

Leading by Example:  
Teacher Mindsets and Depth of Change during a School-Based Growth Mindset Initiative

Ela Joshi

Susan Kemper Patrick

Vanderbilt University

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Teachers influence their students in many ways beyond the academic skills or content knowledge they teach as part of the formal curriculum. Indeed, they may impart such important life skills as compassion, motivation, self-control, and perseverance. There is increasing interest in how these non-academic factors, often referred to as noncognitive skills, character traits, or social and emotional learning, are developed and their influence on student outcomes (Borghans, Meijers, & Ter Weel, 2008; Duckworth & Yeager, 2015; Farrington et al., 2012; Heckman & Rubinstein, 2001; Yeager & Dweck, 2012). A growing number of school-based interventions target these skills and research on these interventions suggest that noncognitive skills are malleable and can influence students' academic performance and success (Aronson, Cohen, & McColsky, 2009; Blackwell, Trzesniewski, & Dweck, 2007; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Yeager & Walton, 2011). However, as Farrington and colleagues conclude in their review of the literature on noncognitive factors, "we still know too little about how teachers and school leaders can incorporate attention to noncognitive factors into the everyday work of schools and classrooms" (p. 77).

Much of the existing research on noncognitive factors and social-psychological interventions only measure the individual effect on students of short-term interventions conducted in laboratory or controlled school settings. In contrast, this study focuses on a school-wide, long-term high school improvement program that engages administrators, teachers, and students. One of the key goals of this improvement model is to encourage students to develop a growth mindset, or a belief that intelligence is malleable and that your aptitude can be improved through effort and practice (Dweck, 2006). While one of the explicit goals of the intervention is to develop growth mindset *in students*, both researchers and practitioners participating in the project quickly realized that successful implementation requires developing growth mindset *in teachers*. As one teacher leader engaged in the project explained:

I think one of the tricky things that I wasn't expecting at the beginning was with growth mindset, it's very, very much dependent on the teachers' mindset as well. I can preach and teach growth mindset all day, but if your students know and see that you don't have a growth mindset, the

whole thing is pointless, and so it's not like oh, do this reading initiative and if you don't believe in reading, I can still teach it.

This study will focus on teachers' understanding of growth mindset, the extent to which teachers seem to embrace growth mindset approaches and finally, how these approaches are reflected in the way teachers talk about students and their teaching practices. We will explore teacher mindsets through the following research questions:

1. To what extent do teachers understand the concept of growth and fixed mindsets?
2. How do teachers exhibit growth or fixed mindset attitudes about students' intelligence and in their own work as teachers?
3. How do organizational mechanisms influence the depth of teachers' understanding of growth mindset and reported beliefs about intelligence?<sup>1</sup>

This study seeks to understand whether the introduction of growth mindset through this school improvement effort in three urban high schools has influenced the practices and beliefs of teachers in meaningful ways. In her work on scaling effective educational interventions, Coburn (2003) concludes that a key indicator for assessing successful educational interventions is the depth of change in teacher beliefs, defined as "teachers' underlying assumptions about how students learn, the nature of subject matter, expectations for students, or what constitutes effective instruction" (p. 4). Given its focus on measuring such teacher beliefs, this study speaks to the broader school improvement literature and the well-known challenge of promoting sustained change in the culture and practices of large, traditionally underperforming high schools.

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<sup>1</sup> In this draft, we have included our analysis for the first research question and a tentative analysis for the second research question. We have not yet completed the analysis for the third research question.

## Background Literature

### Growth Mindset

Growth mindset is defined by Dweck (2006) as a way of thinking that holds that intelligence is malleable and that skills and talents can be developed through effort. Fixed mindset, in contrast, is a belief that intelligence and talent are innate and unchangeable. One main contrast between people with different mindsets is how they approach failure. As Dweck (2006) explains, those with a growth mindset see failure as an opportunity to learn and growth while those with a fixed mindset see failure as a setback or indication that you will never succeed in a particular area. Research on growth mindset, and more generally on theories of intelligence, have differentiated between these two approaches to thinking about intelligence and personality traits. Research on students have found that those who ascribe to the growth mindset approach, also referred to in the literature as an incremental theory of intelligence, are more likely to have more positive attitudes about the value of effort, to make goals around learning (i.e. mastery) rather than goals around performance (i.e. grades), and to attribute failure to lack of effort rather than lack of ability (Blackwell et al., 2007; Dweck & Leggett, 1988; Hong, Chiu, Dweck, & Wan, 1999). Additionally, studies have linked these beliefs about intelligence to academic outcomes. Blackwell et al. (2007) conclude that students who believe intelligence is malleable tend to show higher levels of motivation within the classroom and exhibit greater academic growth than students who believe intelligence is fixed (Blackwell et al., 2007). In their review of research, Yeager and Dweck (2012) cite evidence that students' theories about intelligence influence their resilience in facing academic and social challenges.

A growing body of evidence suggests that noncognitive factors, including mindsets about intelligence, can be influenced by school-based interventions (see Aronson et al., 2009; Durlak et al., 2011; Farrington et al., 2012; Yeager & Walton, 2011 for more detailed reviews of this work). In particular, targeted interventions can successfully develop growth mindset in students that then

significantly improve student achievement (Blackwell et al., 2007; Good, Aronson, & Inzlicht, 2003). In their review of the literature on the link between academic mindsets and performance, Farrington et al. (2012) are cautiously optimistic that changing students' mindset can lead to improved academic outcomes but note that the available evidence is based on short-term interventions by a handful of researchers. Indeed, Farrington and colleagues call for a broader researcher base in order to provide better information for practitioners:

There is strong evidence that mindsets matter for student performance, growing evidence that mindsets are malleable, and both a theoretical and empirical basis for the importance of context in shaping mindsets. Unfortunately, the research does not directly translate into classroom strategies that teachers can use to support positive mindsets in their students. Even in the case of experimental research that focuses on specific intervention strategies, it is not clear how these experimental strategies might be used more globally to improve educational contexts. (Farrington et al., 2012, p. 35)

There is far less research on the mindsets of adults and, in particular, the mindsets of teachers. Most of the available research focuses on very small samples of teachers in disparate contexts and often ask teachers to speculate on what they would do in simulated settings. One small scale study in Israel found that middle school math teachers who exhibit growth mindsets are less likely to rapidly diagnose their students' ability and considered improvement over time as a superior form of ability (Butler, 2000). Similarly, a study of math graduate students teaching undergraduate math courses in the United States found that those instructors who endorsed an incremental theory of intelligence (parallel to growth mindset) were more likely to attribute a poor grade on a math exam to "lack of math intelligence" and had lower expectations for the future performance of students obtaining a low exam grade. In a study of approximately 100 high school science teachers in Delaware, Deemer (2004) found that teachers' belief in malleable intelligence were positively associated with their belief in their own personal teaching efficacy. Lee (1996), in a slightly larger study of 200 elementary school teachers in Korea, observed that "entity teachers" or teachers ascribing to a fixed mindset belief of intelligence, identified

on the basis of a questionnaire about intelligence, were more likely to privilege student ability rather than effort in evaluating the researcher-created student profiles.

In comparison to work on teacher theories about intelligence, there is a much more robust body of research on teacher efficacy, or the extent to which teachers believe that they can influence their students' learning or performance (Goddard, Hoy, & Hoy, 2000; Guskey, 1988; Tschannen-Moran, Hoy, & Hoy, 1998). In a review of recent research on teacher efficacy, Klassen, Tze, Betts, and Gordon (2010) evaluate hundreds of studies conducted in the past two decades which have examined teacher efficacy. Their review finds that most studies focus on measurement validity or identifying associations between teacher efficacy and school contextual factors. Indeed, they conclude that while many theorize that teacher efficacy influences teachers' instructional practices and outcomes for students, the empirical evidence linking efficacy with outcomes is fairly modest and inconclusive.

Expanding on the abundance of research estimating how teachers affect their students' achievement outcomes, recent studies have detected significant and small-to-moderate teacher effects on students' non-cognitive characteristics, including self-efficacy, motivation, and growth mindset (Blazer & Kraft, 2015; Kraft & Grace, 2016; Ruzek, Domina, Conley, Duncan, & Karabenick, 2014). In particular, a recent study by Kraft and Grace (2016), utilizing data from the Measures of Effective Teaching Project in which students were randomly assigned among sets of elementary teachers within the same grade, found that teachers had a significant effect on students' growth mindset and that teacher effects on growth mindset had the strongest correlation with teacher effects on math and reading standardized tests of the four socio-emotional outcome tested (although the correlations were still relatively weak). Notably, these studies only measure the socio-emotional traits of students and not of teachers. Although they suggest that teachers have differential effects on students' non-cognitive characteristics, it cannot be determined whether teachers' own non-cognitive traits explains these teacher effects.

Based on the available evidence, it is not yet clear whether and how teachers' beliefs about intelligence may influence their classroom practices and, ultimately, how those practices may influence students. Deemer (2004) finds no relationship between teachers' beliefs about intelligence and whether they emphasize mastery-oriented or performance-oriented goals in their classroom, but suggests that the binary conceptualization of their measure of intelligence beliefs may not capture the complexities of how teachers think about intelligence. Lee (1996) finds that teachers who subscribe to entity theories of intelligence were more likely to recommend teaching kids in homogenous ability groups rather than heterogeneous ones, but teachers in this study are only suggesting future action for hypothetical students not reporting on their own teaching practices. In a series of experiments in which researchers used different types of praise language in working with fifth grade students, Mueller and Dweck (1998) examined the difference between students who had been praised for "being smart" or "working hard." Students praised for working hard were more likely to persist through challenging tasks, to report enjoyment during those tasks, to attribute failure to low effort rather than low ability, and to describe intelligence in terms of motivation and knowledge instead of as a fixed trait.

Despite the limited evidence on how teacher mindsets may influence students, many scholars writing about the promise of interventions targeting student mindsets are quick to point out the critical role of teachers in implementing these programs (Durlak et al., 2011; Farrington et al., 2012; Yeager & Walton, 2011; Yeager, Walton, & Cohen, 2013). As Yeager and Walton(2011) explain in their review of social-psychological interventions intended to improve student outcomes, "relational dynamics between teachers and students could affect the meaning an intervention carries for students [...] an incremental mind-set intervention might have no effect if students believe that the person who tells them about their potential for growth and improvement does not believe this himself or herself" (p. 290).

### **Teacher Beliefs and School Reform**

Decades of research suggest that it is very difficult to make deep and lasting change within schools and that teachers play an integral role in the success of school improvement efforts (Nunnery, 1998; Payne, 2008; Stringfield & Datnow, 1998). Teachers are the primary implementers of many educational interventions and much attention has been paid to how teachers make sense of policy changes and implementation of new programs within their own classrooms (Coburn, 2001; Datnow & Castellano, 2000; Spillane, Reiser, & Reimer, 2002). Much of the work examining the relationship between teacher beliefs and the implementation of school reforms has focused on the process of sense-making, in which educators must first interpret and “make sense” of reform components before they will change (or not change) their practice based on this understanding (Coburn, 2001; Louis, Febey, & Schroeder, 2005; Spillane et al., 2002). In their review on educators’ sensemaking of reform initiatives, Spillane et al. (2002) outline many dimensions that influence how implementers individually understand reform, including their prior knowledge, beliefs, and experiences as educators. They highlight the importance of examining how educators implementing school improvement reforms understand the content of a reform, explaining “what is paramount is not simply that implementing agents choose to respond to policy but also what they understand themselves to be responding to” (Spillane et al., 2002, p. 393). Indeed, the same policy change or reform may be interpreted in substantially different ways and these differences in interpretation may lead to variation in how it is subsequently designed and implemented in schools and classrooms (Hill, 2001).

Teachers’ beliefs about students and school improvement efforts may also predict the extent to which teacher intend to adopt new practices, their reported use of reform-related practices, their willingness to change their practices, and their continued support for school-based interventions (Czerniak & Lumpe, 1996; Datnow & Castellano, 2000; Haney, Czerniak, & Lumpe, 1996; Louis et al., 2005). These findings suggest that understanding teacher beliefs about a school improvement effort



may be an important part of implementation research and that these beliefs may influence reform efforts regardless of whether the reform targets teacher mindsets or beliefs.

## Methods

### Context of Study

This study focuses on the school improvement efforts of three high schools engaged in design-based research through a partnership between researchers, school-based practitioners, and district leaders in the Fort Worth Independent School District (FWISD), a large, predominantly urban school district that serves over 80,000 students. Like many urban districts, FWISD's student population includes substantial percentages of economically disadvantaged children, children of color, and English Language Learners (ELLs). The district and all three participating high schools have met the Texas accountability standards for the past two years although their performance on accountability measures such as graduation rates, proficiency rates on state-mandated exams, and SAT/ACT averages are often below state averages. See Table 1 for demographic and performance information about the district and the three high schools participating in this project. As shown in the table, the high schools participating in this project vary somewhat in their size, student population and performance, and teacher demographics. Most notably, Williams High School has a smaller percentage of economically disadvantaged students and Hancock High School has a significantly smaller student body than the other two schools.

The larger design-based research project, part of the National Center on Scaling Up Effective Schools, began with a case studies to identify practices that differentiated the district's higher performing high schools. A district team consisting of district administrators, school administrators,

**Table 1. Demographic Profile of Fort Worth Independent School District & Participating Schools**

|                                    | FWISD           |               |              |            |
|------------------------------------|-----------------|---------------|--------------|------------|
|                                    | District Totals | Williams H.S. | Hancock H.S. | Smith H.S. |
| <b>Student Demographics</b>        |                 |               |              |            |
| Total Enrollment                   | 84,360          | >1500         | <1000        | >1500      |
| Enrollment by Race/Ethnicity       |                 |               |              |            |
| Percent Hispanic                   | 62.8%           | 40-60%        | 80-100%      | 80-100%    |
| Percent African American           | 22.7%           | 20-40%        | 0-20%        | 0-20%      |
| Percent White                      | 11.0%           | 20-40%        | 0-20%        | 0-20%      |
| Percent Economically Disadvantaged | 77.2%           | 40-60%        | 80-100%      | 60-80%     |
| Percent English Language Learners  | 30.6%           | <10%          | <10%         | >10%       |
| <b>Teacher Demographics</b>        |                 |               |              |            |
| Total Number of Teachers           | 5217            | >100          | <100         | >100       |
| Teachers by Race/Ethnicity         |                 |               |              |            |
| Percent Hispanic                   | 19.5%           | 0-20%         | 0-20%        | 0-20%      |
| Percent African American           | 22.9%           | 0-20%         | 0-20%        | 0-20%      |
| Percent White                      | 55.9%           | 80-100%       | 60-80%       | 60-80%     |
| Avg. Years of Experience           | 10.4            | 10-12         | 10-12        | 8-10       |
| <b>Performance Indicators</b>      |                 |               |              |            |
| 4-Year Federal Graduation Rate     | 79%             | 80-100%       | 80-100%      | 80-100%    |
| English 1 STAAR Proficiency Rate   | 57%             | 60-80%        | 40-60%       | 40-60%     |
| Algebra 1 STAAR Proficiency Rate   | 71%             | 60-80%        | 60-80%       | 60-80%     |

Source. 2013-14 Texas Academic Performance Report Data

Note: School names have been changed and data presented in ranges to protect confidentiality.

classroom teachers, and researchers developed a school-based improvement model informed by the initial findings of the case studies and three high schools were selected to participate in the initial implementation of this model (described more fully in Cannata, Taylor Haynes, & Smith, 2013). Focusing on student ownership and responsibility (SOAR), this intervention was piloted, refined, and adapted by school-based teams consisting primarily of classroom teachers at each of the three schools. The SOAR intervention was fully implemented at each school during the 2014-2015 academic year. As part of the initial design of the intervention, school teams agreed upon certain non-negotiables, including practices that encourage students to develop a growth mindset. Each school-based team developed different practices that would be implemented within their schools that aimed to help students develop growth mindsets. All three schools introduced growth mindset to students through classroom lessons delivered in the first weeks of school and introduced behavioral reflection forms and grade tracking

activities meant to encourage growth mindset thinking. Because of the autonomy given to each school-based implementation team, each school varied in the exact form of SOAR practices, whether all practices were implemented school-wide or with particular groups of students, and how and when these practices were introduced to students and teachers.

### **Sample**

As part of the larger research study, a team of nine researchers, including one of the authors of this paper, conducted fieldwork at each of the three high schools in October 2014 and April 2015 to better understand how the SOAR intervention was unfolding during its first year of school-wide implementation. Teams of three researchers spent four days in each school during both of the visits. The purpose of the visits was to understand early implementation of SOAR from the perspective of different stakeholders. In particular, we gathered information on participant experiences with implementation, implementation supports, school conditions that would facilitate or impede implementation, and participants' beliefs about and understanding of the various components of SOAR.

During each fieldwork visit, we interviewed the principal, most assistant principals, and numerous teachers. We also conducted focus groups with teachers, school support staff, and students at all three schools. We attempted to interview all teachers and administrators on the school-based implementation teams that led SOAR implementation at their school and also interviewed numerous classroom teachers. Teachers were selected using convenience sampling based on availability and willingness to volunteer. We attempted to interview teachers across a wide spectrum of content areas and levels of experience. This study's analysis utilizes the data from all teacher interviews conducted during both fieldwork visits. This includes teachers who acted as leaders on the school implementation team that coordinated the implementation of SOAR practices at their school. Table 2 presents information on the teacher participants who participated in interviews during our visits and the inclusion of participants in each section of this paper's analysis. Approximately 10-25 percent of

teachers at Hancock were interviewed, 25-40 percent at Williams and 10-25 percent at Smith, totaling approximately 15-30 percent of teachers across the three schools (Note: ranges provided to maintain school confidentiality).

At each school, researchers conducted in-depth, semi-structured interviews with teachers. These interviews typically lasted between 25 and 45 minutes and were conducted in the teacher's classroom, a conference room, or the school library. The teacher interview protocol for those teachers not leading the implementation efforts included multiple questions about growth mindset and, in both visits, teachers were asked to define growth mindset, describe any classroom practices intended to support growth mindset behaviors, and explain how the intervention has influenced their work as a teacher. Due to the semi-structured nature of the interviews, the questions as written in the interview protocols served as guides for the interviewers and were often not asked in exactly the same way in every interview. In a few cases, teachers were never asked to define growth mindsets or explain their understanding of either growth or fixed mindsets. Teacher leaders received a distinct interview protocol that asked about implementation efforts and growth mindset but did not directly ask interviewees to define growth mindset.

Growth mindset was discussed in some capacity in almost every interview as 86 out of the 89 fall interviews include references to growth mindset and 91 out of the 94 spring interviews did. These 177 interviews, representing 137 participants, served as the basis for our analysis for all three research questions. For our first research question, which evaluates the level of teacher understanding of growth mindset, we only included participants whose interview protocols included questions that asked participants to growth and fixed mindset. As a result, the data from the teacher leaders was not analyzed as part of the first research question because there was often insufficient evidence upon which to base a rating of understanding. While the interviews with teachers leading the implementation efforts at their school were excluded from the analysis for the first research question, they are included

in the analysis for the second and third research questions. See Table 2 for more information about participants and their inclusion in each phase of the analysis. As noted in the table, approximately 45 percent of participants were interviewed in both Fall and Spring, while the remaining 55 percent were interviewed during only one of our fieldwork visits.

Table 2. Participant and Interview Information

|  | Williams<br>H.S. | Hancock<br>H.S. | Smith H.S. | Total |
|--|------------------|-----------------|------------|-------|
| Total Participants                             |                  |                 |            |       |
| Teachers                                       | 30               | 27              | 37         | 94    |
| Teachers leading effort                        | 10               | 11              | 11         | 33    |
| Participants interviewed both Fall and Spring  |                  |                 |            |       |
| Teachers                                       | 12               | 16              | 11         | 39    |
| Teachers leading effort                        | 7                | 8               | 4          | 19    |
| Participants interviewed either Fall or Spring |                  |                 |            |       |
| Teachers                                       | 18               | 10              | 25         | 53    |
| Teachers leading effort                        | 2                | 2               | 7          | 11    |
| Participants included in Analysis for RQ #1    |                  |                 |            |       |
| Teachers                                       | 30               | 23              | 34         | 87    |
| Teachers leading effort                        | -                | -               | -          | -     |
| Participants included in Analysis for RQ #2-3  |                  |                 |            |       |
| Teachers                                       | 30               | 26              | 36         | 92    |
| Teachers leading effort                        | 9                | 10              | 11         | 30    |

### Data Analysis

The 183 teacher interviews from both fieldwork visits were recorded, transcribed, and thematically coded by the full research team through the use of NVivo, a qualitative data analysis software. Given that growth mindset was a core component of the school improvement model at each school, teachers often brought up growth mindset when reporting on their understanding of the goals

of SOAR, the practices they had been asked to implement in their classrooms, and the professional development and supports offered for teachers to prepare for implementation of SOAR practices. Therefore, our analysis extended beyond teachers' answers to questions that explicitly asked about growth mindset. To identify the relevant data for this analysis, the authors performed text searches of the transcribed data to create excerpts for each participant that included 100 words on each side of every mention of "growth," "fixed," or "mindset." This included participant's answers to direct questions about growth mindset but also captured other parts of the interview in which the participant or interviewer referred to mindsets. In addition, the authors queried NVivo to pull the thematic codes most relevant to the focus of this paper, including codes that captured teachers' understanding of SOAR components, teachers' implementation of SOAR practices, and teachers' adoption of SOAR language and practices. Finally, the authors utilized analytic memos written by various members of the full research team, the authors included, on the thematic codes mentioned above.

To answer the first question, the authors compiled all of the relevant transcribed data from each teacher interview from the growth mindset text searches described above. This resulted in a text file for each interview that included all transcribed text related to growth mindset. For every interview, the authors read the compiled text and then utilized a researcher-created rubric to measure teachers' depth of understanding of growth and fixed mindsets. This rubric was created with the input of senior researchers and measures understanding of growth mindset on a four-point scale in which 1 indicates that the participant has no knowledge of growth mindset and 4 indicates that the participant has fairly in-depth knowledge of growth mindset (the rubric can be found in Table 3 in the Results section). An interview could also be identified as unable to be scored if the teacher was not directly asked to define growth or fixed mindset and there was insufficient evidence to code their understanding. Five out of the 66 teacher interviews in the fall (8 percent) and five out of the 68 teacher interviews in the spring (7

percent) were coded as unable to be scored. Any teachers without a rubric score were eliminated from the analysis for the first research question (see Table 2).

The rubric was used after reading all text related to growth mindset, not just the interview questions specifically asking teachers to describe growth mindset, and therefore reflects a holistic score based on all mentions of growth mindset within the interview. Both authors engaged in an iterative process in which they independently coded teacher transcripts of growth mindset-related text, compared and reconciled their coding differences, and made minor modifications to the coding rubric for clarity. In total, the authors both independently coded 65 percent of the teacher interviews (116 of 177), reconciling any differences in coding and then settling upon a final rubric score if there were discrepancies. One of the author independently coded the remaining 61 transcripts (approximately 35 percent of the total sample). After using the rubric to rate understanding for all teacher interviews, the authors analyzed patterns in these ratings across schools. Instead of presenting data separately for the October and April interviews, coded data was pooled for the 2014-2015 academic school year. Approximately 36 percent of teachers included in the analysis for the first research question were interviewed in both Fall and Spring fieldwork visits. Teachers that had two sets of interview data were conservatively assigned the lower of their two scores for the purpose of the analysis.

For the second research question, the analysis included an iterative coding process to determine how teachers expressed beliefs about students and their teaching practice that indicate support for either growth or fixed mindsets. This including coding around examples given by teachers to explain how they may encourage growth mindset in their classrooms or how they may respond to a student exhibiting fixed mindset behaviors. It also included when teachers talked about their own mindsets and how learning about mindsets has influenced their own teaching practices. In reading all text related to growth mindset, the authors created emergent codes to represent common themes in how teachers talked about or reflected growth or fixed mindset beliefs in their interview responses. We utilized

analytic memos written by the research team (the authors included) to triangulate and augment these themes for the final step of analysis.

## Results<sup>2</sup>

Across all three schools, interviewed teachers brought up the importance of teacher mindsets in three distinct ways: (1) suggesting that the SOAR initiative has already or should encourage teachers to reflect on their own mindset or adopt a growth mindset; (2) explaining how learning about growth mindset had made them more cognizant of their own mindset; and (3) expressing frustration about how other teachers or school leaders were not embracing growth mindset in their own practice. These themes emerged across all three schools, with varying levels of prevalence. At both Williams and Smith High Schools, teachers described how part of their initial training on growth mindset specifically targeted teachers' own mindsets. In describing their professional development on growth mindset, one teacher from Smith explained, "we did like a questionnaire, like how do you feel about this, and then we kind of looked at our responses. Is that a growth mindset or a fixed mindset? And discussed how the human brain can change, so we shouldn't have a fixed mindset, because we can improve our students." Similarly, a teacher from Williams describe their teacher training as "during the first week of teacher in service we talked one whole day about this training, of how to implement it into our classes and we talked about how it had to be a teacher, change their mindset, too first before it reaches the kids." In comparison to Hancock, both of these schools had dedicated more professional development time to discussing growth mindset whereas Hancock had included growth mindset along with a list of other topics that teachers would be covering as part of a newly-formed weekly advisory period.

Across all three schools, teachers mentioned that learning more about growth mindset has made them more aware of their own mindsets. Interestingly, multiple teachers used their own personal

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<sup>2</sup> In this draft, we have presented the full results for RQ1 and tentative results for RQ2. We hope to complete results for RQ2 prior to the conference and to have tentative results for RQ3.



experiences or mindset as examples when defining the terms. For example, when asked to define a fixed mindset, a teacher from Hancock pulled from her own experience in math classes:

A fixed mindset is oh, it doesn't matter that I try, I just suck at math and you know, as a student myself in high school, I – I felt that way. I did, I felt that way. I hated – maybe because what, my grades weren't that great on math, you know, I might get a 70 or an 80 so in my mind, I just can't do it. It's me. But then when I got to college and then my mindset changed, it wasn't about okay, I'm just not smart, it was more okay, maybe you have to do things a little differently to actually master this. And once I changed my outlook on math, then every math class that I took, I made As because my mindset changed, versus saying I can't.

Although teachers were not explicitly asked to characterize whether they had more of a growth or fixed mindset, multiple teachers at each school identified themselves as having either a growth mindset or fixed mindset or would distinguish that they may have growth mindset sensibilities about certain areas but not others. While a handful of teachers talked about having a shift in mindset, many more discussed how learning about growth mindset had encouraged them to reflect more on their work as a teacher. A Hancock teacher, when asked whether learning about growth mindset or other SOAR concepts has influenced her teaching practice, explained that “when I first read it, it really kind of made me think of like how I react to children” and goes on to explain that she is now more open to feedback from students about how she could improve her classes.

Teachers and especially teachers leading SOAR implementation brought up the challenge of addressing teacher mindsets and, in particular, how to deal with colleagues who have fixed mindsets. As one teacher leader explained, it can be hard to address the mindset of a colleague:

One of the challenges has been teachers, because you don't -- It's easy for us to tell our students you have a fixed mindset. But it's hard for another teacher to tell a colleague [...] that you have a fixed mindset. So there are still teachers who complain about their students or they talk about how that student was always failing, or attitude, or whatever, and it's hard to go up to them and be like, well, you're really approaching that student with a fixed mindset, or you're really approaching this topic with a fixed mindset, or whatever it may be. It's harder to talk to adults about it, because you don't want to call out your colleague on it, but it's a lot easier to call out a student on it.

Telling your colleagues that they have a fixed mindset could potentially be an indelicate or difficult task and other teachers mentioned their struggle with changing the attitudes of other teachers in their

school. As a teacher at Smith lamented, “there are some teachers that've been teaching for hundreds of years. They would sit there and like, well, the kids can't learn, so I'm not going to teach them that anymore.” Despite hearing these frustrations from some teachers, others expressed that they felt like the teacher mindsets at their schools were changing as a result of the SOAR initiative. For example, one teacher at Hancock described how “you can see how this has changed students, teachers, everybody's mindset [...] they're learning to use their brain just like the students are.” Similarly, teacher leaders at Smith explained that teachers seemed more willing to try new things and that they are embracing the ideas of growth mindset.

### **Measuring Understanding**

The first research question asks the extent to which that teachers understand the concepts of growth and fixed mindsets. Teachers were explicitly asked to define growth mindset and also give examples of students exhibiting growth and fixed mindset behaviors. In this section, we review both general patterns in the rubric scores as well as examples from teachers exemplifying different levels of understanding. Table 3 includes the explanation of the rubric scores as well as multiple examples from the interviews of teacher responses earning that score. Table 4 summarizes the rubric scores for teachers at each school. Figure 1 shows the results of Table 4 in graphical form. The rubric employed by the authors to analyze general patterns in levels of understanding is intended as a rough proxy for understanding and not an exact measure of teacher understanding of growth mindset. The most important distinction within the rubric is between the second and third levels. Teachers scoring at the third level connect growth mindset to theories about intelligence or explain one of the core components of growth mindset, such as the importance of effort and practice, or the possibility of learning from mistakes, failure, or challenges. As shown in both Table 4 and Figure 1, there is some variation across and within schools in terms of the level of understanding.

Overall, about half of teachers show little or only superficial understanding of growth mindset. Often, these teachers talked about growth mindset as being open-minded or willing to grow, but made few explicit connections between growth mindset and how people learn, their ability to improve their aptitude through effort, or how those with a growth mindset approach mistakes. The remaining half of teachers showed greater understanding of growth mindset, with a small subset scoring at the highest level of understanding. Teachers with a greater understanding articulated that a growth mindset is connected to the malleability of intelligence with a specific emphasis on effort and learning from mistakes.

There were some similarities and differences across schools in terms of the distribution of understanding scores. Across all three schools, approximately 10 percent of teachers exhibited little to no understanding of growth mindset. Similarly, between 10-13 percent of teachers scored at the highest level of understanding. The most notable differences occur in the proportions of teachers scoring in the second and third level of the understanding rubric. Smith had a greater proportion of teachers showing deeper levels of understanding, with 50 percent of teachers scoring at the third or fourth level of understanding. Both Williams and Hancock had larger percentages of teachers only showing superficial understanding; each school had close to half of their teachers scoring at the second level of understanding.

**Table 3. Explanation and Examples from Understanding Growth Mindset Rubric**

| <b>Teacher Mindsets – Growth Mindset Understanding Rubric</b> |  |   |
|---|--|---|
| <b>Score</b>  | <b>Explanation</b>   | <b>Examples</b>   |
| 1   | <p>It is clear that the participant has <i>no knowledge</i> of and/or familiarity with growth mindset</p> <p>OR</p> <p>Participant expresses familiarity with concept but gives an explanation that is wholly unrelated to any growth mindset concepts.</p>  | <p><u>Example #1:</u><br/>“Interviewer: So are you familiar with this idea of growth mindset?”<br/><br/>Teacher: No.”</p> <p><u>Example #2</u><br/>“Well, I kind of think that they like -- how they want to start training the kids to think like beyond the, okay, I have to go to school because the state is telling me. I think it's like they want them to know that they -- well, of course you have to go to school because it's the law, but you want them to start thinking about, okay, once I turn 18 and graduate, nothing is free anymore, like how am I going to work towards if I want to go to college?”</p>   |
| 2   | <p>Participant expresses <i>familiarity</i> with the term growth mindset but displays only superficial understanding. Because of this superficial understanding:</p> <ul style="list-style-type: none"> <li>Participant does not connect growth mindset with theories about intelligence, learning, or how the brain works.</li> <li>Participant does not connect growth mindset with the importance of effort, practice, or hard work in getting better or developing your talent.</li> </ul> | <p><u>Example #1:</u><br/>“It's a positive outlook on, really to me, it's just thinking more positively and holding yourself more accountable to your self-improvement, because students who have a growth mindset usually strive to improve themselves without having someone push them, but if they need the push, they can get it from the teachers.”</p> <p><u>Example #2:</u><br/>“My understanding of growth mindset would be a mindset where you think outside the box. Everything is not as is. You can always go beyond what you think your expectations are, or think beyond what you think your expectations are. Go beyond your abilities, stretch yourself.”</p> |
| 3   | <p>Participant displays some <i>understanding</i> or growth mindset</p> <p>Participant does one of the following:</p> <ul style="list-style-type: none"> <li>Participant connects growth mindset with theories about intelligence, learning, or how the brain works</li> <li>Participant mentions the importance of</li> </ul>   | <p><u>Example #1:</u><br/>“For example, look at that Rubik’s cube. I can’t do that because I’m stupid. That would obviously be a fixed mindset. Look at that Rubik’s cube. I have tried this five times and I have failed miserably. I think that if I spent enough time on that and maybe looked up some techniques, I could do it. I could learn how to do it. I have the ability to improve. You have the ability to develop versus you’re fixed in place without the resources or the</p>   |

|   |   |   |
|---|---|---|
|   | <p>effort, practice, or hard work in getting better or developing your talent</p> <ul style="list-style-type: none"> <li>• Participant describes how failure is a learning opportunity and what can be learned from mistakes or challenges</li> </ul>   | <p>means to go where you want to go.”</p> <p><u>Example #2:</u><br/>                 “My understanding of growth mindset is, well, the first way it was presented to us was fixed mindset and growth mindset and about intelligence can be taught versus you're born with whatever you know. So there's a whole philosophy about that, about [how] there's certain behaviors and thought processes that people have that if you're fixed mindset, you think this way, but if you're growth mindset you have these kind of beliefs.”</p>   |
| 4 | <p>Participant displays more <i>in-depth understanding</i> of growth mindset.</p> <p>Participant does both of the following:</p> <ul style="list-style-type: none"> <li>• Participant connects growth mindset with theories about intelligence, learning, or how the brain works</li> <li>• Participant mentions (1) the importance of effort, practice, or hard work in getting better or developing your talent OR (2) how failure is a learning opportunity and what can be learned from it</li> </ul> | <p><u>Example #1:</u><br/>                 “Growth mindset is getting those students to stop them from thinking, I can't do this, I'm not able to do this, and get them more thinking, what's a different approach I can take to doing this. [...] Just because you're not getting the math right away and super quickly doesn't make you dumb. Math comes at its own pace for each and every person. It's – you know, it's not you. Like, you have the math skills in there. I've seen some of the things that you can do with the math. It just means that you need to – all it means is you need more practice at it”</p> <p><u>Example #2:</u><br/>                 “The idea of growth mindset is that there isn't – that intelligence is not fixed. That a person – I supposed intelligence is more effort based, that a person can learn through – through effort, through activities and through continued practice rather than just somebody who's automatically smart.”</p> |

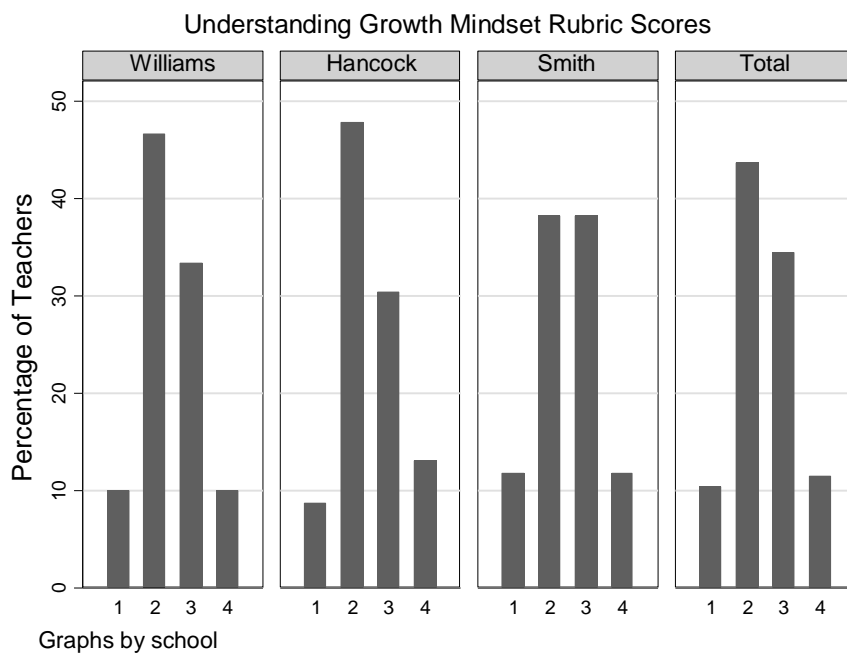
**Table 4. Frequency and Relative Percentages of Understanding Growth Mindset Rubric**

|                      | 1 | 2  | 3  | 4 | Total |
|----------------------|---|----|----|---|-------|
| Williams High School | 3 | 14 | 10 | 3 | 30    |

|                     |              |               |               |               |              |
|---------------------|--------------|---------------|---------------|---------------|--------------|
|                     | (10.0%)      | (46.7%)       | (33.3%)       | (10.0%)       | (100%)       |
| Hancock High School | 2<br>(8.7%)  | 11<br>(47.8%) | 7<br>(30.4%)  | 3<br>(13.0%)  | 23<br>(100%) |
| Smith High School   | 4<br>(11.8%) | 13<br>(38.2%) | 13<br>(38.2%) | 4<br>(11.8%)  | 34<br>(100%) |
| Total               | 9<br>(10.3%) | 38<br>(43.7%) | 30<br>(34.5%) | 10<br>(11.5%) | 87<br>(100%) |

Note: Relative percentage in parentheses

**Figure 1. Relative Percentages of Teachers in Understanding Growth Mindset**



**Exhibiting Growth and Fixed Mindset Attitudes**

The second research question asks how teachers exhibit both growth and fixed mindset attitudes about students’ intelligence and their own work as teachers. While this analysis will consider whether teachers explicitly described themselves as having either a growth or fixed mindset (and some teachers did clearly identify themselves this way), it is more important to consider how teachers demonstrated their theories of intelligence in less obvious ways. Throughout the interviews, teachers

were asked questions about their classrooms, students, and teaching practice and their answers often revealed whether their attitudes subscribed more closely to growth or fixed mindsets.

Many teachers exhibited growth mindset attitudes in the following ways: (1) explaining about their own mindset as educators and applying growth mindset practices within their classrooms, (2) describing how growth mindset naturally aligned to their content area, and (3) drawing connections between growth mindset and encouraging students to take greater responsibility for their learning. As noted above, many teachers explicitly talked about their own mindsets when asked to define growth or fixed mindset or used themselves as a personal example to explain different attitudes about intelligence. Some teachers talked about how learning about growth mindset was refreshing or allowed for greater personal reflection. In describing her experience with learning about growth mindset, one teacher from Hancock explained that “I love learning about the growth mindset because it just really helped you to see where you were as a teacher, and the stuff that you did good, and the stuff that you really need to improve on.” Furthermore, teachers contrasted the initiative’s focus on mindsets with other reforms that often focused exclusively on student test scores.

Teaching our kids how to be critical thinkers, stepping away from – basically having a paradigm shift. Stepping away from the way it used to be, where it was – here's the stuff you need to memorize for the test. [...] Growth mindset is about – is not about a standardized test score. It's about life choices, life decisions, how students handle their resources or the lack thereof.

The teacher above, who helped lead implementation at Hancock, further described how professional development on growth mindset has made her a better educator. Another teacher leader from Williams similarly explained how teachers at his school seem to be conceptualizing what student success means:

We also ask the teachers during their professional development like what does success at [Williams] look like, and overwhelmingly, which surprised me, most of the teachers didn't mention grades, didn't mention passing rates, didn't mention getting on the A/B honor roll. Most teachers were saying they want to see students try. They want to see students attempt problems.

This focus on process rather than on outcome is fundamental to growth mindset. The limited research on teacher mindsets suggests that teachers with incremental theories of intelligence are more likely to privilege effort or improvement rather than static measures of performance (Butler, 2000; Lee, 2008).

Another way that teachers exhibited growth mindset attitudes is discussing how they saw alignment between growth mindset and their content areas. A handful of teachers at each school discussed how they thought it was easy to incorporate growth mindset language into their classroom because of their content area; in particular, arts and foreign language teachers expressed this belief that the nature of their classes aligned with growth mindset. As an art teacher at Smith explained, “it's so easy in art because there's no mistakes, and when they're worrying about something, I'm like there's no mistakes. It might not work, but you learn from your -- what's not working.” Likewise, a foreign language teacher at Smith saw how learning a language often requires you to be open to learning from your mistakes:

I find myself often reminding students that we are all learning. So I've had to put myself in that position in front of them and say, hey, you know what, maybe your Spanish is not as good right now, but I'm pretty much in the same situation. My English is not perfect. I am not a native English speaker, so there will be times when maybe you will be correcting my pronunciation, and I am okay with that.

Teachers in the core content areas expressed similar beliefs about incorporating growth mindset language in their classes. For example, an English teacher at Williams discussed how she utilized growth mindset language in approaching students who say that they cannot write, explaining “I would just tell them, it's not that you can't write. It's that maybe right now you're not writing as well as you would like to, and that's why we do this now. We're going to do several essays and we're going to get better each time.” However, not all teachers saw this natural alignment between their content area and growth mindset. In fact, many teachers explicitly said that they needed to know more about how to fold growth mindset practices into their classes. For example, a math teacher from Williams suggested that, “I think that it would help if, you know, we got together as a math department and, you know, kind of came up



with some lessons that are subject-specific that incorporated the growth mindset.” In fact, many teachers described how they did not always know how to incorporate growth mindset concepts within their content classes.

Finally, interviewed teachers often emphasized the connection between growth mindset and taking responsibility for your learning and, in particular, failures. This is not surprising given that the larger school reform effort focused on increasing student ownership and responsibility for their learning. As Dweck (2006) explains in *Mindset: The New Psychology of Success*, “another way people with fixed mindset try to repair their self-esteem after failure is by assigning blame or making excuses” (p. 36). The idea of blaming others and making excuses for failure came up repeatedly when teachers were asked to describe fixed mindset. In a somewhat typical response, a teacher from Hancock defines fixed mindset:

Well, fixed mindset is just that you are what you are, and anything that happens isn't what you did, it's always an external factor. Like I didn't fail the class, the teacher failed me because he doesn't like me, or I couldn't do any better on that test, because the test was hard, not that I didn't study the right thing or didn't even study.

Teachers often talked about the importance of encouraging students to take greater ownership over their grades and learning. A component of the SOAR initiative that occurred at all three schools was a cyclical goal-setting process in which students reflected on their progress report grades and wrote about what they could personally do to maintain or improve those grades. In describing the goals of SOAR, a teacher at Williams highlighted

To get students to have ownership, to help students understand that just because you do poorly on something does not mean, oh, okay, I can't do that anymore. That just is an indicator that you need to work a little bit more at it. You need to seek help. But, you know, just – to use the code word – to change their mindset of just giving up. But trying to take it more as a challenge, I guess, and you know, that – to me, that's preparing them for the real world, because you can't just give up and I think [...] I think schools have done such a disservice to our kids because we have made it so much more about scores and grades – and even as parents we do that, and we're not allowing them to fail a little bit, because that's how you learn.

Interestingly, a few teachers of Advanced Placement classes specifically mentioned how they need to consider how to help their students take greater responsibility in classes that may be more difficult than their past courses. For example, a teacher at Williams explained that “teaching AP in particular, you

have a lot of kids who are accustomed to only success” and that she explicitly thinks it’s important to challenge those kids and help them deal with disappointment in her classes.

It is important to note that many of the interviewed teachers expressed in some shape or form that they thought their beliefs already aligned with growth mindset. When asked her opinion about the implementation of SOAR, a teacher from Williams explained the alignment, suggesting that “my goals for my students align with those goals, so it helps when they're aligned and I don't have to actually change a large portion of my teaching to support it, but I think what they're doing is great, and as long as they give me time and materials, it's going to be very easy for me to continue.” Similarly, a teacher from Hancock described growth mindset as “common sense” and that she did not see how learning about growth mindset would influence her teaching practice. While this perceived alignment between growth mindset and teachers’ existing beliefs may increase teachers’ will to implement these ideas into their classrooms, it could also keep teachers from implementing new practices that would further encourage growth mindset or identifying and halting practices that promote fixed mindset. In their work on the role of teacher cognition in policy implementation, Spillane et al. (2002) assert that “when implementing agents perceive an instructional idea in policy, the idea may be over-interpreted as essentially the same as the belief or practice that the teachers already hold” and that these beliefs can actually impede the implementation of school reforms because teachers will actually do very little to improve or change their practice.

Across all three schools, teachers also revealed attitudes that align with fixed mindsets. In some cases, teachers said that they wanted to encourage students to have a growth mindset but expressed difficulty in incorporating it into their classes:

One of the biggest hurdles I think I have, because I teach math, is the kids walk in, they have been unsuccessful in math most of their, you know, school career, and so they walk into my classroom with the mentality of, I can’t do this. And so I’m constantly having to be the cheerleader, and going, see you can do this, you can do this. However, I also have to be the one that says, well, even though you can do this, this is wrong. [...] Because math is kind of — math is pretty black and white, too, you

know, and that's the part I hate, is having to be that, well, this is wrong, this is wrong, this is wrong, but at the same time, saying, you can do math.

In the example above, a math teacher from Hancock wants to encourage her students to succeed in math but sees math as "black and white." By focusing on whether students are right or wrong in math, this teacher may be aligning herself with a fixed mindset attitude that privileges the final outcome over the process of learning.

The most common way that teachers revealed a fixed mindset is in talking about characteristics of students as fixed or innate. This often involved labeling or characterizing students as having a fixed mindset based on their academic track, "smart or not smart," or the financial situation of their family. The following examples include exchanges between interviewers and teachers in which teachers were asked to define fixed mindset:

Interviewer: What student behaviors indicate a fixed mindset?

Teacher: All the negative behaviors. [...] and their environment. Their parents, you know, they have a certain belief about doing things a certain way and they've been raised to do that.

Interviewer: How would you describe a fixed mindset?

Teacher: Hopeless. [...] That would be the feeling. I think they'd feel hopeless. Fixed mindset would be hopeless. I'm not going to get out of this financial situation. I'm not going to get out of this four classes I'm failing. I'm hopeless.

Interviewer: So you kind of said that's kind of like having a fixed mindset. What does that mean, to have a fixed mindset?

Teacher: There's – I can give you an example. [...] I asked a student that, you know what, if you want – if you could have the money or the career and the sources to buy a house, where would you buy the house? And they would say, well, I would just buy in the neighborhood. I said, why is that? Oh, well, because you know, I'm happy with what I have, you know, and instead of saying, you know, I want to live somewhere else that has a bigger yard or better school district.

These exchanges reveal a fundamental misunderstanding of fixed mindset in which teachers explain fixed mindset as a characteristic of low-income students who are seen as having low aspirations.

Similarly, a teacher at Hancock described fixed mindset as a cultural trait by saying that "the

implementation of a growth mindset is hard in certain cultures, because certain cultures have the fixed mindset.” In these four cases profiled above, teachers’ understanding were rated as having a superficial understanding of growth mindset. These associations between fixed mindset and low-income students were most common among teachers at Hancock, the school which had a higher overall proportion of teachers with a superficial understanding of growth mindset and with the highest proportion of economically disadvantaged students.

Across all three schools, fixed mindset was commonly associated with low-performing students and very few teachers made clear that students of all performance levels can adopt different theories of intelligence. For example, teachers described students with fixed mindsets as “the bare minimum kind of student,” “who don’t turn in work, who don’t want to learn,” “antagonistic,” or “apathetic.” As a result, teachers sometimes gave the impression that growth mindset lessons, and the SOAR initiative more generally, may be most beneficial for the lowest performers. In their interviews, teachers were often asked how students were responding to the innovation and some teachers utilized certain labels to identify groups of students as high or low performance. For example, when asked how his students were responding to the focus on growth mindset, a teacher at Williams said “smarter kids more quickly.” Teachers in our interviews often labeled students by their academic track (e.g. “the regular students” and “the advanced students”) or performance level (e.g. “the higher performers” and “the low performers”). As Dweck (2006) explains, it is especially common for those with a fixed mindset to translate actions (such as failing a test) to an identity (being a failure). In contrast, a handful of teachers had clearly considered how labels might promote either growth or fixed mindset attitudes and talked in their interviews about the language they use in their classroom.

In a growth mindset, one feels that there's an opportunity to improve and it's not just, 'oh, I'm smart.' We've actually made smart a word we don't say in my classroom because I've told the kids,

once you start to think that you're smart, then you don't try as hard, and so effort – effort is given a major priority in a growth mindset.

However, the above example is more of an anomaly while many teacher utilized more conventional labels that equate students' identity with their performance level or academic track. While this analysis has no way of knowing the language that teachers use in referring to their students within their classroom context, it is not improbable to think that some teachers may be inadvertently sending messages to students by using labels that suggest that performance level is a fixed trait about an individual (fixed mindset) rather than something that can change over time (growth mindset).

*[Analysis for RQ #3 will be added here]*

## **Discussion**

### **Limitations**

One challenge acknowledged in much of the work on both student and teacher mindsets is the difficulty of creating valid and reliable measures to capture the concepts (Duckworth & Yeager, 2015; Goddard, Hoy, & Hoy, 2000; Tschannen-Moran & Hoy, 2001). In their review on the influence of non-cognitive factors on student outcomes, Farrington et al. (2012) conclude that there is a need for both conceptual clarity that defines and differentiates various non-cognitive factors but also better direct measures of these factors. Surveys or questionnaires have been the primary method of choice for most psychologists studying beliefs about intelligence but these methods have been critiqued for being overly simplistic (Deemer, 2004) and susceptible to misinterpretation or social desirability bias (Duckworth & Yeager, 2015). By using interview rather than survey data, this study provides an alternative method for understanding how teachers may think about intelligence. While the use of interview data may allow for greater nuance in capturing teachers' understanding of and beliefs about growth mindset, it still suffers from many of the same limitations of questionnaires, most notably social desirability bias.

Surprisingly, many teachers in our interviews were quite frank about their thoughts about the nature of intelligence with some explicitly describing themselves as having fixed mindset beliefs. While this analysis approach would probably not be appropriate for wide-scale use, it does help identify some of the nuances in teacher understanding and also reveal some of the common misunderstandings or contradictions.

Another limitation of this study is the convenience sampling used as part of the larger research study. Because the sample of teachers drawn from each school may not be representative of each school's faculty, it would be inappropriate to draw inferences about understanding across schools and across time. Instead, the rubric scores presented in this analysis are intended as rough proxies for teacher understanding of growth mindset and should not be treated as exact measures. Furthermore, the semi-structured nature of the interviews means that not all teachers were asked to define growth and fixed mindsets in the same way. In fact, about ten percent of the interviews could not be used in the analysis for the first research question because those interviews did not provide enough information to adequately gauge understanding of growth mindset (typically because teachers were not explicitly asked to define growth mindset). It is important to be cautious in interpreting the findings from this analysis.

### **Implications**

This study explores the role of teacher beliefs in school improvement efforts, specifically examining how an intervention intended to develop growth mindset in students may influence teachers' own beliefs about intelligence. The findings suggest that there can be considerable variation within and between schools in terms of how deeply teachers understand the concept of growth mindset and the extent to which they exhibit growth mindset attitudes in their teaching practices. If nothing else, this analysis suggests that explicitly considering teacher mindsets is important in assessing how to

implement such an initiative. As teachers in these three schools explained, the ultimate success of school-based interventions targeting student mindsets may depend on the extent to which teachers understand and embrace growth mindset. As one teacher in our study explains, teachers play a critical role in modeling growth mindset for students:

The best way to get them to think in a growth mindset is not to tell them about growth mindset, it's to model that for them and through your procedures, through the way that you interact with them, through the way that you conduct yourself and your class, that's how you introduce a growth mindset, without even using the words growth mindset, because when you introduce it as a concept, it just becomes another thing to know and another thing to remember, another buzz word, another vocab word, another thing on the word wall, you know, and so it's more of just – you know, if I was going to make a suggestion, it would be more of just not even necessarily training the kids to think that way, but teaching the teachers to think that way so that they cannot teach the kids, but model it for the kids without really saying the word, but just model it. You know, lead by example.

As noted by the teacher quoted above, such modeling is not possible without training and teachers must deeply understand growth mindset concepts before embedding them into their classroom practice. In all three schools, there was some evidence to suggest that certain teachers had more comprehensive understandings of growth and fixed mindsets. They could activate that knowledge to implement classroom practices fostering growth mindset. However, approximately half of teachers seemed to have a more superficial understanding of growth mindset that could impede them from engaging in the daily modeling of growth mindset described above.

Some (but not many) teachers who expressed support for growth mindset would also voice attitudes about students that actually aligned with fixed mindsets. This revealed a common misperception about fixed mindset that automatically associated a fixed mindset theory of intelligence with students living in poverty or students who were consistently failing their classes. Furthermore, teachers were much more likely to describe fixed mindset as being a characteristic of low-performing students rather than understanding that students of all background and performance levels can exhibit a growth or fixed mindset about intelligence. Often, but not always, these contradictory cases were teachers who exhibited more superficial understanding of growth mindset. These results highlight the

difficulty of changing teachers' established beliefs about student intelligence but suggest that promoting depth of understanding may offer one promising practice to change the mindsets of teachers.

Many past reform efforts in education have focused on organizational changes within the school with limited evidence that such changes will ultimately lead to changes in classroom practices (Bodilly, Glennan, Kerr, & Galegher, 2004). In a much cited article on scaling up effective educational practices, Elmore (1996) argues that large-scale reforms rarely influence the core of educational practice, or "how teachers understand the nature of knowledge and the student's role in learning, and how these ideas about knowledge and learning are manifested in teaching and classwork" (p. 2), and that schools need to explicitly consider how to structure reforms that can influence this core. Indeed, it is critically important to consider the role of teachers and school leaders in implementing any school reform efforts and, in particular, efforts like this one that are intended to deeply influence the culture of schools and how teachers and students interact.

In the burgeoning literature on school-based interventions targeting students' noncognitive factors, not enough attention has been paid to the role of teachers. Many of the existing studies, in which researchers often have high levels of control over short-term interventions, focus exclusively on the effects on students and do not consider the role of teacher understanding or school context. In their recent article on using psychological interventions to address the achievement gap, Yeager et al. (2013) call for greater partnership between researchers and practitioners.

Good teachers often know the importance of belonging, growth, and positive affirmation. But they may not know the best ways to bring these about. Well-intended practices can sometimes even do more harm than good. At the same time, researchers may not always know the best way to make their interventions speak to students in a given class. And many of the interventions developed here were borne of observations of real-world success stories — educators who boosted the performance and life chances of their at-risk youth. This is why, going forward, we believe it is critical for educators and practitioners to work together to develop ways to change students' psychology in school for the better. (Yeager, Walton, & Cohen, 2013, p. 65)



Indeed, teacher-researcher partnerships such as the one profiled in this study, may be critical to better understanding the role of teachers in implementing school-based interventions targeting noncognitive factors and, ultimately, in ensuring that these interventions are successful.

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