.090) surrounding the RMSEA result provided supporting evidence that the proposed model was a good fit to the estimated population (Browne & Cudek, 1993; MacCallum et al., 1996). The accuracy of this fit was strengthened by a CFI of .96 and a NNFI of .95—both well above the suggested threshold.

CHAPTER FIVE

DISCUSSION

Introduction

This study explored the underlying factor structure of the WMSM scale using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). A four-factor structure was identified by the EFA and tested against a four-factor hypothesized population model using CFA. The four factors identified and interpreted from these analyses included shared leadership, open communication and peer support, clear goals & a plan with professional collaboration, and student support. The four-factor structure did not support five distinct key features of a growth school mindset culture which include “shared leadership,” “open communication,” “professional collaboration,” “clear goals and a plan,” and “support for all students to grow and learn,” proposed by Blackwell (2012, para. 6-10). A distinction is made between the use of the term factors and features when comparing the results of this study with the literature on mindset. A factor for the purposes of this study included the results of the exploratory factor analysis in which four latent constructs were identified. The key features for the purposes of this study were the theoretical constructs described by Blackwell (2012) in the Mindset Works literature on their website. Key features have not been identified from empirical study and therefore the decision has been made to retain the word feature when referring to the school growth mindset constructs in this paper in contrast to the empirically identified four factors developed from this study. Next, this chapter will describe and interpret the confirmed

factors in the proposed model within the framework of the literature of organizational learning theories, discuss the theoretical and practical implications of the empirical findings regarding the factor structure of the WMSM, and make recommendations for future research.

Growth Mindset

In review, understanding the constructs that contribute to the concept of a growth mindset school culture is important to school leaders who may seek to use the WMSM scale to collect accurate data to understand their school culture and to make recommendations for improvement (Hoy et al., 1991; National Policy Board for Educational Administration, 2008; Kearney, 2007; Farrington et al., 2012 and 2014; Blackwell, 2012; Dweck 2012). To meet the challenge of instilling in students a belief in their abilities to grow and to become life-long learners, school administrators need current research-based information on the key factors in schools that are malleable to influence, can be used to engage and develop teachers in creating change, promote continuous school improvement and student success, and will be critically demonstrated by the approximately three million high school students, who will graduate this year and those following them (Yeager, & Dweck, 2012; Yeager, Paunesku, Walton, & Dweck, 2013; Department of Education, 2014). The WMSM scale operationalizes and measures faculty and administrator perceptions of their school culture and is used to determine interventions for school improvements (Mindset Works, 2008-2012c; Blackwell, 2012).

A review of the literature in the area of mindset and organizational learning suggested faculty beliefs about their school plays a key role in school cultures and school

outcomes. For example, faculty with a growth mindset were more likely to see growth potential in struggling students, to support persistence to mastery, to praise students for effort rather than traits, and to support school change efforts (Mueller & Dweck, 1998; Bryant, 2013; Yeager et al., 2014). Faculty with growth mindset behaviors were more likely to develop students that demonstrated effective academic behaviors and who persevered through school transitions such as from elementary to middle school (Dweck, 1989; Hong et al., 2000; Novak, 2002; Maurer et al., 2003). Key research in the area of psychosocial factors, such as academic mindset, focused on developing interventions to improve school learning, structures, and practices. There are implications from the research that mindset interventions also show potential for developing improved learning organizations and organizational learning (Farrington et al., 2012; Dweck, 2012; PERTS, 2014a). The purpose of this study was to empirically explore and confirm the underlying constructs of the WMSM scale developed by Mindset Works (2008-2012c): specifically answering the question, “What is the underlying factor structure of the WMSM scale?”

Four-Factor Model from EFA and CFA

Table 12 below provides a comparative overview of the differences between the factor structure of the WMSM instrument described by Blackwell (2012) and the factor structure evidenced in this study. The key difference between the four-factor model extracted in this study and the five key features of the growth school mindset was the collapse of Blackwell’s (2012) five-feature structure to a four-factor structure, which combined professional collaboration with establishing clear goals and planning.

Table 12. Comparison and contrasting items of 4-factor structure with Mindset Works 5 key features of a growth school mindset.

Empirically Derived Four-Factor Structure

Factor 1 – Shared Leadership

1. Leadership opportunities are open to all staff members and staff members are invited to participate periodically throughout the school day.
2. We have systems where teachers are directly involved and participate in decision-making and planning for site initiatives.
3. Administration and leaders communicate decision-making strategies with staff and elicit their input.
4. Staff are able to put ideas "on the table" and "take them off" safely during planning, collaboration, and decision-making meetings.
5. Teachers are invited to give critical feedback about administrative practices and how they would like additional support.

Factor 2 – Open Communication and Peer Support

6. Staff members are reluctant to work with or support new or struggling teachers.
8. We have exclusive clicks or "camps" within our faculty.
10. Our teachers tend to protect or guard our lessons, strategies, tests, etc. from one another.
17. Administrators and faculty in our school truly believe that they can help all students to meet learning goals.

Mindset Works Inferred Five-Factor Structure

Key Feature 1 – Shared Leadership

1. Leadership opportunities are open to all staff members and staff members are invited to participate periodically throughout the school day.
2. We have systems where teachers are directly involved and participate in decision-making and planning for site initiatives.
3. Administration and leaders communicate decision-making strategies with staff and elicit their input.
4. Staff are able to put ideas "on the table" and "take them off" safely during planning, collaboration, and decision-making meetings.
5. Teachers are invited to give critical feedback about administrative practices and how they would like additional support.

Key Feature 2 – Open Communication

6. Staff members are reluctant to work with or support new or struggling teachers.
7. Teachers observe one another and give each other feedback to develop the team's best practices.
8. We have exclusive clicks or "camps" within our faculty.
9. Teachers collaborate several times a month, sharing or co-developing lessons, assessments, and student work.
10. Our teachers tend to protect or guard our lessons, strategies, tests, etc. from one another.

Table 12 continued

Empirically Derived Four-Factor Structure	Mindset Works Proposed Five Factor Structure
<p><u>Factor 3 – Clear Goals & a Plan with Professional Collaboration</u></p> <p>7. Teachers observe one another and give each other feedback to develop the team’s best practices.</p> <p>9. Teachers collaborate several times a month, sharing or co-developing lessons, assessments, and student work.</p> <p>11. Instructional expectations, standards, and evaluation protocols are made clear to faculty in advance.</p> <p>12. Administrators communicate a sincere belief that staff members can develop their teaching skills with practice and feedback.</p> <p>13. Teachers receive clear feedback on an ongoing support for their practice outside of formal evaluations.</p> <p>14. Teachers, coaches, and administrators work together to design goals and plans for faculty development.</p> <p>15. Teachers receive professional development that is targeted to their professional needs and goals.</p> <p>16. Time is provided in the workday for coaching, co-planning/co-teaching, in structured professional learning.</p>	<p><u>Key Feature 3 - Clear Goals and a Plan</u></p> <p>11. Instructional expectations, standards, and evaluation protocols are made clear to faculty in advance.</p> <p>12. Administrators communicate a sincere belief that staff members can develop their teaching skills with practice and feedback.</p> <p>13. Teachers receive clear feedback on an ongoing support for their practice outside of formal evaluations.</p> <p><u>Key Feature 4 – Professional Collaboration</u></p> <p>14. Teachers, coaches, and administrators work together to design goals and plans for faculty development.</p> <p>15. Teachers receive professional development that is targeted to their professional needs and goals.</p> <p>16. Time is provided in the workday for coaching, co-planning/co-teaching, in structured professional learning.</p>
<p><u>Factor 4 – Student Support</u></p> <p>18. There are structures for faculty and administrators to share information and work together to meet the specific needs of individual students.</p> <p>19. There is an "us against them" feeling between teachers and students.</p>	<p><u>Key Feature 5 – Support for All Students to Learn and Grow</u></p> <p>17. Administrators and faculty in our school truly believe that they can help all students to meet learning goals.</p> <p>18. There are structures for faculty and administrators to share information and work together to meet the specific needs of individual students.</p> <p>19. There is an "us against them" feeling between teachers and students.</p> <p>20. There is a culture of continuous improvement where we are constantly looking at our current state and setting improvement goals year-to-year (Mindset Works, 2008-2012c)</p>

Factor 1 - Shared Leadership (SL) included items describing shared decision making between teachers and administration and a willingness of the administration to receive feedback from teachers on administrative practices largely related to decision making. The factor interpreted as shared leadership captured WMSM items 1-5. A review of the WMSM items and the five key features of a growth school mindset suggested these factors would load together (Blackwell, 2012). The name of this factor was considered reasonable to describe the underlying latent construct of shared leadership. The construct of shared leadership aligns well concepts found in the literature such as the framework of systems thinking as discussed by Senge (1990). Also, Hoy & Tarter's (2004) enabling school structures included collaborative decision making and compared to shared leadership. The factors of a growth school mindset are interrelated in a similar way to the variables in the Open Systems model. For example, shared decision-making would support the development of professional collaboration and in turn develop open communication and trust. These factors were shown to lead to improved school outcomes. A regression of factor 1 - shared leadership (SL) on factor 3 – clear goals & a plan with professional collaboration (CGPC) supported this relationship. Regression of SL on CGPC showed that SL explained 52% of the variance of items comprising the CGPC factor, $F_{(1, 308)} = 330.570, p < .001, B = .719, p < .001$.

Factor 2 - Open Communication and Peer Support (OCPS). This factor included items (6, 8, 10 & 17) that described teacher perceptions of faculty willingness to support new teachers, share lessons, and openness to support all teachers. This factor had a near simple structure

showing the variables that loaded on this factor demonstrated the ability to discriminate between factors. A review of the items' descriptions revealed supportive and open communication with peers but used the following negative wording, "Staff are reluctant to work with or support new or struggling teachers," "We have exclusive cliques or camps within our faculty," and "Our teachers tend to protect or guard our lessons...from one another" (Mindset Works, 2008-2012c).

Sergiovanni (2009) wrote, "...teachers, parents and others invest their talents and energy in the school and its children in exchange for certain benefits." "When teachers no longer receive their contacted benefits they are less willing to invest in the school," (p. 108 & 109). Also, he referenced a report by the Institute for Education and Transformation (1992) explaining school improvements occur through leveraging the relationships between teachers in the school (p. 113). Open relationships are a feature of the Open Systems model for enabling school structures. A review of the mindset literature's five key features revealed two of the items expected to load on mindset key feature 2 - open communication actually loaded on factor 3 – clear goals & a plan with professional collaboration. Results from the EFA found that the open communication and peer support factor did not capture item 7, "Teachers observe one another and give each other feedback to develop the team's best practices," and item 9, "Teachers collaborate several times a month, sharing or co-developing lessons, assessments, and student work," (Mindset Works, 2008-2012c). A review of the wording of these items showed they described teacher behaviors within the formal structures of the school giving feedback and collaborating professionally, not in an informal structure of peer support.

Based on the items that defined factor 2 and a review of the literature, a decision was made to change the factor name to include peer support. Peer support indicates an important distinction between communication in the formal structures of the school and the informal relationships between peers (Tschannen-Moran & Hoy, 2000; Goddard, 2002; Goddard, Hoy & Woolfolk, 2000). Factor 2 - open communication and peer support was shown to compare and contrast to constructs of a culture of trusting and supportive peer relations shown by Tarter & Hoy (2004) to contribute to improved student achievement (p. 548). A culture of trust was shown to explain the development of collective efficacy in schools. Collective efficacy behaviors of the individuals and the group are supported by an enabling system in the school that supports faculty and administrator behaviors to help each other and to help individual students learn and grow (Hoy & Miskel, 2005; Goddard, 2002; Blackwell, 2012; Farrington et al., 2012; PERTS, 2014a).

Factor 3 – Clear Goals & a Plan with

Professional Collaboration (CGPC). This factor was made up of items that

described activities related to clear expectations and feedback for teachers, collaborative goal setting and structured and targeted professional development. This factor also listed time provided as a resource for teacher collaboration and training in two of the seven variables. Factor 3 - clear goals & a plan with professional collaboration captured the greatest share of variables including seven of the total 19 retained items indicating it may be overrepresented.

A review of the mindset literature and the five key features of a growth mindset school culture revealed that extracted factor 3 – clear goals & a plan with professional collaboration, identified from this study, is a combination of several key features proposed by Mindset Works, Inc. (Blackwell, 2012) including; key feature 3 - clear goals and a plan (items 11, 12, & 13), key feature 4 - professional collaboration (items 14, 15, & 16), and items 7 & 9 from key feature 2 – open communication. The results of this study revealed the items listed from these three key features were shown to contribute to one latent construct resulting from the exploratory factor analysis. Further review of the literature on organizational learning provided some explanation for the theoretical basis of these constructs combining as one factor. In organizational learning theory, the organization is considered to learn from the projections of individuals into the group and the organization provides feedback to the individuals. The combination of projection and feedback develops a common vision and goals that result in organizational behaviors (Collison & Cook, 2007; Senge, 2000; Blackwell, 2012). This process is demonstrated most clearly in the organizational routines of goal setting and planning. Tarter & Hoy (2004) explained a comparable multivariate view of overall effectiveness of schools that contributed to improved performance. An enabling school structure promoted school effectiveness by establishing relational trust and organizational routines such that principals and teachers work together as colleagues. “An enabling school structure helps, rather than hinders, the teachers in their work” (p. 540). This process occurred through structured activities for the faculty to collaborate on the vision, learn the skills necessary to move toward the goals, and time to work together and practice this learning in the

work environment. A shared vision occurs as the faculty collaborates toward common goals (Hoy & Sweetland, 2000 & 2001). Mindset Works, Inc. key feature 3 – clear goals and a plan seems closely related the concept of shared vision as discussed in leadership literature. Shared vision does not result in improved schools directly however, and requires teacher collaboration to implement the goals and plans. Growth school mindset key feature 3- clear goals and a plan and key feature 4 – professional collaboration can be explained to combine as one factor theoretically because professional collaboration is often situated in a goal-setting and planning context. Conversely, creating a shared vision through professional collaboration is essential to effective organizational goal setting and planning activities.

Another way to explain the combined factor is that clear goals and a plan is mediated by professional collaboration to create improved school outcomes as demonstrated by Tarter & Hoy (2004). The operationalized descriptions of administrator behaviors described a system that supports teachers. For example, items 11-13 describe, "Administrators communicate a sincere belief that staff members can develop their teaching skills with practice and feedback," "Instructional expectations, standards...are made clear to faculty," and "Teachers receive clear feedback and ongoing support." These compared favorably to the operationalized teacher behaviors in the five key features of a growth school mindset items 14-16. These items included, "Teachers...work together to design goals and plans," "Teachers receive professional development that is targeted to their professional needs and goals," "Time is provided in the workday for...co-planning/co-teaching."

The combining of key features 3 and 4 are further supported in organizational learning theory by Bolman and Deal (2008). Bolman and Deal described a framing and reframing approach to develop improved cultures necessary for collaborative work. Developing a collaborative culture requires structured time in the schedule for teachers to work together, and secondly, opportunities must be provided to develop a shared belief system. An analogy can be seen in the creation of professional learning communities. A review of the items 11-16 show a description of a structured work environment supported by administration where teachers work together and develop shared goals and visions similar to that described by Bolman and Deal's model.

Next, items 7 and 9 also compared favorably to open communication within the enabling school structure construct. The five key features operationalized definitions of items 7 & 9 included "Teachers observe...and give each other feedback to develop best practices," and "Teachers collaborate several times a month...co-developing lessons..." A review of the operational definitions suggested the teacher behaviors were described as occurring within the formal actions and structures of the school organization rather than in informal interactions between individuals in the school. This may explain why these two items grouped on factor 3 – clear goals & a plan with professional collaboration rather than factor 2 – open communication and peer support.

The systems thinking model by Senge (1990) supported the concept of teacher and administrator behaviors contributing together to create a collective consciousness within the organization through behaviors of team learning and shared vision. Senge emphasized the inter-relationships within the organization that promoted the development

of the organization's collective consciousness, in what he termed shared mental models. Sergiovanni (2009) explained, "Connections among people are made when they are connected to shared ideas and values. Once achieved this binding of people to ideas and this bonding of people together forms a fabric of reciprocal roles, duties and obligations that are internalized by members of the group," (p. 109). This is consistent with Dweck's (2012) school mindset concept of mutual support and shared knowledge making described in the items included in this factor (Kofman & Senge, 2003; Flood, 1999; Hong et al., 2000; Kiedrowski, 2006; Mindset Assessments, 2012).

In summary, the theoretical relationships between the items within factor 3 – clear goals & a plan with professional collaboration revealed overall school effectiveness resulted from a combination, or multivariate, view of administrator and teacher behaviors, within an enabling school structure (Hoy & Sweetland, 2000 & 2001; Tarter & Hoy, 2004). These behaviors included the development of clear goals & a plan with collegial behaviors of professional collaboration that resulted in a shared vision, collective consciousness, and shared mental models (Senge, 2000). Finally, factor 3 – clear goals & a plan with professional collaboration could be given a more parsimonious name such as collaborative planning.

Factor 4 - Student Support (SS). This factor was made up of items that described activities related to teachers, administrators, students, and school structures that work together to support individual student needs. The factor SS included less than the preferred indices for the number of variables loading on a factor. Only two variables loaded on factor 4 – student support, items 18 and 19. The mindset literature suggested

that student support is an important component of a growth school culture (Blackwell, 2012). The student support factor comprised of items 18 and 19 is consistent with the Mindset, Inc. key feature 5 – student support and belief in growth (Mindset Works, 2008-2012c; Blackwell, 2012). Item 18 described structures in the school that supported student needs, "There are structures for faculty and administrators to share information and work together to meet the specific needs of individual students." Although item 19 was negatively worded it operationalized an attitude of collaboration and support between students and teachers, "There is an 'us against them' feeling between teachers and students." When reviewing the literature on the five key features of a growth school mindset, this factor would have been expected to load item 17, "Administrators and faculty in our school truly believe that they can help all students to meet their learning goals," and item 20, "There is a culture of continuous improvement where we are constantly looking at our current state and improvement goals year-to-year" (Blackwell, 2012). However, item 17 seemed to be confounded among three different factors. It had a small factor loading with this factor and factor 3- clear goals & a plan with professional collaboration. Item 17's largest loading was on factor 2 - open communication and peer support. This outcome can be explained if item 17 is viewed as a collective efficacy belief developed from working together with teachers in informal and formal settings.

A further review of the organizational learning literature showed that the WMSM items associated with factor 4 – student support, compared favorably with staff support in the development of student academic mindset. Academic mindset described a feeling of belonging and the students' beliefs they can succeed (Farrington et al., 2012).

Specifically, teachers with growth mindsets promoted development of individual student efficacy beliefs and growth mindset. Individual efficacy beliefs are closely connected with the theory of collective efficacy as described by Bandura (2001). Bandura explained the individual must act within a group to accomplish one's objectives. Therefore acting by proxy or collectively is also considered a part of human agency. This ability of humans to act collectively or in another's behalf lifts the burden of individual responsibility and expands the human agency construct to collective agency (Bandura, 1977). As individuals act transactionally within a social system, an "emergent" concept of collective efficacy develops. Collective efficacy is not the sum of the individuals' self-efficacy but a separate independent group construct. The group's belief in its collective efficacy serves the group functionally in a like fashion as self-efficacy does the individual (p. 14). Research on collective efficacy showed that groups with high collective-efficacy were more likely to set higher goals, persist in the face of setbacks, demonstrate higher motivation, and have greater levels of accomplishments. Individual and group efficacy beliefs are key components in explaining mindset concepts (Blackwell, 2012; Murphy & Dweck, 2010). Collective efficacy of faculty includes two parts; group competency and task analysis. Group competence is the belief all teachers have the skills, abilities, and knowledge to help all students. Task analysis is the faculty belief that the resources, environment, and community of students, parents, and school are sufficiently supportive to be able to perform the tasks necessary to help all students learn and grow (Goddard, 2002). Further work is recommended to develop item definitions that operationalize important teacher and student behaviors in schools that

contribute to student support. For example, items found in the PERTS (2014b) survey might be included such as task relevance, sense of belonging, and self-efficacy beliefs in the ability to perform the tasks. Blackwell, Trzesniewsk & Dweck (2007) described the importance of psychosocial skills and a growth mindset in teachers. Teachers with growth mindset were shown to develop growth mindsets in students and improved academic behaviors. These skills compare with work locus of control concept and personal mastery skills in Open Systems and systems thinking models (Spector, 1988; Furnham & Drakeley, 1993; Senge, 2000; Tarter & Hoy, 2004).

In sum, two items loaded strongly on the construct of student support. This factor was an underrepresented construct as evidenced in the results of this study. Student support was shown to be an important part of the growth school mindset construct and compared favorably with constructs of individual and collective efficacy, supportive relationships between teachers and students, and task analysis (Blackwell, 2012; Tarter & Hoy, 2004; Bandura, 2001; Goddard, 2002). The name of this factor seems consistent with the descriptions of the construct in mindset theory and should be retained as extracted and described based upon logic, theory, and review of the analyses. Such a recommendation is consistent with other methodological principles and practices (Field, 2000 & 2009; Netemeyer et al., 2003).

Discriminant Validity. The results of the analysis from this study revealed that factor 1, shared leadership, demonstrated multicollinearity with factor 3 – clear goals & a plan with professional collaboration (.867). Indices used in this study for the desired correlations between items and factors included $\pm .80 \geq x \geq \pm .32$. (Field, 2000 2009;

Brown, 2009; Gravetter & Wallnau, 2014). When variables highly correlate, it may create issues when using the results of statistical analysis. Variables that contribute to more than one factor tend to increase error variances resulting in an error in the calculations. The implications of multicollinearity include difficulty in interpreting the item contributions to each variable that make up the total construct of WMSM. Multicollinearity influences coefficient calculations of individual predictor variables by increasing or compounding the standardized error. Even with the collinearity between the factors of the mindset model, the results from the overall scale were shown valid and useful for school administrators and researchers. When using the factors from this study in multiple regression analysis, or with each other or in combination with other predictor variables, the model will hold. R^2 values (regression coefficients) will be valid (Stevens, 1993).

In sum, caution is recommended regarding the need to account for the multicollinearity between the factors when attempting to determine the individual contribution of independent variables given the likelihood of inflated error. Researchers should use caution when combining items that highly correlate into one factor, or in combination with other items as independent variables when performing regression analysis. The result could lead to errors of interpretation. The researcher could erroneously reject a single factor as insignificant when it is in fact contributing significantly to the overall mean of the dependent variable mean (Netemeyer et al., 2003). Further discussion of multicollinearity is outside the scope of this research study.

Summary. The underlying four factors extracted from this study were shown to be reliable and valid constructs that compared and contrasted with factors in the research literature on organizational learning and mindset culture. The four factors aligned with the five key features described in a growth school mindset model, as well as other well established comparable models in organizational learning (Spector, 1988; Hoy & Sweetland, 2000 & 2001; Senge, 1990 & 2000; Argyris & Schon, 1996; Bandura, 2001; Goddard, 2002; Dweck, 1988, 2012; Farrington et al., 2012; Blackwell, 2012). Through statistical analyses and descriptions of conceptual psychosocial factors related to student learning, many of the variables on the WMSM scale have been shown to combine to form factors that explain underlying constructs of a growth school mindset culture. Tarter and Hoy's (2004) Open Systems theory of learning organizations' concepts of mindfulness, collegial behaviors of shared decision-making, shared vision, and open communication compared favorably with the four factors and with the five key features of a growth school mindset. The four factors also compared to factors of team learning, shared mental models, and systems thinking explained by Senge (2000). The concept of a growth school mindset operationalized on the WMSM scale was shown through this study to be comprised of latent variables that are similar to variables shown by researchers as important to healthy school cultures.

Implications

The implications of having reliable instruments for gathering and interpreting data are clearly addressed in the standards for school administrators (National Policy Board

for Educational Administration, 2008). Providing sound research-based data for improving school outcomes is important because the stakes are high for the welfare of the students, the impact on the economy, the influence on future generations, and the world (Netemeyer et al., 2003). Therefore, evaluating the variables that may contribute to improved school performance has become a central area for educational researchers and a critical policy area for legislators. Current trends include debates over how to accurately identify school success at the organization level and the student level. Parents, legislators, teachers, and administrators ask questions about the usefulness and accuracy of high-stakes testing for school accountability and the singular use of criterion-referenced cognitive assessments delivered once a year. Furthermore, using the current approach of increasing standards by strengthening the curriculum alone, and expecting improved outcomes, lacks rigorous scientific research-based evidence (Behizadeh, 2014). Therefore, the Federal government has provided exemptions to several school districts from the strictly cognitive-based accountability testing required under the No Child Left Behind Act to collaborate with researchers and explore the potential for using psychosocial markers, such as school mindset, to indicate school improvement and student growth (Briceno, 2013). The question of what constitutes the factors that influence the domain of learning and whether these factors are malleable to influence for improving organizational outcomes is key to the goals of these and other researchers (Rotter, 1954; Bandura, 1977, 1986, 2001; Weiner, 1986; Dweck & Leggett, 1988; Esses et al., 1993; Taylor & Gollwitzer, 1995; Nenkov, 2012; Farrington et al., 2012, p. 9). The four factors identified in this study may provide information to advance the research in this area.

School leaders can consider the results of this research study when they want to identify perceptions of their faculty that contribute to improved school cultures.

Understanding the difficulty of capturing implicit thoughts and processes as explicit expressions may inform principals in the importance of reflective practices that begin with sound data on their faculty perceptions of the school culture (Marzano et al., 2005; Collinson & Cook, 2007; Sergiovanni, 2009; Blackwell et al., 2007; Blackwell, 2012). Principals may use the surveys and these research results to begin conversations with their staff on the reasons for their perceptions. Yet, principals must understand that just recognizing a difference in perceptions exists is not enough to promote a school growth mindset. School leaders must use their understanding of perceptual differences among their faculty to establish organizational routines that promote shared leadership, open communication, clear goals and a plan with professional collaboration, and student support.

There are many implications for using research-based data from scales such as the WMSM that quantify faculty and administrator perceptions of their school culture. School leaders may use their influence and openly engage discussion about faculty perceptions that could create school-wide opportunities for teacher participation and involvement. Survey research is just a beginning to finding realistic ways to implement change in a school. Principals can provide the research-based evidence from the WMSM scale as a sound reason for exploring new practices, emphasizing that hard work is a key element to good outcomes, and engaging in productive discussions as a beginning to the process.

Principals can work to develop the four factors of a growth school mindset in their schools by modeling a growth mindset, being open to change, providing faculty with opportunities to participate in shared leadership, developing a shared vision with clear goals, co-developing continuous improvement plans, providing resources of time for faculty to work together, and supporting development of targeted professional development that promotes a growth school mindset in teachers where faculty believe all teachers in their school can help all students learn and grow (Hoy et al., 1991; Kearney, 2007; Sanders & Sheldon, 2009).

Recommendations for Further Research

Netemeyer et al., (2003) explained

...the process of scale development may well be an iterative and ongoing procedure in which restarts are required as researchers learn from their efforts/mistakes and revisions are needed in such steps as conceptual definition, item generation, and defining construct dimensionality (pp. xiii & xiv).

Areas to consider when developing and modifying items for the WSM scale could include adding additional items that operationalize latent constructs that are under-identified on the WSM scale (specifically factor 4 - student support). Another recommendation would be to test the factor model on a new sample from another population to determine measurement invariance. Another useful area for additional research would be to compare and contrast learning organization constructs with learning factors identified in psychosocial academic mindset of students in schools. For example, PERTS (2014a) factors of intelligence beliefs, belonging, relevance, and efficacy could

also be factors for schools as learning organizations. Other recommendations for study include performing observations at school sites to determine if the observed variables reported by teachers and administrators on the WMSM scale in self reports actually occur in the school setting; performing research studies to determine if factors of mindset culture explain school outcomes; identifying what interventions prove effective in developing a school growth mindset; and identifying what traits of school principals lead to schools with a growth mindset. Recommendations for future studies could also include a phenomenological qualitative research study to advance and confirm additional underlying psychosocial constructs of a growth school mindset culture. Specifically, developing a research design to record the specific observed behaviors of administrators, faculty, and students, and observe specific organizational routines to better understand the differences between espoused theory of practitioners and the theory in use in regard to the growth mindset school culture (Ruff, 2002; LaLoux, 2014). Identifying the latent, or underlying factors, such as the five key features of a growth mindset and the four-factor model developed from this study helped to contribute to the research on what drives the actions of schools as successful learning organizations. Finally, performing correlational research using the WMSM scale along with other reliable and valid survey instruments shown by researchers to explain improved school outcomes such as work locus of control, collective efficacy, mastery learning, and enabling school structures could provide validity for the constructs identified in this study (Spector, 1988; Midgley et al., 1998; Hoy et al., 1991; Tarter & Hoy, 2004).

In sum, interventions to improve schools have been shown to target the tacit ways of knowing described by Dweck (2008, 2010 & 2012) in her theories of growth mindset. Developing a well-designed scale that quantifies and captures psychosocial and cognitive perceptions of faculty and administrators requires an understanding of the implicit processes of individual learning, the reciprocal influence of the group on organizational learning, as well as the factors underlying the behaviors of individuals and the group (Netemeyer et al., 2003). Senge's (1990) Five-Discipline model and Argyris & Schon's (1996) theories include the concept of double-loop learning used to describe the process of learning in organizations. This process of double-loop learning emphasizes the importance of discovering the underlying assumptions of the collective mind in a school organization as a leverage point in bringing about meaningful change (Senge, 2000).

Conclusions and Recommendations

In conclusion, the WMSM scale reliably quantifies and captures four underlying latent factors, or constructs, of a growth school mindset, shared leadership, open communication and peer support, clear goals and a plan with professional collaboration, and student support. The WMSM scale has a Cronbach alpha reliability coefficient of .899 (n=311) for the 19 items retained. Additional study is warranted in the area of survey research using the mindset construct (Netemeyer et al., 2003). Principals who use the results of the WMSM scale to determine their faculty's school mindset can be confident that the data quantifying their faculty's perceptions can be used to draw valid conclusions about their school culture. Principals can provide support to develop a

growth school mindset among their faculty by using data from the WMSM scale to open dialogues about their perceptions of their school culture. Principals can reflect on their own mindset and openness to collegiality, open opportunities for faculty engagement in the decision making and change processes, collaborate to develop clear goals, provide targeted feedback, and provide time for teachers to learn and work together. The results of this study show potential for the WMSM scale to be a useful tool in support of continuing processes of school improvement (Dweck, 2012; Adams, 2014).

The underlying factors of the WMSM scale identified in this study align with organizational learning and learning organization models that are considered critical contributors to the organizational health of schools. (Blackwell, 2012; Dweck, 2012; Bandura, 2001; Senge, 2000; Tarter & Hoy, 2004). Senge (1990) explained,

...people are agents, able to act upon the structures and systems of which they are a part. All the disciplines are, in this way, 'concerned with a shift of mind from seeing parts to seeing wholes, from seeing people as helpless reactors to seeing them as active participants in shaping their reality, from reacting to the present to creating the future' (p. 69).

New ways of thinking about individual and group learning in school organizations may be developed through research studies in the area of psychosocial markers used for indicating student and school outcomes (Laloux, 2014). The reciprocal relationships between the social experiences of the group and the individual teachers, administrators, and students requires further exploration of the underlying constructs of human ways of knowing and learning. Looking with new eyes may bring new styles of instruments for collecting different types of data (Slattery, 1995; Bandura, 2001; Tarter & Hoy, 2004; Dweck, 2012). Perhaps new ways may be developed to explore the individuals and the

group's intricately interwoven experiences and the implicit ways of knowing in school settings. The importance of growth school mindset situated in a postmodern world is captured in a quote from Kummel (1965) in Slattery (1995):

Generally, the future represents the possibility, and the past the basis of a free life in the present. Both are always found intertwined with the present: in the open circle of future and past there exists no possibility which is not made concrete by real conditions, nor any realization which does not bring with it new possibilities. This interrelation of reciprocal conditions is a historical process in which the past never assumes a final shape nor the future ever shuts its doors. (p. 50)

The construct of a growth school mindset is an expanding frontier, just as is survey instrument research, in exploring the psychosocial factors of student learning (Netemeyer et al., 2003). An exciting challenge lays ahead in discovery, implications, and interventions that could lead to further improvements in school organizations to help all students learn and grow.

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APPENDICES

APPENDIX A

SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN SUBJECTS
RESEARCH AT MONTANA STATE UNIVERSITY

Mindset Survey Introduction: This is a survey on growth versus fixed Mindset. You will be asked to complete a rating scale on factors related to your school culture. Your responses will be used to determine the usefulness of the Mindset survey to schools like yours and help me complete my dissertation project at Montana State University. The survey should take approximately five minutes. The following *Consent Form* provides information necessary for you to make an informed decision about whether you choose to participate or not in this survey. Thank you, Janet Hanson

SUBJECT CONSENT FORM FOR PARTICIPATION IN HUMAN RESEARCH AT MONTANA STATE UNIVERSITY

Study Title: Mindset Research

Purpose of the research study: You are being asked to participate in a research study on school Mindset, that is, your beliefs about characteristics of your school culture, to determine the usefulness of the Mindset survey to schools like yours.

Voluntary participation: Your participation in this research is completely voluntary and you can choose not to answer any questions you do not want to answer and/or you can stop at any time. **Procedures Involved:** If you agree to participate in this study you will be asked to complete a one-time survey on Mindset and demographic information. The responses you provide are anonymous. Data will be grouped and summarized. Only the researcher will see the individual data.

Risks and Benefits: If you feel uncomfortable about any of the questions, you may choose to leave items blank or to terminate your participation in the survey. This study is of no benefit to you.

Source of Funding: NA **Cost to Subject:** There is no cost to you.

Confidentiality: No personal identifying information will be collected. The survey information you provide is anonymous and confidential. **Encouragement to ask questions:** You are encouraged to ask questions and may contact me, the researcher, Janet Hanson, janethanson1@montana.edu (208) 610-8498; Dr. William Ruff, wruff@montana.edu, (406) 994-3120, or Mark Quinn, Chairman, Institutional Review Board, MSU-Bozeman, (406) 994-4707, mquinn@montana.edu.

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I _____ (name of subject), agree to participate in this research. I understand that I may later refuse to participate, and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: _____ Date: _____

Witness: _____ (optional)

Investigator: Janet Hanson/jh Date:5/08/15

Please sign one copy and return, please keep one copy.

APPENDIX B

THEORY OF INTELLIGENCE SCALE

Theory of Intelligence Scale

Intelligence – Fixed or Growth Mindset – Dweck, 1999

$\alpha = .90$; $M = 3.31$; $SD = 1.04$; cf. Dweck, Chiu & Hong, 1995

In the following questions, we ask about your views about intellectual ability, learning and performance. Opinions differ on these matters and your honest, "gut" response will be most helpful.

T1-FM1 1. You have a certain amount of intelligence, and you really can't do much to change it. [*Reverse-scored*]

- Disagree Strongly
- Disagree Somewhat
- Disagree Slightly
- Agree Slightly
- Agree Somewhat
- Agree Strongly

T1-GM1 2. You can always substantially change how intelligent you are.

- Disagree Strongly
- Disagree Somewhat
- Disagree Slightly
- Agree Slightly
- Agree Somewhat
- Agree Strongly

T1-FM2 3. You can learn new things, but you can't really change your basic intelligence. [*Reverse-scored*]

- Disagree Strongly
- Disagree Somewhat
- Disagree Slightly
- Agree Slightly
- Agree Somewhat
- Agree Strongly

T1-GM2 4. You can change even your basic intelligence level considerably.

- Disagree Strongly
- Disagree Somewhat

- () Disagree Slightly
- () Agree Slightly
- () Agree Somewhat
- () Agree Strongly

APPENDIX – Scoring Guidelines

The survey is coded with scale indicators, meaning that the items with a common prefix go together. The instructions for the first scale, theory of intelligence (i.e., mindset), are below and can give you guidelines on how items within a survey are to be combined.

Theory of Intelligence: GM1 & GM2 items are counted as scored (1=1, etc.)

FM1 & FM2 items are reverse-scored, so that 1=6, 2=5, 3=4, 4=3, 5=2, 6=1.

Add the scores for the 2 GM items + the reversed scores for the 2 FM items and divide by 4 to get the average.

APPENDIX C

ONLINE INDIVIDUAL MINDSET SURVEY

Online Individual Mindset Survey

Please show how much you agree or disagree with each statement by circling the item that corresponds to your opinion.

1. You have a certain amount of intelligence, and you can't really do much to change it.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
2. Your intelligence is something about you that you can't change very much.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
3. No matter who you are, you can significantly change your intelligence level.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
4. To be honest, you can't really change how intelligent you are.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
5. You can always substantially change how intelligent you are.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
6. You can learn new things, but you can't really change your basic intelligence
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
7. No matter how much intelligence you have, you can always change it quite a bit.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
8. You can change even your basic intelligence level considerably.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
9. You have a certain amount of talent, and you can't really do much to change it.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
10. Your talent in an area is something about you that you can't change very much.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree
11. No matter who you are, you can significantly change your level of talent.
Strongly Agree, Agree, Mostly Agree, Mostly Disagree, Disagree, Strongly Disagree

APPENDIX D

PERTS ACADMEIC MINDSET SURVEY

PERTS Academic Mindset Survey

- Intelligence Mindsets
 - Belonging
 - Relevance
 - Self-efficacy
1. You can learn new things, but you can't really change your basic intelligence.
 2. Your intelligence is something about you that you can't change very much.
 3. You have a certain amount of intelligence and you really can't do much to change it.
 4. I feel like I belong in this class.
 5. I feel respected in this class.
 6. I feel comfortable in this class.
 7. I feel like I can be myself in this class.
 8. My class gives me useful preparation for what I plan to do in life.
 9. This class teaches me valuable skills.
 10. Working hard in this class matters for success in the work force.
 11. What we learn in this class is necessary for success in the future.
 12. I can earn an A in this class.
 13. I can do well on tests, even when they're difficult.
 14. I can master the hardest topics in this class.
 15. I can meet all the learning goals my faculty sets.

(PERTS, 2014a)

APPENDIX E

WHAT'S MY SCHOOL MINDSET? SURVEY

What's My School Mindset? Survey

Scale: Never=1, Rarely=2, Sometimes=3, Frequently=4, Usually=5, Always=6

1. Leadership opportunities are open to all staff members and staff members are invited to participate periodically throughout the school year.
2. We have systems where teachers are directly involved and participate in decision-making and planning for site initiatives.
3. Administration and leaders communicate decision-making strategies with staff and elicit their input.
4. Staff are able to put ideas “on the table” and “take them off” safely during planning, collaboration, and decision-making meetings.
5. Teachers are invited to give critical feedback about administrative practices and how they would like additional support.
6. Staff members are reluctant to work with or support new or struggling teachers. [Reverse-scored]
7. Teachers observe one another and give each other feedback to develop the team’s best practices.
8. We have exclusive cliques or “camps” within our faculty. [Reverse-scored]
9. Teachers collaborate regularly, sharing or co-developing lessons, assessments, and student work.
10. Our teachers tend to protect or guard our lessons, strategies, tests, etc. from one another. [Reverse-scored]
11. Instructional expectations, standards, and evaluation protocols are made clear to teachers in advance.
12. Administrators communicate a sincere belief that staff members can develop their teaching skills with practice and feedback.
13. Teachers receive clear feedback on and ongoing support for their practice outside of formal evaluations.
14. Teachers, coaches, and administrators work together to design goals and plans for teacher development.

15. Teachers receive professional development that is targeted to their professional needs and goals.
16. Time is provided in the work day for coaching, co-planning/co-teaching, and structured professional learning.
17. Administrators and teachers in our school truly believe that they can help all students to meet learning goals.
18. There are structures for teachers and administrators to share information and work together to meet the specific needs of individual students.
19. There is an “us against them” feeling between teachers and students. [Reverse-scored]
20. We review our current state and set improvement goals for both the short and long-term.

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SCORING & FEEDBACK:**Fixed Mindset (20-59 total points)**

At present, your school probably has many of the following characteristics:

- Administrators and perhaps a few key leaders make most decisions for a site.
- Some staff members are frustrated by decisions and may challenge administration each time there is a change on campus.
- Leaders perceive staff to be entrenched and resistant to change.
- While there are pockets of excellence, the quality of instruction is quite inconsistent.
- Many teachers work in relative isolation and less-skilled teachers have little chance to learn from their colleagues.
- Teachers who are ineffective may not understand why or what do to about it.
- When teachers are unsuccessful, they are generally either gotten rid of, or ignored and worked around.
- Teaching staff generally finds professional development offerings to be unrewarding.
- The needs of many students are not being effectively met and no one is sure what to do about it.

What does this mean?

A fixed mindset school community is one in which people lack confidence in their ability to grow and develop together in a positive direction. When a community is working with a primarily fixed mindset orientation, most of its members are focused on preserving their status and avoiding negative judgments. Like an individual with a fixed mindset, a fixed mindset school culture keeps people anxious, striving to either look good or guard against looking bad, rather than working to get better. These conditions can undermine the motivation and morale of everyone in the building—administrators, teachers, and students. Even high-performing schools can exhibit these belief-based dynamics, limiting their potential to engage everyone to their utmost.

But school culture CAN be changed! Just as a person can develop a growth mindset, when members of the school community consciously cultivate growth mindset principles and practices, they can transform their collective culture and experience much greater success.

Mixed Mindset (60-89 total points)

At present, your school probably has many of the following characteristics:

- Individual teachers grow leadership skills through their own initiative and the site provides those individuals leadership opportunities.
- Leaders' perceive staff as wary of change.
- Some grade-levels or departments are dynamic and collaborate, but school-wide there is not a culture of collaboration

- There is a mismatch between expectations and opportunities for collaboration.
- Teachers are congenial, but do not go out of their way to support one another if someone is struggling.
- When teachers are struggling, intervention efforts are made by administrators or coaches, but mediocre teaching is generally tolerated.
- Teaching staff generally finds professional development offerings to be of mixed value; it may be seen as not relevant or insufficiently supported in follow through.
- Although the needs of some students are not being met, there is a sense that the site is doing “just fine.”

What does this mean?

A school with a mixed mindset is not meeting its full potential. While some staff members are focusing on how they can do better, others are preoccupied with trying to maintain the status quo and avoid the risk of blame or new demands. Like an individual with a mixed mindset, a mixed mindset school culture creates vulnerabilities and weak points where people are striving for a positive judgment or to maintain comfort, rather than to continuously improve. Many middle or high-performing schools fall into this category: content to rest on a positive achievement record, but missing the opportunity to accelerate students’ achievement or to serve the needs of all students at a high level. While there may be a feeling that the site is doing well and there are no glaring issues, a closer look might reveal some areas that are real cause for concern. Unless the school has a system and a culture for supporting growth, those small areas will never resolve themselves.

But school culture CAN be changed! Just as a person can develop a growth mindset, when members of the school community consciously cultivate growth mindset principles and practices, they can transform their collective culture and experience much greater success.

Growth Mindset (96-120 total points)

At present, your school probably has many of the following characteristics:

- Many or most staff members participate in leadership and decision-making, and all have the opportunity to do so.
- Leaders act as learners and model the growth mindset, including openness to feedback and improvement of their practice; they support their teachers as learners.
- Staff has come to see change as normal and part of the development process, rather than threatening.
- Excellent teachers share their knowledge, and all teachers have the opportunity to contribute to collective learning. The quality of instruction is consistently improving.

- Less-skilled teachers are encouraged to learn from their colleagues, and structured time is available for them to do so.
- When teachers are ineffective, they are consistently supported in the areas where they struggle, and most ultimately succeed.
- Teaching staff generally finds professional development offerings to be responsive to their needs and a positive benefit.
- The needs of most students are being met; where they are not, teams are working deliberately to find solutions.
- There is school-wide pride in joint achievements, but no sense of complacency.

What does this mean?

A school with a growth mindset is one where everyone sees themselves as learners and where they support one another in developing toward individual and common goals. Knowing that all humans can grow their intelligence influences and motivates both adult and adolescent learners. Being in a growth mindset school doesn't mean that there are no challenges, mistakes, or failures—it means that people are continually striving to overcome them. When students are in an environment that promotes growth and, hopefully, intellectual risk-taking, they excel too. Of course, even a growth-minded school community usually has some areas in which they could develop and be more effective. When members of the school community consciously cultivate growth mindset principles and practices, they can transform their collective culture and experience ever greater success.

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