School-Level Implementation of Mastery Goal Structures: A Case Study

Thesis

Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts in the Graduate School of The Ohio State University

By

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2015

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Abstract

This case study examines a public, early-college, STEM-focused (science, technology, engineer, and math) secondary school that has implemented a school-wide system to support mastery achievement goals among students. Interviews were conducted with volunteer administrators (n = 3), teachers (n = 4) and students (n = 15) to determine how the mastery system at STEM School is envisioned by the school leadership, practiced by the teaching staff, and perceived by the students. Further, this case study employed pattern matching techniques of qualitative inquiry (Trochim,) to determine in what ways these vision, practice, and perceptions align with Goal Orientation Theory (GOT), from which the concept of mastery goals is derived. Within GOT, TARGETS is an acronym used to represent the dimensions of a classroom that support student motivation: *tasks, authority, recognition, grouping, evaluation, time, and social supports* (Ames, 1992a; Patrick, Anderman, Ryan, Edelin, & Midgely, 2001). Data were coded for these components, as well as mastery and performance goal structures. Some codes, such as self-regulation, emerged from the data. Results indicate that many of the components can reinforce student perceptions of the mastery goal structures in their environment (e.g. social supports), but the use of threshold practices (e.g. criterion-based evaluations) can undermine these perceptions.

Acknowledgments

Thank you to Megan Sanders for moving this project forward with her thoughtful and careful teamwork. Thank you, too, to Dr. Shirley Yu, principal investigator of the project from which this study came. And to the Drs. Anderman, Lynley and Eric, for insisting that this be better, and for their support in ensuring that it will be. I am appreciative for your attentive feedback, and to Lynley, especially for her mentorship and high expectations.

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Chapter 1: Introduction

Empirical research conducted over the last thirty years has consistently shown that classroom goal structures are an important component of supporting both student motivation and student understanding of the purpose of learning. Classroom goal structures generally indicate whether students perceive the goal of learning to be either mastery-based, emphasizing improving competence, or performance-based, emphasizing students' standing relative to peers (Ames, 1992; Anderman & Wolters, 2006). Relatively little research has been conducted at the school level (cf. Maehr & Midgley, 1996), in part because an explicit institutional implementation of either mastery or performance goals is rare to find in practice. This case study examines one school attempting to bridge the divide between theory and practice by implementing research-based policies and structures in an effort to foster mastery goals. The purpose of this study was to understand the school's motivational climate by examining how the implemented structures first were envisioned and communicated by administrators; second, were subsequently understood and practiced by teachers; and finally, were perceived by students.

Goals in Learning

In education research, goal orientations represent the beliefs that influence how students perceive, approach, and respond to situations that involve achievement (Ames, 1992a; 1992b; Schunk, Pintrich, and Meece, 2008). Goal Orientation Theory (GOT) further distinguishes between two kinds of achievement goals, which have been conceptualized as task-focused and ability-focused (Maehr & Midgley, 1991), learning and performance goals (Dweck & Leggett, 1988), task-involved and ego-involved (Nicholls, 1984), and mastery and performance (Ames, 1992a; 1992b). Though there are distinctions between these conceptualizations (see Nicholls, 1990 for an overview), they are closely related; this project utilized Ames' (1992b) notion of mastery and performance goals. Regardless of the conceptualization, empirical evidence suggests that achievement goals influence student perceptions of the purpose of learning, guide behavior and intention, and shape the way students approach or engage in achievement-related tasks. Specifically, mastery goals emphasize learning for the sake of learning, measure student success in terms of progress or self-improvement, and are generally associated with adaptive outcomes that include persistence (Elliot & Dweck, 1988), use of self-regulation strategies (Ames & Archer, 1988), and academic achievement (Dweck & Leggett, 1988).

By contrast, performance goals emphasize extrinsic reasons for learning. Performance goals influence students to compare their success to others, either in an effort to best their peers or to avoid looking worse by comparison (Meece, Blumenfeld, & Hoyle, 1988). Because of this, struggling with academic tasks can threaten students' self-appraisals or sense of self-efficacy or -worth, which can lead to avoidance of challenging

material (Elliot & Dweck, 1988), the use of shallow learning strategies (Meece et al. 1988) and more infrequent use of self-regulation strategies (Pintrich & De Groot, 1990).

Recent research suggests there may be further distinctions within the mastery and performance orientations. For instance, A.J. Elliot and his colleagues have proposed a 2x2 framework distinguishing between *approach* and *avoid* profiles. In this model, those with approach orientations focus on achieving goals, while those with avoid orientations worry about failing (Elliot & McGregor, 2001). Students with personal goals characterized by the mastery-approach orientation report a focus on understanding course material, measuring success in terms of self-improvement. By contrast, students with performance-approach goals report a focus on being the best or smartest among peers, using normative standards such as grades to measure success. Students with mastery-avoid orientations are concerned about not improving or understanding; a task is considered successful if a student does not complete it incorrectly. Performance-avoid orientations induce a focus on avoiding looking dumb or inferior compared to others; students consider a task successful if they do not earn the worst grade. Research to further refine GOT has continued, with some suggesting six (Urdan & Mestas, 2006) and even as many as twelve potential profiles within the mastery/performance goal framework (Vansteenkiste, Lens, Elliot, Soenens, & Mouratidis, 2014). In this study, however, the four-goal model is utilized.

Outcomes. Empirical work has linked mastery-approach orientations with adaptive outcomes such as a sense of pride and increased interest in learning tasks (Ames, 1992b) and deep processing strategies (see, for instance, Pintrich 1999, Wolters et al 1996). There is strong evidence linking mastery-approach orientations to behavioral

outcomes such as the use of self-regulation strategies (Pintrich & Garcia, 1991, Pintrich, Marx, & Boyle, R, 1993) and help-seeking (Linnenbrink, 2005, Karabenick, 2004, Ryan, Pintrich, and Midgley, 2001). Some research has even linked mastery-approach goals to achievement (Dweck & Legget, 1988; Roeser, Midgley, & Urdan, 1996; Wolters, Yu, & Pintrich, 1996; Grant & Dweck, 2003). In comparison, performance-avoid orientations are often linked to maladaptive affective outcomes such as decreasing interest or task value (Wolters, et al., 1996), and anxiety (Linnenbrink, 2005). Behaviorally, performance-avoidance goals have been correlated with procrastination and self-handicapping (Urdan, Midgley, & Anderman 1998, Urdan et al. 2002). Research has generated mixed findings regarding whether performance-approach is an adaptive or maladaptive orientation in education settings (see Schunk et al. 2003). While approach and avoid distinctions as described in the 2x2 model proposed by Elliot and McGregor (2001) are particularly useful in considering the context and results of this project, determining the relative adaptive or maladaptive outcomes of perceived orientations is beyond the scope of this project.

Classroom Goal Structures

There is strong evidence linking students' personal goal orientations with the goal messages embedded in the structures of a classroom environment; for instance, teacher instruction. These *classroom goal structures* are a second component of GOT, and influence whether students perceive that teachers focus on demonstration of ability and competition, or developing ability and effort (Anderman & Anderman, 2010). Research suggests that classroom practices can predict changes in both students' valuing of

domains (such as math) and the goal orientations they adopt within those classrooms (for instance, Anderman, Eccles, Yoon, Roeser, Wigfield, and Blumenfeld, 2001). Empirical research utilizing both quantitative and qualitative inquiry has linked the manipulation of teacher instructional practices to differences in student perceptions of the goal environment (e.g. Kaplan, Gheen, & Midley, 2002; Self-Brown & Matthews, 2003). In the study conducted by Self-Brown and Matthews (2003), evaluation was a critical component influencing student perceptions; students who were assessed individually and permitted to set personal achievement goals adopted more mastery goals than students who were evaluated against normative standards felt discouraged from setting mastery goals, reported working to please their teachers, and were more likely to become frustrated.

Other research has examined the impact of teacher communication on student perceptions of classroom goal structures. In a qualitative investigation conducted by Patrick, Anderman, Ryan, Edelin, and Midgley (2001), classrooms considered by students to have a strong mastery focused had teachers who emphasized the importance of effort, articulated support for student progress, and encouraged student interaction. By contrast, teachers whose classrooms were perceived by students to be focused on performance talked with students about the importance of grades and assessments, and often reflected on students' relative standings to each other. Relatedly, Anderman, Patrick, and Ryan (2004) found that teachers who explicitly stated the purposes of learning to be an active process were more likely to have students who perceived stronger mastery goals in their classrooms. These findings support work conducted by Meece (1991) who found that teachers of students who perceived a high mastery-goal focus

were those who adapted instruction to students' individual needs and interests, encouraged peer collaboration, and spoke to their students about both the purpose and value of not only learning, but deep understanding.

Recent empirical work suggests that student perceptions of teacher beliefs are an important aspect of their perceptions of the classroom goal environment, which subsequently influence personal goal orientations. Gilbert, Musu-Gillete, Woolley, Karabenick, Strutchens, and Martin (2013) found that students' perceptions of whether their teachers believed that they were capable of learning in math class were positively correlated to the development of mastery goal orientations. Similarly, student perceptions that their teacher did not believe they were capable of understanding was related to performance goal orientations.

Classroom goal structures and the messages students receive about the purposes of learning may be particularly important for students in the middle grades. L.H. Anderman & E.M. Anderman (1999) found not only that students transitioning to middle school increased their endorsement of performance goals, but also that this higher endorsement was linked with declines in school belonging. Similarly, Urdan and Midgley (2003) found that for students making the transition to middle school, decreases in perceived mastery-goal structures were linked to lower reports of self-efficacy and positive affect, as well as declines in grade point average. Students who perceived increases in the performance goal structures of their classrooms also endorsed more performance goals and reported more negative affect toward school. These changes were not only salient during the students' transitions, but remained statistically significant through the first two years of their middle school experience.

TARGET(S). The clear relationship between student perceptions and their academic behaviors has led to considerable research examining the ways teachers can cultivate climates conducive to the development of mastery-oriented learning goals in their classrooms. Adapted from Epstein (1989), Ames (1992a) suggested the acronym TARGET as a theoretical framework for conceptualizing and examining the instructional practices that influence classroom motivation: **t**asks, **a**uthority, **r**ecognition, **g**rouping, **e**valuation, and **t**ime.

In overview: the TARGET theoretical model suggests that in teaching practice, classroom goals can be communicated through assignments and activities that are appropriately challenging, diverse, and meaningful. Students should share authority with their teachers, involved in both knowledge-construction and decision-making. Teachers should recognize students for their progress and effort, and grouping should balance teamwork and individual responsibility. Evaluation should be private and frame mistakes as an opportunity to learn, and time should be utilized to ensure students have access to materials at the pace they need to engage deeply with the content.

Research suggests the inclusion of **s**ocial supports as additional dimension influencing student perceptions of the classroom goal environment (Anderman et al., 2002; Patrick, 2004; Patrick, Anderman, & Ryan, 2002). The idea of social supports encompasses students' interactive and mutually respectful relationships with peers, as well as warm relationships with teachers in which students derive informational comparisons—as opposed to negative relative ability comparisons—in an effort to support their individual learning goals. In mastery-focused classrooms, for instance, Patrick et al. found that teachers gave praise that was focused on effort and progress.

Additionally, social supports that influence student perceptions of mastery goals includes a student's sense of belonging in his or her school at large (Anderman, Patrick, Hruda, & Linnenbrink, 2002). Turner and her colleagues (2002) found similar results in their mixed-methods investigation of math classrooms: teachers whose instruction included supporting students through complex content and providing varied opportunities to demonstrate new skills were related to students who reported utilizing performance-avoid strategies less frequently than peers whose teachers were perceived to be less mastery-focused. For the purpose of this study, the idea of social supports is included in the framework, resulting in the TARGETS theoretical model.

These empirically derived guidelines are intended to be interpretive rather than prescriptive; they provide ample room for classroom practice to take shape in ways that align with any teacher's subject area and personal style. Anderman and Anderman (2010) provide a summary of the TARGET components with examples of teaching practices that align with each; for instance, for *recognition* they suggest a teacher write "an encouraging note to a student who recently has been displaying a great deal of effort," (p. 201).

School-Level Research

To date, limited research has examined the implementation of mastery goal structures beyond individual classrooms to entire school institutions. Maehr and Midgley (1991; 1996) conducted one such attempt, explicitly utilizing GOT and the TARGET theoretical framework to guide their intervention. They argued that because of "organizational culture," it is possible for schools to implement structures that send

messages to students influencing their endorsement of mastery and performance goals, similarly to classroom goal structures. In fact, path analyses conducted to prepare their intervention suggested that as students advanced through the grade levels, the influence of family messaging ceded to the "psychological environment" of their schools (1991; p. 408). From this, Maehr, Midgley, and their research team developed a school-wide intervention outlining practices aligned with the TARGET framework; for instance, in relation to tasks, they asked schools to avoid tokens for attendance or achievement, and to develop programs that supported self-regulation strategies (p. 410). Additionally, they attempted to craft a program that identified school leaders to guide the intervention, designed collaborative workspaces for the leadership teams to examine school structures and implement the intervention, and involve the school community and stakeholders. Ultimately, this intervention struggled to take hold in the participating schools. Maehr and Midgley (1996) concluded that the aim of moving the schools away from stressing performance goals and toward supporting mastery goals was mixed in its success, particularly in light of teachers perceiving a top-down approach to the intervention.

In a review of achievement goal theory literature, Urdan (2004a) questioned whether GOT could be used as an effective framework in guiding school reform, particularly due to little robust (observational, qualitative) evidence that classroom goal structures influence students' personal goal orientations, as well as a lack of evidence for defining the mechanisms through which goal structures are perceived by students . He concluded that stronger links between instructional practices and students perceptions of mastery or performance goal structures must be found before endorsing GOT for teachers and schools. Yet Urdan also noted that practical limitations inhibit the success of

empirical research in classrooms, and are further amplified when attempted across entire schools. Quantitative research relies primarily on student reports, while qualitative research is difficult and time-consuming to undertake and report, making available data scarce. Once begun, researchers must rely on teachers, students, and classroom conditions that vary in ways that make causal inferences all but impossible. Teachers can perceive interventions as restrictive, may misunderstand the purpose of interventions entirely, or believe that the interventions work against other policies they are mandated to uphold.

These concerns cannot be alleviated within researcher-imposed empirical studies. If, however, a school *chooses* to implement a mastery goal system, this provides a context for research in which some of Urdan's concerns can be mitigated. STEM School is one such environment.

Present Study

This study addresses a gap in the literature regarding goal orientation in three important ways. First, STEM School is a unique research environment, as there are relatively few schools attempting to explicitly implement mastery goal structures, especially outside of researcher intervention. A case study analysis expands the literature on how goal structures can be operationalized beyond the classroom context to an entire educational institution. Second, little research exists examining a school that chooses, as part of its mission, to promote a mastery environment, beyond the influence of researcher intervention. Examining how theory was understood by administration and teachers and subsequently translated into practice can serve as a useful way to understand how

practitioners interpret empirical research. Finally, few studies have had an opportunity to examine and compare the perspectives of administrators, teachers, and students simultaneously. The research questions this study addresses are:

1. How are mastery goals at STEM School envisioned and communicated by administrators, subsequently understood and implemented by teachers in their practice, and ultimately perceived by students?
2. How do the vision, practice, and perceptions of STEM School's mastery goal framework compare to TARGETS, a model used as a guideline for assessing goal structures?

Chapter 2: Method

Because the goal of the study was to establish a deeper understanding of STEM School, a case study analysis was an appropriate methodological approach. Yin (1992; 2003) suggests that case studies are particularly appropriate when any of four conditions are met: (1) research questions center on "how" and "why" questions; (2) researchers and their work do not influence or manipulate the participants' behavior or environment; (3) researchers are particularly interested in contextual conditions believed to be relevant to phenomenon of interest or (4) boundaries between phenomenon and context are not clear (see also Baxter & Jack, 2008). Three conditions of this project justify the use of case study methodology using Yin's criteria: first, the research questions include *how* a school-level focus on mastery learning shapes administrative vision, teacher practice, and student perceptions. Second, researchers did not intervene, control, or manipulate school-level conditions or variables. Finally, this project focuses on the contextual conditions of STEM School that influence student motivation. This particular case study is descriptive in nature, rather than explanatory or exploratory (Yin, 2003; Baxter & Jack, 2008) because the analyses was undertaken to understand the phenomenon—in this case, school-level mastery goals—in context.

STEM School

Situated on a university campus in a large Midwestern city, STEM School operated for six years as a public high school, with a unique funding partnership with the university and a nearby research-and-development company, before becoming a public charter. STEM School is considered a small learning community, with just fewer than 400 students enrolled in the high school. Enrollment in STEM School is lottery-based. Data from the school's website[1] indicate that for the freshman class admitted in the fall of 2013—the most recent academic year available, and the year in which this study was launched—263 students applied for 100 available openings. Fifty percent of the openings in any given years are reserved for the large urban school district in which STEM School is located. The remaining spots are open to students in 13 suburban districts, though STEM School provides no transportation. Students maintain concurrent enrollment in their district (though their diplomas are awarded by STEM School), which allows students to participate in extracurricular opportunities that may not be offered on the STEM School campus.

The student population is considered diverse; for the 2013-2014 academic year, the racial demographic breakdown included 53% White, 28% Black, 8% Asian, and 8% bi- or multiracial students. Additionally, 30% of the students qualify for free or reduced-price lunch, and the school estimates 13% of students have needs requiring Individualized Education Plans or special education services. The school does not provide data regarding the number of students identified as Gifted and Talented by State

[1] The school website was most recently accessed for this information on March 23, 2015; however, the full citation is not provided to protect participant privacy.

standards, though several teachers and administrators suggest that because of STEM School's reputation, students with a particular affinity for STEM subjects, or, more broadly, learning, are among the greatest number of those who apply.

STEM School is considered a high-performing school according to the state's Department of Education criteria, earning a letter grade of "A" on the state report card for student performance on the state achievement test. The average student ACT score is 24.5, higher than the national average of 21.1. Additionally, STEM School boasts a 100% graduate rate, with nearly all students enrolling in college after graduation.

The school's formal mission statement focuses on offering students a highly personalized learning environment that emphasizes rigorous academic content. In an expanded vision statement, STEM School indicates it hopes to prepare learners holistically (cognitively, socially, and emotionally) for a world that requires skills in math, science, and technology in addition to critical thinking and collaboration. As a result, science, technology, engineering, and math (STEM) subjects are a major concentration of the school curricula, embedded in all content areas.

Two other school-wide structures make STEM School unique: the mastery system, and the accelerated course scheduling. These two structures are designed to work together in STEM School's mission to promote student access to rigorous academic content by helping students access college credits before graduating from high school. The mastery system is designed to support deep engagement with content by requiring that students earn a grade of 90% or higher on all assignments, tests, and courses. If students fall short of this threshold on an assignment or test, they are required to participate in some form of remediation, which often includes attending after-school

office hours with the assigning teacher, completing similar assignments, or correcting the mistakes made on the original work. Students can remediate portions of tests or classwork, but must remediate courses in full the following term. Student grades at STEM School are either assigned as "A" or "WIP," which stands for Work-In-Progress.

STEM School partners with a nearby research university to offer its students opportunities to take college coursework, which they may begin as early as their 11th grade year as long as they have satisfied other requirements. To ensure students can take advantage of this opportunity, STEM School offers a unique, accelerated course pacing and sequencing schedule similar to many universities, which involves completing entire classes during a traditional 15-week semester. There are two, four-month semesters in the school's academic year, with one five-week "J-Term" in-between. If students master a course in the fall, they move on to the next subject in their trajectory the following semester and are permitted to take "fun" courses or independent studies during J-Term. If a student fails to master a course in the fall, J-Term is used as a time for remediation; if a student fails to master the course during J-Term, then they repeat the course the following semester, and every semester, until mastery is achieved. Because this ranges widely for students, attempts-to-mastery is not formally measured or counted in school records, though the school website states that it is expected every student will have to remediate at some point in time. Additionally, some summer programming exists to support students toward mastery. This accelerated pace is designed to provide students the flexibility to advance through coursework as quickly as they prefer, or spend more time in subjects with which they prefer more support.

In an effort to create a sense of community despite the individualized nature of the academics at STEM School, students are assigned to "advisory" classes. Similar to the concept of "homerooms," these are (usually) homogenous by grade level and remain unchanging for an entire academic year. In addition to providing time for students to work through remediation or WIPs, advisory classes also engage in service-learning opportunities together, and serve as a "home base" for STEM School announcements.

In 2013, STEM School launched in-house middle school programming, and now offers grades six through eight in a separate wing of the same facility. The middle school began the 2013-2014 academic year with 75 students, and admitted 200 additional students during the 2014-2015 academic year. The middle school mirrors the high school in most ways: students are assigned to advisories, but follow an accelerated course schedule and are expected to remediate work or classes until they have earned a 90% or better. Some middle-schoolers take coursework (e.g. trigonometry) alongside high school students, but other courses (e.g. chemistry) are offered on both sides of the school. The expansion of the campus included an expansion of the staff: the hierarchy of STEM School includes a lead principal who is primarily involved in the day-to-day operations of the high school but serves as the public face of STEM School. Alongside this lead principal at the high school include two additional high school administrators; one vice principal and one principal-in-residence. On the middle school campus, there is one administrator, and fourteen middle school teachers.

Participants

As part of a larger, mixed-methods, longitudinal investigation of STEM School's addition of the middle school, this case study focused on the transcripts from semi-structured interviews conducted with volunteer administrators (n = 3) and middle school teachers (n = 4), each of whom consented to participate in both the larger study and recorded interviews. Middle school students selected for interviews (n = 15) were purposively sampled from the pool of participants in the larger study of STEM School, and were chosen to be representative of the school demographically and in terms of attitudes, beliefs, and achievement. Interviews were conducted between April and December 2014. The protocol, consent, and assent documentation as approved by the university's Institutional Review Board appears in Appendix A. Table 1 provides a list of the pseudonyms assigned to each participant represented in this study.

Table 1

List of participant pseudonyms.

Pseudonym	Role
Ms. Washington	Lead principal
Ms. Adams	Middle school principal
Mr. Jefferson	Middle school teacher
Ms. Madison	Middle school teacher
Taylor	Middle school student
Kennedy	Middle school student

Procedure

Student interviews were semi-structured and conducted by trained members of the research team. These interviews were recorded on school grounds, and were conducted, at the school's request, during the advisory block at the beginning of the school day. Teacher and administrative interviews were scheduled at the participant's convenience, and occurred before, during, or after school on weekdays. A trained member of the research team conducted these interviews on school grounds or at a nearby coffee shop, depending upon the participant's preference. The interview protocols for students, teachers, and administrators are each available in Appendix B.

Data Analyses

Corbin and Strauss (2008) note that qualitative data analysis "is an interpretive act;" one that relies upon "turning raw data into something that promotes understanding and increases professional knowledge," (p. 46). The purpose of this project was to understand a novel approach to the implementation of mastery goals, and increase the field's professional knowledge of how these goals are communicated and perceived by administrators, teachers, and students. The data reduction and analyses techniques employed in this study were specifically designed to highlight the common experiences within each group while also making evident the consistencies or inconsistencies across each group.

Data reduction and coding. Derived from the literature regarding construct validity and evaluation, pattern matching (Yin, 1994, Trochim, 1989, Creswell, 2008) is a

widely used data reduction technique in case study methodology that, in some ways, mirrors the role of the hypothesis in experimental research. In pattern matching, observed data are organized through reduction techniques such as coding, and compared to theoretical concepts. Because of its ties to quantitative research, the goal of pattern matching is usually deductive (analyzing data within the boundaries of a defined theory) rather than inductive (generating a new theory from the data). Case study methodologies and inductive inquiry are often employed when a context can provide new or distinct insight for a field (Yin, 2003). In analyzing the case of STEM School, a deductive approach was appropriate for two reasons: first, the school designed and implemented structures explicitly utilizing an existing theory. Second, little published research exists examining the implementation of school-level structures derived from GOT. A deductive approach can make use of case study methods to afford new insights into a unique context while framing the context of STEM School in an existing body of literature, highlighting what may be similar and different in ways that can expand the field.

Given STEM School's explicit use of achievement goal theory, two lists were generated before data analyses began: (1) expected or predicted practices, behaviors, or beliefs and (2) a set of codes, aligned with the TARGETS framework as well as mastery and performance goals (Ames, 1992a; Anderman et al. 2002). Two members of the research team constructed the first list, drawing from the vast body of empirical literature on classroom goal structures (see Schunk, Pintrich, & Meece, 2003, for an overview). Using this list, patterns in interview responses were identified and compared to the existing body of literature on achievement goals.

Responses were coded in three ways: first, to indicate from which aspect of TARGETS the prompting question was derived; second, to which component(s) of TARGETS the participant's response was aligned, and finally, whether the data corresponded to predicted or expected behaviors associated with mastery or performance goals. The following is an example from a teacher interview:

> Researcher: So, what sorts of structures are in place at [STEM School] to recognize student success?
>
> Mr. Jefferson: I guess just individually in classes, you know, try to recognize kids.
>
> Researcher: How so? Like, what does that sound like?
>
> Mr. Jefferson: Oh, like, I guess I'll just individually say, "hey, you did a great job on this test," or whatever . . . I would always, like, give a little prize to the person who got the top score on the test or something. And I like doing that; I think it is a neat thing for kids to be recognized in front of their peers for doing well. Even if it embarrasses them.

This exchange was coded first as corresponding to *Recognition,* but was secondarily coded as *Evaluation* because the teacher explicitly stated that tests triggered the recognition. Finally, the practice was coded as *Performance Goal,* both because this teacher recognizes students who score the highest on tests, and because the recognition is made publicly rather than privately. Studies suggest broadcasted evaluations of success, especially those that make clear a student's standing relative to peers, is related to performance-oriented perceptions among students (Patrick et al., 2001). Coding in this

manner made links between the components of TARGETS evident, and for those links to evolve into patterns compared against expected behaviors for either mastery or performance goal structures. In the given example, the codes do not suggest that students did or did not perceive a performance-goal environment in actuality. Instead, the codes serve to locate this specific practice within an existing body of empirical literature.

In addition to those codes derived from GOT and TARGETS, further codes were generated from the data. This process highlighted key ideas, actions, or behaviors that may be unique to the context of STEM School, or are otherwise unrepresented in GOT/TARGETS literature. A complete overview of the coding scheme, including the codes that were generated from the data, is available in Appendix C.

Validity and reliability. Qualitative research requires a different approach to validity than quantitative inquiry. In qualitative research, validity refers to whether research is considered "plausible, credible, trustworthy, and, therefore, defensible," (Burke, 1997). According to Burke, the primary threat to validity in qualitative inquiry is researcher bias. To mitigate this, several strategies suggested by Lincoln and Guba (1985), Burke (1997) and Creswell and Miller (2000) were employed: first, the method of pattern matching kept the interpretation presented herein grounded in theory. Second, data interpretation regarding the practices, culture, and shared beliefs of STEM School was triangulated through the utilization of administrator, teacher, and student interviews. Theory triangulation was employed in allowing for codes to be generated from the data. The researchers responsible for coding the data each developed lists of suggested codes while individually coding, and convened to compare and synthesize. Investigator triangulation

was an additional strategy utilized, as three members of the research team participated in data coding and interpretation, from which inter-rater reliability was calculated.

Inter-rater reliability was used as a verification tool to ensure coherence in and alignment to the theoretical frameworks that form the basis of the analysis. Two members of the research team coded interview transcripts separately before convening to compare codes. The raters coded less than five percent of the total data differently, and these disagreements were resolved by consensus.

There is some concern in qualitative research communities that post-hoc procedures, including measures of inter-rater reliability, "may very well evaluate rigor, but do not ensure it," (Marques & McCall, 2005). This is because post hoc procedures can do "little to identify the quality of [research] decisions, the rationale behind those decisions, or the responsiveness and sensitivity of the investigator to data" (Morse et al., 2002). Though this study employed post hoc procedures, three additional steps were taken in an effort to ensure greater theoretical and decision-making reliability. After the initial research design was planned, an additional member of the research team participated in generating the list identifying predicted or expected behaviors related to mastery and performance goals. Second, a portion of the data (less than ten percent) was coded together to establish and verify the coding scheme before the researchers began coding separately. Finally, a summary of the research findings was presented to a third member of the research team—the principal investigator—to verify coherence, construct validity, and theoretical support for the interpretations.

Chapter 3: Results

Results are presented to feature the individual components of TARGETS (tasks, authority, recognition, grouping, evaluation, time, and social supports), comparing the responses between administrators, teachers, and students. Administrators' responses represent the vision for the school, teachers' responses represent that vision in practice, and students' responses represent perceptions of the impact of those practices on their motivation. Data selected to highlight the most salient aspects of the common STEM School experience are presented in Tables 1-7.

In some cases, one or more groups did not perceive some aspect of TARGET as particularly salient to their experiences. Additionally, as is often the case in school research, participants perceived some aspects of TARGETS as closely related to one or more additional components. For the purpose of this study, data are organized by the component to which they were coded first; in the example provided in Chapter 2, we would present Mr. Jefferson's comments in the section devoted to *Recognition*. Whether participants themselves or the research team in coding noted connections between the TARGETS components are also discussed.

Tasks

The STEM School administrators envision tasks as the primary methods through which students can be engaged in STEM content. STEM School implements collaborative, project-based challenges across all content areas. Ms. Washington, the lead principal, referred to this approach to tasks as "perks," or something that students should perceive as a unique benefit of attending STEM School. Additionally, administrators believed some tasks could be a means through which teachers were empowered to connect with students. Ms. Washington said, of teachers: "*they are able to* work collaboratively with their advisees on a service-learning project, and so this is something they develop together…" (emphasis added).

Teachers largely reported relying on the utilization of inquiry-based learning to carry out this vision, but there was some concern among the participants about the developmental appropriateness of this practice for students in the middle grades. This concern stemmed from teachers perceiving middle school students, specifically, as requiring more concrete instruction; that they are perhaps less able to participate in what the two teachers referred to as "higher level" thinking.

The kinds of tasks assigned at STEM School were varied. In addition to inquiry-based projects, teachers also referenced at least 9 kinds of tasks, including: group work, individual homework, in-class worksheets, computer-based learning tasks, computer-based assessments, research reports, informal assessments, unit exams, and any task designed for remediation.

Student interviews indicated that they perceived little differentiation between *kinds* of tasks (e.g. homework, projects, or tests), seeming instead to consider tasks in

terms of whether it was one they had not yet attempted, had attempted and mastered, or one that required remediation (re-doing tasks or portions of tasks until mastery is earned). Across the school, “mastery” was defined operationally as earning a 90% or above on any given assignment. Overall, students perceived the kind of work they receive at STEM School to be challenging. Nearly all of the student participants indicated that STEM School required them to “work hard,” which included recognizing the importance of some self-regulation strategies:

> Researcher: What's "working hard,” though? What does that mean?
>
> Taylor: Probably studying every night for stuff that's, like, a week later because you want to get that 90% on that test, or else stuff is just going to keep building [because of the required remediation policy]. Or, like getting done with your project in two nights instead of procrastinating, I think that really helps. Not procrastinating here.

Procrastination was a common theme among all students, who either admitted to participating in this behavior, or shared the strategies they implemented to overcome it. Additionally, “working hard” referred to the amount of work assigned, both in and out of classes, which was perceived by students to be more than in other middle schools they had experienced:

> Kennedy: Some people are up 'til like, 2:00 in the morning . . . I usually have, like, an hour and a half of homework a night.

In summary: administrators' vision for tasks aligned well with mastery-oriented conceptions of activities that are meaningful, though Ms. Washington extended this to include *engaging* and *fun.* Teachers attempted to implement this vision in practice primarily through the use of inquiry-based or project-based learning, and assigned a variety of tasks as recommended by the mastery-goal framework. Students, however, perceived tasks in a way that aligns more closely with performance orientations, as their stated goal for any task was, first and foremost, to earn a grade of 90 percent or higher. Because of this, students' conceptualizations of *tasks* seemed closely aligned with *evaluation*. The amount of work assigned seemed to trigger behaviors associated with performance orientations, specifically, procrastination.

Table 2

Tasks.

Role	Response
Administrator	"We made some shifts in our courses that we're offering, to make it a little more fun."
Teacher	"I use a lot of inquiry, you know. And I just want kids to kind of figure things out, and sometimes they're not quite ready for those higher-level kind of thinking questions."
Student	"You have to get a 90% or above to pass a class or, like, to pass a test, or to pass, like, an assignment."

Authority

The administrative vision for STEM School included students taking ownership of their learning. The leadership team understood this shared ownership of knowledge-construction to be indicative of students engaging deeply with the material or content:

> Ms. Adams: I just tell teachers…for students to be able to master something, students have to have some ownership in the classroom. Because a good display of mastery is for students to be able to articulate, verbally, about something, or present it, or be able to show a model of something.

Teachers seem to have adopted this vision, and reported implementing opportunities for students to articulate and present their work:

> Mr. Jefferson: They have to, like, orally present things. So, they've done a lot of oral presentations . . . Science Fair is a great example of that. So, they've had to orally present things, and present themselves, which I think is huge.

There does seem to be, however, a desire for increased shared decision-making between administrators and teachers, in line with research conducted by Maehr and Anderman (1993). One teacher said:

> Ms. Madison: One thing I would like to see here is just more shared decision-making between the administration and the faculty…. say the design challenges. You know, [they said], "this spring the design challenges are biology, and this is what we're doing." And it's like, we had no input into that decision.

In terms of their relationships with students, many teachers indicated a willingness to share authority for knowledge-construction in the classroom, but questioned whether middle school students were ready or capable for that responsibility because of a perceived developmental need for organizational structure. For instance: one teacher wondered whether his assignments were "geared too much toward critical thinking," especially in light of how "needy" he perceived his students to be:

> Mr. Jefferson: Like, it's like you give a test or a quiz and it's like, there's ten questions. "Can I sharpen my pencil?" "I don't have a pencil." You know, "what does this question mean?" "What am I supposed to do? Can I write on the test? Can I ..." They need more direction.

Administration agreed with teachers in this regard. One said:

> Ms. Washington: …in the very beginning, you feel like you're going back to spoon-feeding them everything in order to develop the confidence in their skills to be, um, independent learners.

Students seemed to perceive a sense of personal responsibility for learning, though this was nearly always associated with the remediation, rather than initial learning, process:

> Kennedy: Going through the remediation process, I, like, look up videos of how to do it, I talk to my teacher, and I really understand the material after that. Like, after doing all that work, I feel like it's easier for me to do.

Students also seemed to perceive the opportunity to share in knowledge-construction in class:

> Taylor: I feel like she gives a lot of discussion with the class, like we can talk back to her and have a conversation instead of, like, a lecturing kind of thing. It's like, we can talk to her.
>
> Researcher: Do you find that across [STEM School] at all?
>
> Taylor: Yeah, I feel like all the teachers are like that. Like, they have like, respect for us and we can talk to them, and it's, like, more casual, you know?

In summary, STEM School seems to have pedagogical structures in place for students to participate in knowledge-construction alongside their teachers, as well as

opportunities to demonstrate their understanding of the material. While the approach to instruction is aligned with *Authority* as conceptualized by Ames (1992) in ways to promote mastery, participants across each of the groups identified a need for structures to support students through a perceived "developmentally needy" period; suggesting that, in practice, students were granted too much autonomy in ways that undermined academic success. For instance, students seemed to wait until remediation to engage deeply with content, and relied on teachers to help make sense of their learning needs. Because administrators and teachers identified this as specific to the middle school experience, "developmental appropriateness" emerged as a code alongside "self-regulation," or issues related to students' abilities to manage their learning goals.

Similar issues related to self-regulation became a common theme in analyses of the other components of TARGETS. Authority, however, also seemed closely connected to issues of relationships or *social supports*. Finally, when considering implementing mastery goal structures at the school-level, teacher responses highlighted the additional consideration of supporting *Authority* between administrators and teachers, as well as between teachers and students.

Table 3

Authority.

Role	Response
Administrator	"The teacher has to be okay with giving up some of that ownership in the classroom...student voices are just as imperative--um, important, as teacher voice."
Teacher	"You've got a kid that can't even bring his pencil to class and … you're expecting him to take the initiative."
Student	"I feel like if I went to talk to [a teacher] more, then **she could** figure out what I need to learn."

Recognition

Across the school, the approach to recognition aimed to keep students academically focused. For the administrative team, students' mastering of course content indicated only that they were meeting expectations. Additionally, the administrative team understood traditional school-wide means of recognizing student success (e.g. honor rolls) as an invitation for students to unfairly compare themselves to their peers. Instead, the principal team hoped students felt supported and cared for:

> Ms. Washington: We don't do class ranking, or, um, typical things; honor roll things like that. We don't do, because then, again, that puts us in a position where we're still comparing a student's successes to the students who aren't at the same place. So, I think probably the biggest accolades

> that we say we give are just when students—students know that we care about them. And that's probably, that probably means more to most of our students than, you know, having a presentation or an assembly where your parents come and . . . they know we care.

Despite the intention, the leadership team acknowledged comparisons still have a profound effect on the student experience. Ms. Washington reported having individual conversations to address this, including with parents:

> Ms. Washington: And we sit with them and we talk: "I'm not comparing you. I don't care if it takes you the full year to get through this class as long as you get through it."

Teachers reported no organized structures or methods for recognizing student success, though some (e.g. a Student of the Week program) were attempted at the beginning of the academic year. Instead, teachers largely reported working to recognize students on an individual basis. In practice, however, this recognition often included public displays, ranging from announcing the highest test scores in class to writing on classroom windows the names of students who mastered material on their first attempt.

Perhaps unsurprisingly, recognition for success did not emerge as a salient component of the student experience as recorded in the interviews selected for this analysis. Students indicated that they received feedback from teachers on their work or perceived effort in ways that indicate teachers understand their individual needs. For instance, one student said she appreciated a particular teacher:

> Kennedy: He'll say, "I'll call you up, one-on-one, we're going to talk what you specifically need."

Students felt their academic needs were recognized in ways that were conducive to meeting their goals. Though the administrators worried about students comparing their success to others, this seemed most salient in connection to evaluation, discussed below.

In all, the lack of articulated (by all three groups of participants) structures or methods in place to recognize students suggested that *recognition* is a component of the TARGETS model that is not aligned in practice at STEM School with supporting a mastery environment. Practices considered supportive of mastery goals include recognizing effort, progress, and growth. Instead, there were informal practices (such as writing on the classroom windows the names of students who achieved a 90% or greater on their first attempt of a task) that seemed aligned with performance orientation by making clear to students their relative standing. Additionally, administrators and students noted the frequent use of peer comparisons among students (and their parents), which are empirically linked to performance orientations. These comparisons are discussed in more detail below, as they seemed particularly salient to students in terms of evaluation.

Table 4

Recognition.

Role	Response
Administrator	"There's not a lot of bells and whistles, . . . some teachers, as students master tests for the unit, they'll write their name on the glass, just to say that they mastered it the first time. But that's pretty much the extent of the accolades that come for taking advantage of your own opportunities."
Teacher	"We started out doing, like, the Student of the Week... I started that and it kind of fizzled out. I guess I'll just individually say, 'hey, you did a great job on this test.'"
Student	"If you're not working hard, they will tell you that you need to step up."

Grouping

Though the TARGET (Ames, 1992) theoretical model usually conceptualizes grouping in terms of classroom instruction, conversations about grouping at STEM School diverged from this and were focused primarily on the flexible course scheduling. Novel approaches to course scheduling permit students to re-take classes over several semesters, or accelerate through traditional classes and begin college coursework before learning to drive.

For administrators and teachers, this generated questions about developmental appropriateness. Under the current system, the addition of the middle school permitted children as young as eleven to take classes alongside high school students. The lead principal noted:

> Ms. Washington: if you have a 6th grader who's reading and ready for 8th grade class, well, the topics within an 8th grade class change significantly from a 6th grade. So just ‘cause they can read it doesn't mean that they're necessarily ready for the exposure of what we're talking about here.

To date, STEM School staff has managed developmentally inappropriate placement on a case-by-case basis. The middle school principal said that when this happens, staff agreed:

> Ms. Adams: Well, we need to provide something different for them to be able to, um, experience in that class.

Teachers called for structures to be developed to address this need, in addition to structures that could spare students the burden of remediating courses several time:

> Ms. Madison: [the current system is] geared probably towards the brighter students, or the more motivated student. So I think we're going to try some different levels… so kids can feel success without having to work as hard.

For students, the opportunity to “learn at your own pace” is among the most valuable of the perceived opportunities provided by STEM School. The opportunity to engage in an individualized course trajectory was more salient than grouping, even as conceptualized by administrators and teachers.

In line with the suggestions embedded in TARGETS for grouping, students at STEM School have many formal and informal opportunities to work in groups. Teachers

and students understand the primary purpose of group work to be learning to collaborate with others. In fact, one teacher summarized the STEM School philosophy as "mastery and collaboration," which was a theme echoed by the middle school principal:

> Ms. Adams: These are the things that you really need to succeed as a 21st learner.

Though students acknowledged how often and in what ways they work with others, learning and mastery were spoken as primarily individual pursuits; tasks and projects undertaken with peers were in service of mastering the course to move on.

In summary, students did not perceive grouping to be more than a means to an end in their individual pursuits of moving through their coursework, making this practice neither saliently supportive of mastery or performance goal structures. Teachers felt grouping primarily made distinctions between students in regards to their effort or aptitude (two codes that emerged from the data); first, that some students had to work harder and remediate more often than others, and second, that the current "grouping system" (accelerated course scheduling) was best geared toward students with stronger academic abilities. This can be interpreted as indicative of both mastery and performance goal structures simultaneously: student performance is an important component of whether they must remediate or are permitted to move on, while students have the ability to pursue their individual learning goals. Grouping practices at STEM School, then, were not entirely incompatible with supporting a mastery goal structure, however the student reports of perceiving the grouping practices' as normative references of their success does suggest an alignment with performance orientation. Administrators envisioned grouping from a mastery goal perspective, reporting it as a method of supporting students

in their individual trajectories, while also developing skills central to STEM School's mission such as collaboration and teamwork.

Table 5

Grouping.

Role	Response
Administrator	"That's probably the biggest thing...having appropriateness [in class placement] not just based on what I can do, but what's appropriate for me as a learner, emotionally, psychologically, and academically."
Teacher	"They don't really do a lot of tracking here, but I think there may have to be some degree of that."
Student	"I've always been, like, ahead of my peers, and so taking a class twice as fast has, like, been a good level for me to learn."

Evaluation

Administrators envisioned evaluation as a means of ensuring access to educational opportunities as students are ready. The mastery system as implemented was

designed to allow students multiple opportunities for success while facilitating an accelerated pacing schedule:

> Ms. Washington: And so the mastery system thus allowed us to teach high-rigor courses but also you know, making sure that we instituted a process to assess whether the kids really were college ready or not. And so we put in the development of the ACT quality core exams and of course exams for the students, as well as classroom-created end-of-course exams that the teachers would facilitate. So you know, the notion of mastery also comes into play with the philosophy of having an inclusive school that invites any type of learner into the school environment.

Teachers and students, however, perceived a strong sense of pressure on students perform. One teacher suggested the current mastery system may work against developmental characteristics of middle school students:

> Mr. Jefferson: They're not ready for that level of intensity, to get a 90 on every assignment.

It seems, however, that despite performance pressure, teachers understand mastery as an opportunity to craft an individual learning trajectory that focuses on true understanding of the material. Regarding "failing," which is any grade lower than 90%, a teacher explained:

> Ms. Madison: …failure isn't permanent, and you can have an opportunity to learn. So, the focus is more on learning and not just, "okay, you got a grade, you fail it, you're done." We want to make sure kids learn.

For students, earning a grade of 90% was perhaps the most salient aspect of the STEM School experience; it came up often in every interview, as did a distinct sense of disappointment when they earned grades that were just under the 90% threshold:

> Researcher: So it sounds like you had a good experience with the mastery system in some classes. Have you had a bad experience with the mastery system?
>
> Taylor: Probably when I got the 87 and I had to re-take the whole class.

In addition to the time required to remediate (discussed below), the 90% threshold does seem to invite comparisons between students especially in regards to attempts-toward-mastery:

> Taylor: I don't consider myself one of the smarter ones.
>
> Researcher: Why not?
>
> Taylor: Because I see, like, a bunch of people around me getting 90s right off the bat, or like getting, like, 95s on their tests and then I'm sitting here getting like, 50s and 60s [the first time] so it kind of just like . . . you just don't feel like you're there yet.

In addition to the 90% threshold, students—in middle school—perceived pressure to complete high school credits so they could begin taking (or "gateway" to) college coursework. They recognized this as an academic benefit or advantage (a code that emerged from the data) of STEM School's programming, but at the same time, used whether they were on track to "gateway" as a means by which they could determine whether they measured up to their peers. The lead principal, however, explained perceived pressure to perform as students choosing not to take advantage of systems in place to support their learning:

> Ms. Washington: If you don't perform well on a test and a teacher gives you a reassessment date, and wants you to come to tutoring so that you can make sure you've been re-taught the information that you missed for the next assessment period, but you choose not to do that--and then the test comes, yeah, you do feel the pressure to perform.

In summary, evaluation was a complicated piece of the STEM School experience and seemed to send mixed messages, simultaneously promoting and undermining mastery goals as conceptualized by TARGETS. Administrators understood the purpose of evaluation, and specifically the implementation of the threshold grade of 90%, to serve as both a way to be inclusive (students could remediate as often as necessary to demonstrate mastery, a practice envisioned to communicate that all learners are welcome and supported) and also serving as a normative reference in relation to how many opportunities students were accessing compared to their peers as a result of "mastering" or not "mastering" coursework the first time. Teachers seemed to understand the purpose

of evaluation practices at STEM School as a method to communicate to students that "failure isn't permanent," (Ms. Madison), which seems aligned with the TARGETS model, but worried about the developmental appropriateness of requiring every student to earn an A on every assignment. Students overwhelmingly understood the evaluative practices of STEM School to be a normative reference of their abilities, perceiving pressure to perform in ways that are aligned with the literature regarding performance orientations.

Table 6

Evaluation.

Role	Response
Administrator	"We're not trying to compare your child's progress against someone else's, but we want [parents] to understand that every time [students] have to repeat a course, that's one college class that you don't have access to."
Teacher	"I think [the students] had a very good experience here, if you take the grade equation out of it. But I know most of them haven't really achieved mastery."
Student	"It's a lot more difficult to get a 90 than just a passing grade, you know?"

Time

Similarly to *grouping,* time was conceptualized differently by STEM School participants than the Ames (1992) TARGET(S) theoretical framework, focusing instead on the unique pacing system the school utilized. The administrative team envisioned time to be a benefit of STEM School's mastery system, perceiving time to serve two unique functions for students: first, it allowed students to be in control of their own pacing needs. The flexible course schedule allowed students to spend only the time they need to understand the material in a given class. Second, having access to more time, if needed, can make salient the larger goal of mastery:

> Ms. Adams: And the first time you fail, you're not a failure; you just made a -- like, you just didn't learn it. You just need more time.

Teachers perceived time as the source of students' consternation regarding learning and attempts to mastery. Specifically, the remediation policy for all assignments, tests, and courses prevents the implementation of teacher-enforced deadlines.

> Ms. Madison: You can't have a deadline, because they always have an opportunity to remediate. And I can't work without deadlines as an adult; if you don't give me a deadline, it's probably not going to get done. So we're expecting middle-schoolers to be motivated without a deadline?

Teachers and students each identified this aspect of the remediation policy as breeding bad habits regarding self-regulation, including procrastination:

> Mr. Jefferson: It's just not teaching kids responsibility. I guess I feel the whole mastery system really encourages procrastination. And I often wonder if we're doing kids any favor.
>
> Kennedy: I had to do a big poster on softball. I had to do it like that whole night because I just didn't want to do it through out the whole week. And so my dad was kind of mad at me because I had to do all of that in one night…

Teachers also wondered about the developmental appropriateness of the 90% threshold for mastery because of the time needed for multiple remediation of assignments and classes. Teachers understood this as fostering discouragement:

> Mr. Jefferson: They kinda give up. Where maybe they could get a 70, which isn't terrible, or an 80, which isn't terrible, but sometimes they think they can't. …'Cause for some students it's going to take them an awful lot of work to get up to that mastery, to that A level.

This was echoed in student interviews, where time was perceived as a cost. For instance, one 8th grade student interviewed was taking 10th grade chemistry for the third time, and spending three to four days a week in "office hours" with her teacher after school.

In summary, administrators envisioned time at STEM School to function in ways that support mastery goals by providing room for students to engage with content until they understand it. Teachers and students, however, felt this engagement was undermined by a lack of self-regulatory supports (e.g. deadlines) that seemed to foster avoidance

habits, especially for assignments that students perceived to be challenging. Additionally, teachers worried that the time required for some students to reach the threshold of 90% became a burden or cost in ways that were not necessary to maintain a focus on learning for the sake of learning.

Table 7

Time.

Role	Response
Administrator	"We had to equalize the playing field for all those students. And so the only way to do that was to hold them to the same standard, but giving them the opportunity and the time to reach that same measure."
Teacher	"Well, it's just the time it takes to study to get to that A level, and to remediate everything to get that A level. I mean, it's just an awful lot of work for kids. Especially in middle school."
Student	"I'm really bad about [procrastinating]... I'm waiting 'til the last minute 'cause there are some days where I have, like, no homework at all and then one day, like, 'oh, my paper is due tomorrow.'"

Social Support

The existing social supports at STEM School received high praise from administrators, teachers, and students across the board. Administrators attributed this to the school's philosophy that all students can achieve mastery and should be permitted to find their own way there. Warm relationships between teachers and students are encouraged by the administration, who provide structured opportunities for teachers to build relationships with their classes:

> Ms. Washington: I give them the time to do this, to send emails to their advisees, you know, saying something positive about that particular student. So if you haven't thought about that student, guess what, I'm giving you some time to really think about what you can positively say about that student's performance, or as an individual, or as a helper in advisory class, or as a communicator; as a collaborator, what is it that you can find that's positive about that individual that you then can articulate…

Teachers also perceive the STEM School environment as a safe space, stemming from the vision and tone set by the administrative team:

> Mr. Jefferson: That's the high point, I think. It's just a very positive atmosphere, amongst the students and I think, the faculty and the administration models it. 'Cause they're very respectful to the teachers. You know? I mean I think that kind of filters down to the students, too.

Teachers recognized, too, that the environment influenced their practice by reducing the amount of time spent on disciplinary issues arising from student social issues:

> Researcher: Does it affect your practice at all, or affect your classroom? Is there a difference teaching here as opposed to another school with that kind of environment?
>
> Ms. Madison: Um . . . I think you don't have to spend as much time just getting kids to get along. Now, there's still the little cliques, you know, and I think that's unavoidable in middle school. But there's very little bullying.

This environment supports both student engagement in STEM subjects and the independent exploration needed to develop a customized academic trajectory:

> Kennedy: I feel like I've been able to be more myself here and discover what I'm really interested in, like compared to like, what I acted like I was interested in to fit in, you know?
>
> Researcher: Can you give me an example?
>
> Kennedy: …like, I went to engineering club. I would have never done that at my old school.

In summary: the environment at STEM School is envisioned by administrators to be an warm atmosphere in which students feel safe engaging in learning, as suggested by the TARGETS framework. Teachers recognized the supportive atmosphere modeled by administrators and saw the supportive environment reflected in the way students treated each other, as well, ultimately saving time otherwise spent managing a classroom for teaching and learning. Students overwhelmingly reported STEM School to be a place

where they felt they had strong relationships with their peers and their teachers, and in which they felt as though they belonged, indicative of a mastery-goal environment.

Table 8

Social Supports.

Role	Response
Administrator	"The biggest thing that you [as a new teacher] need to understand is that we care about kids and we don't just say it, we do it. We show it on a daily basis. If the decisions you make in your classroom are for the good of the kids, then you've made the right decision. "
Teacher	"I think we're meeting some of their needs. I think emotionally it's a good, safe place to be. And it's an encouraging environment. It's a very positive environment."
Student	"How everything is set up, like, just how the grades are set up and how the tests are set up, how your homework's set up. Like it just totally, like, blew me away kind of...like, you just have to do it all on your own. But they give you everything that you need. You just have to put it in your type of way that will work for you, basically."

Table 9 presents a summary of the interpretations of STEM School administrator, teacher, and student perceptions of the components that can support mastery goals. The administrative vision seemed aligned to theoretical conceptualizations of mastery goals for tasks, authority, group, time, and social supports. Similarly, teacher practices or aligned with fostering an environment conducive to mastery goals in the areas of tasks, and social supports. Teachers reported understanding the purpose of grouping and evaluation in terms that were aligned with supporting mastery goals, but in practice seemed aligned with performance goals. Students largely reported perceiving performance-orientation messages in all areas except recognition and grouping (which were not salient in their interview responses), and social supports.

Table 9

Summary.

Component	Administrator	Teacher	Student
Tasks	Y	Y	N
Authority	Y	N	N
Recognition	N	N	Not salient
Grouping	Y	N*	Not salient
Evaluation	N	N*	N
Time	Y	N	N
Social Supports	Y	Y	Y

*Teachers may have an understanding supported by the theoretical model, but practices did not align.

Chapter 4: Discussion

With limited research examining school-wide implementation of mastery goal systems (cf. Maehr & Midgley, 1996), the first purpose of this study was to determine how mastery goals at STEM School were envisioned and communicated by administrators, subsequently understood and implemented by teachers in their practice, and ultimately perceived by students. Results indicate that there are distinct alignments and misalignments across the administrative vision, teacher implementation, and student perceptions of STEM School's mastery framework. As demonstrated in Table 9, it is not clear that the administrative and teaching staff at STEM School define the purpose of the mastery system in the same way. Similarly, students report perceiving components of the mastery framework in ways that are incongruent both with the school leadership (e.g. *tasks*, *authority*, and *time*) and with their teachers (e.g. *tasks*). Further, analyses of the student interviews indicated that incongruence between the administrative vision for *grouping* and teacher practice was related to students reporting that this component did not have a salient impact on their perceptions of their experience.

As noted by Maehr and Midgley (1996), incongruence between administrators and teachers impacts implementation and practice, which is central to student perceptions of the goal structures in their classrooms. Because there is some evidence to suggest that, at STEM School, a clear vision set by administrators is understood by teachers (e.g. the

components *tasks, grouping,* and *social supports*) and teachers can implement this vision (*tasks, social supports*), clarifying the definition and purpose of mastery goals with the administrative staff may improve teacher implementation of classroom goal structures perceived by students (e.g. *tasks*, *authority*, *evaluation*, and *time*).

The second purpose of this study was to determine how the vision, practice, and perceptions of STEM School's mastery goal framework compare to TARGETS (Ames, 1992a, Patrick et al. 2001), a theoretical model highlighting the dimensions of a classroom that are empirically linked to fostering an environment conducive to mastery goals. Results suggest again that there were alignments and misalignments with GOT as conceptualized by the TARGETS model. For instance, though the administrative vision for *tasks* seems aligned with the mastery-emphasis promoted by the TARGETS model, and teachers implemented these tasks as envisioned, students reported perceiving an overwhelming emphasis on the importance of earning a 90% or better on all graded assignments. Analyses of the school's *authority* and *time* practices revealed similar misalignments, with breakdowns presented between students' perceptions and administration intentions. Perhaps because of these misalignments, some dimensions were perceived simultaneously to be both positive and negative dimensions of the school; *time,* for instance, was conceived by administrators to be supportive of mastery goals by providing students with as many opportunities as needed to engage with course material. Teachers understood time, however, as a burden for those students who were required to spend a substantial amount of time in remediation. Similarly, the accelerated pacing schedule was perceived by all participants to be a benefit of STEM School's focus on

early college access, but was related to students' normative comparisons of their success (in reaching "gateway" status) to their peers'.

These results suggest that even structures otherwise well aligned with the conception of mastery goals can be undermined when implemented alongside "threshold" practices. A strong sense of social support did not mitigate the perceived pressure reported by students to obtain a 90% (*evaluation*) or accelerate through their coursework (*grouping*; *time*). Students perceived tasks primarily as performance indicators that were closely linked to *evaluation* and *recognition* as opposed to perceiving tasks as opportunities to meaningfully engage with content to promote understanding; students reflected on their tasks as those for which they either achieved a 90%, or required remediation. This perceived burden seemed to align with performance orientations; specifically behaviors relating to avoidance habits such as procrastination. These results support prior research linking performance-avoid orientations to high-pressure classroom environments that promote comparisons among peers (e.g. Urdan, Midgley, & Anderman 1998, Urdan et al. 2002; Urdan 2004[b]). Additionally, students were keenly aware of their peers' progress, drawing comparisons to their classmates to determine their own success. Administrators seemed aware of these comparisons, and explicitly mentioned having conversations with students and their families to mitigate these comparisons. They encouraged students to consider only their own opportunities, and chose not to institute typical *recognition* practices such as Academic Honor Roll in an effort to limit such comparisons. Teachers, however, regularly recognized student success (e.g. achieving a 90%) publicly, through practices such as writing on the classroom windows the names of students who mastered a particular task on the first attempt.

There were, however, some strong alignments between vision, practice, and perception in ways that also align with the TARGETS model. Students perceived a strong sense of *social support* that was reflected in teacher and administrative comments. Though *social supports* were perceived strongly across the entire STEM School sample, these warm relationships with teachers or peers did not seem to prompt a more robust sense of *authority* among students, who relied upon their teachers to understand their progress. Whether this reliance is a developmental need of students in the middle grades or specific to STEM School as a result of its mastery framework has yet to be determined. Research suggests, however, that perceptions of goal structures and subsequent motivation for students in the middle grades may differ from those in elementary or high school (e.g. Anderman & Maehr, 1994), and further, that the motivational profiles of middle school students are related to better adjustment in high school (e.g. Anderman, Maehr, & Midgley, 1999; Murdock, Anderman, & Hodge, 2000; Anderman & Midgley, 2004;). The results of this study reinforce findings that suggest social supports are necessary, but not sufficient, for fostering mastery goal orientations and behaviors among students (see, for instance, Turner, Midgley, Meyer, Gheen, Anderman, Kang, & Patrick, 2002).

Interestingly, two instructional practices included in the TARGETS theoretical model were not salient to student perceptions of their learning environment. That students did not perceive *recognition* as noticeably impacting their experiences is unsurprising considering the lack of formal structures to acknowledge student achievement, reported by both teachers and administrators. *Grouping*, however, was salient to STEM School staff, though not to students. This could be because students at STEM School understand

their learning to be an individual pursuit. This suggests that the grouping practices as enacted by STEM School (e.g. accelerated coursework which mixes grade levels) and as conceptualized by theory (promoting interaction and collaboration) could promote mastery-goal orientations, keeping students focused on their individual trajectories.

This study also makes clear that there are important considerations that apply to expanding a mastery goal framework across an entire school. For instance, issues of *authority* are no longer only between teacher and student, but must also be considered between administrators and teachers as suggested by Maehr & Anderman (1993). As noted, the concept of *grouping* may expand beyond how students are paired in classrooms to how and who is learning together across content areas and grade levels. Further, when considering school-wide mastery goals, *time* may be different conceptually from the original TARGETS framework, as it relates both to how time is spent in schools and classrooms as well as the cost of time to achieve mastery. It is important to note that in some cases, such as teacher implementation of *authority* and *evaluation* practices, the mastery system as designed by STEM School is not incompatible with the TARGETS framework, but some structures seemed to work against each other in fostering mastery goals. For instance, *authority* as practiced and *evaluation* as understood by teachers were strongly indicative of expected behaviors or beliefs to foster mastery goal orientations, but students perceived each of these components in ways that more closely align with performance orientations.

Finally, this study highlights the importance of a clear definition of *mastery* across school staff. There are varied definitions of mastery in educational research and practice, some of which confound each other (for a review, see Guskey & Anderman,

2013). In particular, there is a distinct theoretical difference between learning to demonstrate competence (e.g. Bloom, 1971) and learning for the sake of learning, demonstrating progress (e.g. Ames, 1992b). STEM School administrators envision certain dimensions of the school experience to be clearly aligned with the concept of mastery goals (e.g. *tasks, authority, grouping, time, social supports*). Interestingly, the misalignments (*evaluation*, *recognition*) seem derived from the concept of mastery learning.

Though there is a clear theoretical difference between mastery goals and mastery-as-competence, the development of mastery goals can support students in their pursuit of mastery learning. To do so, Guskey and Anderman (2013) write, "If teachers want their students to focus on mastery of content and tasks, they need to allow students to work on tasks repeatedly, without penalties, until they achieve mastery," (p. 22). Additionally, Guskey and Anderman suggest that the definition of mastery should be meaningfully defined for students before beginning a task—this definition should include not only how mastery will be measured, but also how a given task supports students' development of competency of the content (p. 22).

Perhaps because the administrators' vision for *recognition* and *evaluation* differ from the theoretical concept of mastery goals, teacher practice and student perception of these dimensions do, too. At STEM School, policies such as remediation provide opportunities for students to practice tasks repeatedly. However, students can perceive this practice as a penalty because of the *time* burden involved in after-school office hours or semester-long course repeats. Further, interviews with students suggested that they did not perceive understanding the purpose of their *tasks* in learning the course content;

instead, students focused exclusively on *evaluation* (earning at least a 90% on each assignment). A constricted focus, school-wide, on the 90% criterion may be limiting the opportunity for students to engage in learning strategies that promote deep engagement with content (Pintrich & De Groot, 1990).

Evaluation practices are not tied to performance goals necessarily, however. Ames (1992b), for instance, suggests that learning should be measured in terms of progress and self-improvement. E.M. Anderman, L.H. Anderman, Yough, and Gimbert (2010), suggest that value-added models are one method of capturing growth and progress in line with a mastery goal framework. Though typically utilized in evaluating teachers and schools, the tenant of value-added (shifting focus away from simply measuring academic proficiency among students to instead measuring academic growth) has been considered at the student level. For instance, Martin (2006, 2013) has suggested introducing in schools the use of "personal best" goals, which he defines as detailed, challenging, and self-referencing opportunities for students to focus on improving their performance on future tasks compared directly to those that they attempted previously, rather than the students' peers. Though Martin (2013) draws a distinction between growth goals ("exceeding oneself") and mastery goals ("focused on the task"), the two are not incompatible in an environment such as STEM School, which aims to couple students' individual progress through their academic trajectory with deep learning of content.

Nascent empirical evidence suggests that personal best goals are related to students' endorsement of incremental theories of intelligence, homework completion, and behavioral engagement in tasks (Martin, 2006; 2012). Incorporating personal best, or other growth-based assessments, into STEM School's evaluation practices may reduce

performance-orientation behaviors among students, including procrastination and normative comparisons.

Limitations

There are some limitations to this study. First, none of the administrators and only one of the teachers interviewed had previous professional experience in middle schools, which may have influenced their perceptions of the developmental appropriateness of their practices or student behavior; however, the participants gave no indication that they would adjust their implementation of the mastery goal system differently specifically for students in the middle grades. Second, the use of pattern matching necessarily confines analyses to the selected existing model or hypothesis. While the data were coded in ways that extended beyond the TARGETS framework, the purpose of this study was to compare current practice to the model, rather than analyzing the fit of the model in relation to the current practice (an effort which could highlight future directions for the conceptualization of goal structures). Because the school staff designed a mastery goal system without researcher intervention, it is important to understand the ways this practitioner-led model compares to the original theoretical framework. Finally, though this case study analyzed a school-wide implementation of mastery structures, this sample of teachers and students were usually reflecting on their personal experiences in and across their classrooms in ways that may not reflect the school-wide execution of mastery goals structures. However, there is nothing to suggest these participants were atypical from the other STEM School staff in either their understanding of the school-wide mastery system or their practice.

Future Directions

Conducting a similar case study with high school administrators, teachers, and students can begin to clarify whether the strengths and weaknesses of STEM School's mastery framework are: (1) specific to the middle school, (2) exist across the entire campus as a result of these specific structures and their implementations, or (3) might exist across any school-wide attempt to implement mastery goals. Second, though the theoretical literature regarding the TARGETS model makes clear distinctions between each component, these analyses revealed reciprocally influential relationships between several of the theoretical factors. For instance, *evaluation* underscored *tasks* and *recognition, social supports* were related to *authority,* and *time* was central to nearly all of the other components in ways that should be empirically explored further to refine the TARGETS model. These complex relations are akin to results found in other classroom research, including Anderman, Andrezejewski, and Allen (2011), and Turner and Meyer (2004), each of whom noted that teacher actions could serve multiple purposes. This is particularly important when considering how the actions and messages students observe in their experiences across an entire school may interact with each other. Finally, exploring the codes generated by the data, especially the concepts of *self-regulation* and *developmental needs*, could yield insight into important components necessary in structures designed to foster mastery goals for students in the middle grades.

Conclusion

Decades of research in Goal Orientation Theory suggest that cultivating and supporting mastery goal orientations in students is a complicated task for classroom

teachers. Implementing structures across an entire school only increases the opportunities for students to receive mixed (or no) signaling about the purpose and aims of their learning and activities. This case study contributes to existing literature by examining the unique considerations for implementing mastery goals school-wide. For instance, there is a clear need for a well-defined understanding of mastery goals across administrators and teachers. Additionally, there is not one particular practice—no silver bullet—that can ensure students develop mastery goals; staff and students perceive many dimensions of the school experience to be deeply entwined. Because of this, structures designed to support students in engaging deeply with material (remediation tasks) can be undermined by others (e.g. criterion grading) and must be examined critically to ensure they work together to send consistent messages to students.

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Appendix A: Institutional Review Board Documentation

Protocol

Longitudinal Evaluation of Metro Middle School

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I. Objectives

The specific scholarly aim of the research project is to longitudinally evaluate middle schoolers' academic success at The Metro School.

Research questions:

1. What motivational factors are associated with middle schoolers' academic success at The Metro School?
2. What psycho-social factors are associated with middle schoolers' academic success at The Metro School?
3. What school climate factors are associated with students' academic success at The Metro School?

II. Background and Rationale

The Metro School will enroll its' first cohort of middle school students in the Fall of 2013. The leadership team of The Metro School has asked for a research project that evaluates this new middle school on how well it supports academic success for its' sixth through eighth grade students.

The proposed project will be based in a number of theoretical frameworks. First, the project will examine students' motivation to learn. There are a number of motivational theories that have been used to explain student achievement, and these will be incorporated because (a) prior funded work has used these theories, and (b) these theories all have led to the development of extant measures that can be easily adapted for use in this project. The first motivation theory that will guide this work is goal orientation theory (Ames, 1992; Anderman, Austin, & Johnson, 2001; Elliot & Harackiewicz, 1996; Midgley, et al., 1998; Pintrich, 2000; Wolters, 2004). Goal orientation theory focuses on the reasons why students do their academic work, as well as on the types of instructional environments that teachers create in classrooms. The second motivation theory that will be incorporated is Eccles' and Wigfield's expectancy-value model of achievement motivation (Eccles (Parsons), et al., 1983; Eccles & Wigfield, 2002; Eccles, Wigfield, Flanagan, & Miller, 1989; Wigfield & Eccles, 1992, 2000, 2002). Expectancy-value theory was selected because research clearly indicates that the expectancies and values

that students acquire during early adolescence are highly predictive of the types of courses that they take and jobs that they eventually pursue in the future (Durik, Vida, & Eccles, 2006).

Secondly, on a more general level, students' backgrounds will be examined. Students at Metro high school are diverse, and come from an array of locations across Columbus, and from a mixture of socioeconomic and ethnic backgrounds. These factors will be examined as well, particularly through a cultural lens (Gay, 2000).

III. Procedures

A. Research Design

The proposed longitudinal project is descriptive only and does not include any interventions. The project will incorporate mixed methodologies. Metro Middle School will enroll approximately 90 sixth through eighth grade students in the Fall of 2013. This project will survey all Metro Middle School students from Fall 2013 through Spring 2020, surveying and interviewing them twice yearly each academic year in middle school. Moreover, this study seeks to conduct a comparative evaluation in Metro High School comparing students who come from Metro Middle School to students from other middle schools across measures of academic success, thus Metro High School students will also be surveyed and interviewed twice every academic year beginning Fall 2013 and ending Spring 2020. We also will collect end of year achievement data from students' records so that we can examine predictors of success.

Finally, individual semi-structured interviews will be conducted with representative groups of faculty and parents, and administration. The individual interviews will allow us to examine with a finer-grained analysis the reasons why students do (and do not) succeed in this setting.

B. Sample

All middle and high school students in grades 6 through 12 admitted Fall 2013 through Fall 2019, teachers and parents at The Metro School will be invited to participate in the study. There are approximately 90 middle school students (grades 6 through 8), 400 high school students (grades 9 through 12), and 10 teachers, and 20 administrators at Metro Middle School. Convenience sampling will be used for recruiting parents and this project will seek approximately 20 parents to participate in this study.

C. Measurement / Instrumentation

Questionnaires:

Measures are attached in a separate document. All measures have been shown to be both reliable and valid.

Interview Questions:

Semi-structured interview questions (attached) were constructed by the research team for students, teachers and parents to provide additional information related to the

research questions. As the quantitative data are analyzed from students, questions may be changed to probe deeper into responses on the questionnaires.

D. Detailed project procedures

Recruitment. Participants will be recruited by members of the research team through collaboration with the assistant principal. All Metro School students (middle school and high school) are eligible to participate.

The research team will ask the assistant principal for permission to inform parents of the project at both the middle school and high school parent meetings during orientation week. Parents will be informed of (a) the purpose of the project, (b) participants' rights, (c) project tasks or procedures, (d) duration of participants' participation, (d) confidentiality, (e) incentives, (f) contact information of the principal investigator, and (g) name of sponsor funding the research. After providing this information, parental permission forms will be distributed and parents (or guardians) will have the option to either "accept" or "decline" to allow their child to participate in the project.

As not all parents will attend the orientation meetings, the researchers will provide the assistant principal with a list of parents who responded during the orientation meeting so that parents that have not responded can be identified by the assistant principal. The researchers will ask the school secretary to forward an email crafted by the researchers to parents who have not responded. This email will contain all information on the consent form and the email will ask parents to print the permission form, sign it, then hand it to their child to return to the locked box in the secretary's office.

At the conclusion of the parent orientation meetings, researchers will approach parents individually to inform them of a need for parental interviews and ask parents to participate in the project. For those who agree, the researcher will collect contact information including name, phone number, and email address to facilitate the arrangement of parental interviews throughout the duration of this project. Recruitment of parents will be done in a manner that attempts to gain a sample of 20 diverse parents.

During advisory class in the first week of school, researchers will enter both middle school and high school classrooms to give the same recruitment statement to students delivered to parents at the orientation meetings. After discussing the proposed project and reading the assent form, students will have the option to either "accept" or "decline" participation in the project. For students who signed the assent form, but do not have parental permission forms on file, the researcher will hand that student a parental permission form to take home, get signed, and have returned to a locked box in the main office. All students who have both an assent form and a parental permission form, both with the box marked "yes, I consent to participate/have my child participate", will be considered participants of this project.

During the recruitment window each year, parents and students will be reminded to turn in their consent and assent forms, respectively, via poster board signage during drop-off and pick-up each school day. These poster boards will say, for parents: "Parents: Please turn in your (gold) OSU educational research forms by [DATE]." For students, the poster boards will say: "Students, Please turn in your (green) OSU educational research forms by [DATE]."

This entire recruitment process will be repeated every Fall from 2014 through 2019 to capture all new students that enter Metro Middle School and Metro High School.

There is a possibility that some junior and senior high school students are either 18 years or older during the recruitment process or will turn 18 while participating in this project. Those students will be given a consent form to sign.

Procedures. Students will be surveyed for one hour every semester. These surveys ask about student perceptions of their school climate, academic abilities, academic self-perceptions, classroom behaviors, educational beliefs, identity, learning strategies, and general well-being. Middle school and high school students will be administered the same survey at the same time. The researchers will arrange with the assistant principal and teachers for students to have time to complete surveys online during their advisory period. The survey will be accessed through a link emailed to student participants just before they are scheduled to take the survey. In the survey, students will be asked to provide their student ID number as generated by the school and printed on their school ID cards. This will link the surveys to the achievement data collected.

Twenty students will be selected to be interviewed throughout this project. Selection of student interviewees will be done in a manner that provides the most diversity in terms of demographics to ensure that the group of interviewed students is a representative sample of the student population in terms of grade level, age, race, gender, and socio-economic status. The additional participation time required for students selected for interviews is approximately one hour every semester. At the beginning of each interview, students will be reminded of the objective of this project and reminded of their participant rights. Additionally, students will be asked at the beginning of the audio-recording to provide their student ID number. This will link their interview data to their survey and achievement data. Students who participate in the project will be entered in a drawing to receive a $10 gift card. Five drawings will occur every semester. Students are eligible for gift cards drawings in the semesters they participate in the study.

The estimated time required for parent and teacher interviews is approximately one hour every semester. The researchers will arrange individual interviews at the convenience of each individual teacher and parent in regards to the time and location of the interview. At the beginning of each interview, parents and teachers will be reminded of the objectives of the study and reminded of their rights as participants. In the first interview with each parent and teacher, verbal consent to participate in the study will be obtained.

All interviews will be audio recorded and transcribed. This will be done so that the data can be more accurate (the alternative is to have the interviewer take notes during the interview, but that method leads to unreliable data). All interviews – student, parent and teacher – will be reported.

To protect the privacy interests of the participants, the names of participants will not be included on questionnaires or in the transcription of interviews. The personally identifiable private information involved in the research is students' end of year academic performance in mathematics, science, social studies, and English language arts which will either be obtained from school personnel or questionnaires. Only members of the research team will have access to questionnaire and interview data and end of year academic performance data for participants. All files (i.e., electronic and hard copy

records) will be kept in a locked file cabinet in the principal investigator's office (29 W. Woodruff Ave., 145 Ramseyer Hall).

E. Internal Validity

Mortality, location, instrumentation, and instrument decay are four main threats to internal validity in survey research. To minimize the threat of mortality, surveys will be cross-sectional, that is administered to all participants in a single administration. To minimize the threat of location, the instrument will be administered electronically within their classrooms. To minimize the threat of instrumentation, items on the instruments have undergone a review by the research team and expert reviewers. To minimize the threat of instrument decay, completion of the survey instruments will be untimed and during interviews questions will be paced such that participants will be given time to reflect on the questions before responding.

F. Data Analysis

For the survey data, statistical analyses will include descriptive and inferential statistics, as well as hierarchal linear modeling. For the interview data, the constant comparison method will be utilized. The constant comparison method is a formal qualitative analytic method where transcripts are read and compared to one another to develop data-driven themes (Glaser & Strauss, 1967). Interview data will be used to both enrich survey data collected from students to provide deeper understanding of the survey data and also be aggregated and used for separate analyses unrelated to the survey data, but still addressing the project objectives and research questions.

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The Ohio State University Parental Permission
For Child's Participation in Research

Study Title: Longitudinal Evaluation of Metro Middle School

Researcher: Drs. Shirley Yu, Lynley Anderman, and Tracey Stuckey-Mickell

This is a parental permission form for research participation. It contains important information about this study and what to expect if you permit your child to participate.

Your child's participation is voluntary.

Please consider the information carefully. Feel free to discuss the study with your friends and family and to ask questions before making your decision whether or not to permit your child to participate. If you permit your child to participate, you will be asked to sign this form and will receive a copy of the form.

Purpose: The specific scholarly aim of the research project is to longitudinally evaluate students' academic success at The Metro School. Fall 2013 was the first year The Metro School added grades 6 through 8. This study will evaluate the effectiveness of the middle school in preparing students for success in a rigorous high school. As such, we also need to survey high school students at The Metro School to understand how well students do in high school when they come from Metro's middle school compared to other middle schools.

Research questions:

4. What motivational factors are associated with middle schoolers' academic success at The Metro School?
5. What psycho-social factors are associated with middle schoolers' academic success at The Metro School?
6. What school climate factors are associated with students' academic success at The Metro School?

Procedures/Tasks:

This project will survey all Metro Middle School students from Fall 2013 through Spring 2020, surveying and possibly interviewing them two times each academic year. Moreover, this study seeks to conduct a comparative evaluation in Metro High School comparing students who come from Metro Middle School to students from other middle schools, thus Metro High School students will also be surveyed and possibly interviewed two times every academic year beginning Fall 2013 and ending Spring 2020.

We also will collect end of year achievement data from students' records so that we can examine predictors of success.

These surveys ask about student perceptions of their school climate, academic abilities, academic self-perceptions, classroom behaviors, educational beliefs, identity, learning strategies, and general well-being.

Additionally, 20 students will be selected to be interviewed throughout this project. The interview will be audio recorded.

Duration:

The total expected duration of your child's participation is approximately one hour each semester they are enrolled in The Metro School. If your child is chosen and chooses to be interviewed, an additional hour is expected every semester from 6th to 12th grade. Your child may leave the study at any time. If you or your child decides to stop participation in the study, there will be no penalty and neither you nor your child will lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with The Ohio State University.

Risks and Benefits:
There is a small risk of breach of confidentiality if student records are obtained by individuals outside the research team. There are no direct benefits to individual participants. However, as a result of this study, schools and districts in Franklin county and the state of Ohio can have a better understanding of the connections between Metro Middle School educational practices and academic success of students at Metro Middle School, and understand how this experience affects students as they go to high school. It is hoped that schools and districts in the state of Ohio will use the findings of this study to ensure that their students achieve the same level of academic success.

Access to Child's Academic Records: To fully understand the factors that may contribute to students' academic motivation and academic performance, it is important that researchers have access to your child's end of year achievement data. Data pulled from student records include students' grades, standardized test scores, classes attempted, attendance, discipline referrals, home district, grades from previous schools, and demographic information such as gender, age, grade-level, IEP status, and whether the student receives free/reduced lunch. End of year achievement data will be provided to researchers without your child's name. Instead, students will be identified on their surveys, interviews, and achievement data by their student ID number.

Confidentiality:

Efforts will be made to keep your child's study-related information confidential. However, there may be circumstances where this information must be released. For example, personal information regarding your child's participation in this study may be disclosed if required by state law. Also, your child's records may be reviewed by the following groups (as applicable to the research):

- Office for Human Research Protections or other federal, state, or international regulatory agencies;
- The Ohio State University Institutional Review Board or Office of Responsible Research Practices;
- The sponsor, if any, or agency (including the Food and Drug Administration for FDA-regulated research) supporting the study.

Incentives: Students will be entered into drawings for $10 gift cards the semesters they participate in this study. Five winners will be drawn each semester.

Participant Rights:

You or your child may refuse to participate in this study without penalty or loss of benefits to which you are otherwise entitled. If you or your child is a student or employee at Ohio State, your decision will not affect your grades or employment status.

If you and your child choose to participate in the study, you may discontinue participation at any time without penalty or loss of benefits. By signing this form, you do not give up any personal legal rights your child may have as a participant in this study.

An Institutional Review Board responsible for human subjects research at The Ohio State University reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Contacts and Questions:

For questions, concerns, or complaints about the study you may contact **Dr. Shirley Yu at (614) 688-3484 or yu.1349@osu.edu, Dr. Lynley Anderman at (614) 292-4145 or anderman.2@ osu.edu; or Dr. Tracey Stuckey-Mickell at (614) 292-6569 or stuckey-mickell.1@osu.edu.**

For questions about your child's rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

If your child is harmed as a result of participating in this study or for questions about a study-related harm, you may contact **Drs. Shirley Yu, Lynley Anderman, or Tracey Stuckey-Mickell**

Signing the parental permission form

I have read (or someone has read to me) this form and I am aware that I am being asked to provide permission for my child to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction.

☐ I voluntarily agree to permit my child to participate in this study. I am not giving up any legal rights by signing this form. I will be given a copy of this form**.**

☐ I do **NOT** permit my child to participate in this study.

Investigator/Research Staff

Printed name of subject (child)

I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

Printed name of person authorized to provide permission for subject

Signature of person authorized to provide permission for subject

Printed name of person obtaining consent

Signature of person obtaining consent

AM/PM

Relationship to the subject

Date and time

AM/PM

Date and time

The Ohio State University Assent to Participate in Research

Study Title: Longitudinal Evaluation of Metro Middle School

Researcher: Drs. Shirley Yu, Lynley Anderman, and Tracey Stuckey-Mickell

Sponsor: College of Education and Human Ecology

- **You are being asked to be in a research study. Studies are done to find better ways to treat people or to understand things better.**
- **This form will tell you about the study to help you decide whether or not you want to participate.**
- **You should ask any questions you have before making up your mind. You can think about it and discuss it with your family or friends before you decide.**
- **It is okay to say "No" if you don't want to be in the study. If you say "Yes" you can change your mind and quit being in the study at any time without getting in trouble.**
- **If you decide you want to be in the study, an adult (usually a parent) will also need to give permission for you to be in the study.**

1. What is this study about?

This study evaluates Metro Middle School on how well it prepares students for academic success. We want to understand how Metro's educational practices affect its students.

2. What will I need to do if I am in this study?

If you decided to be a part of this study, you will be asked to complete a survey every semester while you are in middle school and high school from Fall 2013 to Spring 2020.

You may also be selected for interviews. If you are selected, and you choose to participate in interviews, you will be interviewed for one hour every semester while you are in middle school and high school.

3. How long will I be in the study?

You will be in this study until you leave The Metro School, or until Spring of 2020, whichever comes first.

4. Can I stop being in the study?

You may stop being in the study at any time.

5. What bad things might happen to me if I am in the study?

No bad things are expected to happen to you. If you are selected for an interview, those interviews will be audio recorded, but those recordings will be kept in a researcher's locked office. Also, we will collect your school records so that we may understand how Metro's practices affect student academic achievement, but those records will also be kept in a researcher's locked office and your name will not be on the student records, only your student ID number will be on the records.

6. What good things might happen to me if I am in the study?

The results of this study will hopefully result in Metro faculty making positive changes to improve Metro Middle School for you and your peers.

7. Will I be given anything for being in this study?

Each semester, we will choose at random 5 students to receive $10 gift cards. All students who have a signed parental permission form and this assent form on file will be eligible for the first drawings in Fall of 2013. After that, students who remain in the study will be eligible for the drawings each semester.

8. Who can I talk to about the study?

For questions about the study you may contact **Dr. Shirley Yu at (614) 688-3484 or yu.1349@osu.edu, Dr. Lynley Anderman at (614) 292-4145 or anderman.2@ osu.edu; or Dr. Tracey Stuckey-Mickell at (614) 292-6569 or stuckey-mickell.1@osu.edu.**

To discuss other study-related questions with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6

Signing the assent form

I have read (or someone has read to me) this form. I have had a chance to ask questions before making up my mind.

☐ I want to participate in this study. I will be given a copy of this form**.**

☐ I do **NOT** want to participate in this study.

Investigator/Research Staff

I have explained the research to the participant before requesting the signature above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

AM/PM

Signature or printed name of subject **Date and time**

Printed name of person obtaining assent

Signature of person obtaining assent

AM/PM

Date and time

This form must be accompanied by an IRB-approved parental permission form signed by a parent/guardian.

The Ohio State University Consent to Participate in Research

Study Title: Longitudinal Evaluation of Metro Middle School

Researcher: Drs. Shirley Yu, Lynley Anderman, and Tracey Stuckey-Mickell

This is a consent form for research participation. It contains important information about this study and what to expect if you decide to participate.

Your participation is voluntary.

Please consider the information carefully. Feel free to ask questions before making your decision whether or not to participate. If you decide to participate, you will be asked to sign this form and will receive a copy of the form.

Purpose:

The specific scholarly aim of the research project is to longitudinally evaluate students' academic success at The Metro School. Fall of 2013 was the first year The Metro School added grades 6 through 8. This study will evaluate the effectiveness of the middle school in preparing students for success in a rigorous high school. As such, we also need to survey parents, teachers, and administrators at The Metro School to understand how well students do in high school when they come from Metro's middle school compared to other middle schools.

Research questions:

1. What motivational factors are associated with middle schoolers' academic success at The Metro School?
2. What psycho-social factors are associated with middle schoolers' academic success at The Metro School?
3. What school climate factors are associated with students' academic success at The Metro School?

Procedures/Tasks:

This project will interview teachers, parents, and administrators twice each year from Fall 2013 through Spring 2020. Teachers and administrators will be interviewed in

this time period as long as they are employed at The Metro School (middle and high school) and parents will be interviewed in this time period as long as their child is attending The Metro School (middle and high school).

These interviews ask about perceptions of the school including academic systems, disciplinary systems, school expectations, parental involvement, teaching pedagogies/philosophies, school climate, classroom behaviors, and perceptions of the general student body characteristics.

All participants will be given an ID number. For teachers and administrators, this ID number will be a random set of digits. For parents, this ID number will be your child's school ID number. We do this to keep your study-related information confidential by not using your names in any interview data.

Duration:
The total expected duration of your participation is approximately one hour each semester that you are either employed at The Metro School or have a child enrolled in The Metro School.

You may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with The Ohio State University.

Risks and Benefits:
There is a small risk of breach of confidentiality if the record linking your interview data to your name is discovered. There are no direct benefits to individual participants. However, as a result of this study, schools and districts in Franklin county and the state of Ohio can have a better understanding of the connections between Metro Middle School educational practices and academic success of students at Metro Middle School, and understand how this experience affects students as they go to high school. It is hoped that schools and districts in the state of Ohio will use the findings of this study to ensure that their students achieve the same level of academic success.

Confidentiality:

Efforts will be made to keep your study-related information confidential. However, there may be circumstances where this information must be released. For example, personal information regarding your participation in this study may be disclosed if required by state law. Also, your records may be reviewed by the following groups (as applicable to the research):

- Office for Human Research Protections or other federal, state, or international regulatory agencies;
- The Ohio State University Institutional Review Board or Office of Responsible Research Practices;
- The sponsor, if any, or agency (including the Food and Drug Administration for FDA-regulated research) supporting the study.

Incentives:
There are no incentives.

Participant Rights:

You may refuse to participate in this study without penalty or loss of benefits to which you are otherwise entitled. If you are a student or employee at Ohio State, your decision will not affect your grades or employment status.

If you choose to participate in the study, you may discontinue participation at any time without penalty or loss of benefits. By signing this form, you do not give up any personal legal rights you may have as a participant in this study.
An Institutional Review Board responsible for human subjects research at The Ohio State University reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Contacts and Questions:
For questions, concerns, or complaints about the study, or you feel you have been harmed as a result of study participation, you may contact **Dr. Shirley Yu at (614) 688-3484 or yu.1349@osu.edu, Dr. Lynley Anderman at (614) 292-4145 or anderman.2@ osu.edu; or Dr. Tracey Stuckey-Mickell at (614) 292-6569 or stuckey-mickell.1@osu.edu.**

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

Signing the consent form

I have read (or someone has read to me) this form and I am aware that I am being asked to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction.

☐ I voluntarily agree to participate in this study. I am not giving up any legal rights by signing this form. I will be given a copy of this form**.**

Investigator/Research Staff

I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

Printed name of subject **Signature of subject**

AM/PM

Printed name of person obtaining consent

Signature of person obtaining consent

AM/PM

Date and time

Appendix B: Semi-Structured Interview Protocols

Administrator Interview Questions

1. How is the middle school program going? From an administrative standpoint, what have been the middle school's biggest successes, and what opportunities remain for the program?

2. How well do you think the overall Metro model works for middle grades students? What, if anything, did you feel you had to modify because of the students' age and readiness? What seemed particularly suitable? difficult?

3. What does it look like for a student to succeed at Metro? What sorts of accomplishments are recognized? What sorts of structures are in place at Metro to recognize student success?

4. What do you think that a student needs to be successful in the Metro middle school program? Does this program work for all students? Is there a particular type of student who is more likely to be successful here?

5. How did you learn about Metro's philosophy? **How do you communicate it to teachers and students?** To what extent does it shape your teaching practice? How? In what ways do you see it reflected in the school climate? How do you talk about these ideas with your students?

6. When you think about students in the middle school grades, what do you think are their most significant developmental characteristics or needs? How well does the Metro model meet those needs? How do you try to meet those needs in your classroom/in your practice?

7. How would you compare the successes and challenges of this approach to other middle school programs that you are familiar with? How would compare the middle school program to the high school program at Metro?

8. If you were giving advice to a teacher new to Metro, coming into the middle school program, what would be the most important things for them to know?

9. How much have student misbehavior and/or disciplinary concerns been an issue this year and how have you handled that? How do behavioral concerns fit within the larger Metro philosophy? Do you see concerns being handled differently at the middle vs. high school levels? Should they be?

Teacher Interview Questions

1. Coming into this year, what sorts of expectations did you have about what it would be like to teach at Metro (or, if the teacher was already at Metro, what it would be like to teach in the middle school program)? Now that you're in the middle of [your first year OR the second year] of the middle school program at Metro, what are your overall thoughts about how it's going? As you look toward next year, what might you do differently, both in terms of your own teaching and at the program level?

2. If you were giving advice to a teacher new to Metro, coming into the middle school program, what would be the most important things for them to know?

3. How well do you think the overall Metro model works for middle grades students? What, if anything, did you feel you had to modify because of the students' age and readiness? What seemed particularly suitable? difficult?

4. When you think about students in the middle school grades, what do you think are their most significant developmental characteristics or needs? How well does the Metro model meet those needs? How do you try to meet those needs in your classroom/in your practice?

5. How much have student misbehavior and/or disciplinary concerns been an issue this year and how have you handled that? What are the Metro disciplinary policies and structures? Have they been effective this year? Are they practiced uniformly across the building? How do you enact them?
6. How would you compare the successes and challenges of this approach to other middle school programs that you are familiar with? How would compare the middle school program to the high school program at Metro?

7. What does it look like for a student to succeed at Metro? What sorts of accomplishments are recognized? What sorts of structures are in place at Metro to recognize student success?

8. What do you think that a student needs to be successful in the Metro middle school program? Does this program work for all students? Is there a particular type of student who is more likely to be successful here?

9. How did you learn about Metro's philosophy? To what extent does it shape your teaching practice? How? In what ways do you see it reflected in the school climate? How do you talk about these ideas with your students?

Student Interview Questions

Introduction

Thank you for taking the time to meet with me today. My name is_____, and I am part of the OSU research team that has been visiting Metro this semester. I would like to talk to you about your experiences as a Metro student and how this year has been for you.

The interview should take less than forty-five minutes. To thank you for your time, you will be entered into another drawing for a $10 gift card.

I will be audio-recording our conversation because I don't want to miss any of your comments, and I may also take some notes. Everything you say will be kept confidential. This means that your interview responses will only be shared with the other people on the OSU research team—not with your parents, not with any of your friends, and not with anyone else at Metro—and any information we include in our report will be anonymous. You can tell me as many or as few details as you like. I might stop you to move on to other questions if I think I have gotten enough information, but you should feel free to take your time to think of your responses. Finally, remember that you don't have to talk about anything you don't want to and you can end the interview at any time.

Do you have any questions about how we're going to be doing the interview? I'm going to start the recording now. First, I'm going to say the date and time, and then your student ID number and grade.

(Start recording.) Do you voluntarily agree to participate in the interview?

Today's date is_____. The time is_____. I'm with [Student ID #] in_____grade.

Questions

1. So, Metro Middle School is brand new. **What were your expectations coming into Metro?**
    - *Clarify/redirect/expand:*
        - *In what ways did this year turn out the way you thought it would be?*
        - *In what ways did it not turn out the way you thought it would be?*
    - **How was it different from other schools that you have been in?**

2. **Now I'd like to talk about your class work and your homework at Metro. What was it like this year?**
    - *Why is that/can you give me an example/in what ways?*
    - **What has been most challenging about your school work this year?**
    - **What sorts of support do you get from your teachers?**

Tell me about the mastery system → only ask if not naturally covered in #2.
- *How does it work?*
- **How do you feel about the mastery system?**
- *What happens if a student doesn't achieve mastery?*
- **Have you had to do (recovery/remediation)? What was it like?**

3. **Let's switch gears and talk about your teachers and your experiences of being a student here. What are the expectations for students at Metro?**
    - **Tell me about the Metro Habits - do your teachers or the principals talk about them often? What do they say?**
        - *(If they do not know the Habits): Well, I was reading on the website about being an inquiring learner and and a responsible decision maker and things like that. Does the Metro staff talk about those?*
    - **Do you practice the Habits personally? Why/why not/in what ways/can you give me an example?**

4. **Now let's talk about how you fit in here.**

- **Would you say it is easy to be yourself here at Metro? Why/why not?**
    - *Clarify/Redirect: Do you have to try hard to fit in? Do you have to change who you are to have friends or have good relationships with your teachers?*
    - *Is it easy or difficult to make friends at Metro?*
        - *Follow-up: What makes it easy/difficult; why is that? OR Can you give me an example?*
- *Are there people like you who also attend Metro?*

5. **Let's talk about respect at Metro. Do the teachers respect you? How do you know?**

What about the other students; do they respect you? How do you know?

6. **Do you enjoy studying STEM? Why/why not?**

Do the people you hang out with here at Metro enjoy studying STEM? What about the school itself; do your friends at Metro like this school? Are you glad you attend Metro? Is there any other school you'd rather go to, or is this the best one? (Prompt/redirect if necessary)

Closing

Is there anything else that you would like to add? Thank you so much for your time!

The time is_____. (Stop recording).

You can assign multiple codes but can't untangle - cite Anderman and Turner, and then go into TARGETS – grouping as a practice isn't mastery –averse but undermined by evaluation

Appendix C: Coding Scheme

Theoretical Framework	Codes
TARGETS	Tasks
	Authority
	Recognition
	Grouping
	Evaluation
	Time
	Social Supports
Goal Orientation Theory	Mastery
	Performance
	Mastery-approach
	Mastery-avoid
	Performance-approach
	Performance-avoid
Data-Generated	Academic benefit
	Academic cost
	Effort
	Developmental appropriateness
	Self-regulation
	Social benefit
	Social cost