

Fifth Grade Teacher Mindset and Impact on
Student Mindset and Performance

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Statement of the Problem

The quality and level of education in society may affect future innovation, critical thinking to solve global problems, and policy decisions, especially in a democracy. Unfortunately, one in five students in the United States (US) are delayed when earning their high school diploma (McFarland et al., 2018). In addition, less education is associated with increased unemployment, poverty, and poor health outcomes (Autor, 2014; Patton, 2016). Research has identified that the perspective, or mindset, someone has may play a critical role in achievement outcomes and determination in the face of challenges (Schunk et al., 2014). Further, the words we use to speak to each other, especially children, can affect the type of mindset that they develop (Dweck, 2007). For example, praising students' intelligence (i.e., "Good work on this assignment, I can see how smart you are.") instead of praising students' hard work (i.e., "Good work on this assignment, I can see how hard you worked.") may lead to the development of an entity theory of intelligence. Unfortunately, this entity theory, or fixed mindset, can lead to higher rates of helplessness, the avoidance of challenges and quitting tasks more quickly, especially in people with low self-efficacy. Fixed mindsets are defined by a belief in static ability, and people often have a desire to perceive themselves more highly (Schunk et al., 2014). However, incremental theory, or growth mindset, is a different attitude where people believe ability can change and their goals are often focused on a competency increase. Students who have this perspective sustain motivation longer regardless of current confidence in their abilities (Blackwell et al., 2007). People with an incremental theory of intelligence believe ability can be improved through hard work (Schunk et al., 2014). This research proposal will focus on motivation and the variables that appear to affect mindset, along with their relationship to motivation and performance.

Purpose of the Study

The intent of this research is to determine if changing teachers' mindset (from fixed to more of a growth mindset) would lead to improvements in student mindset and performance on national standardized examinations. First, one group of teachers will complete a 15-week interventional activity (total time of 105 hours) to encourage a growth mindset. Then, all teachers (including a second group who did not perform the 15-week activity) would receive eight-week instruction for incorporating more growth mindset instructional activities into their fifth grade (year six in England) classrooms. The impact of a possible change in teachers' mindset would be measured, and student mindset, along with academic performance would be evaluated.

This research will clarify prior conclusions to determine if an adult's mindset (specifically young or middle-aged teachers) is able to be modified through interventional activities (Sheffler et al., 2022). In addition, if teachers' mindset can be improved, a better understanding of the relationship between teacher mindset and student's mindset and performance is possible. The hypothesis is an increase in growth mindset beliefs for fifth grade teachers, followed by learning techniques about how to incorporate growth mindset into class activities, would positively improve student growth mindsets as measured by Motivated Strategies for Learning Questionnaire and test scores measured on the Key Stage 2 SATS Exam (compared to a control group of teachers who simply learn how to incorporate mindset lessons into class activities).

Theoretical Significance of the Study

The foundation for the theoretical basis for this research is Dweck's model of goal orientation (Schunk et al., 2014). This theory is a combination of attribution theory and achievement goal theory. First, attribution theory discusses the perceived rationale that someone uses to explain various outcomes. For example, whether someone believes their academic success

is due to natural intelligence or hard work is an important aspect that predicts future behavior. If someone believes their success was due to hard work, this may encourage and motivate a person to work harder in the future. Next, achievement goal theory focuses on what the person desires to achieve. The two main options are performance goals and learning goals (Schunk et al., 2014). These goals can be further subdivided into approach and avoidance goals to describe the motivating underlying behavior. Performance goals focus on achieving success and competence relative to others. Mastery goals differ substantially and are focused on the process of becoming knowledgeable and learning a skill for its own sake (Schunk et al., 2014). Applying these lessons to the academic sphere, an example of a performance goal would be to be the valedictorian of your high school class, while an example of a mastery goal would be to become fluent in Spanish.

Ultimately, this research proposal seeks to understand the effects of a change in fifth-grade teachers' attributions and goals for themselves. It aims to identify how a change in teachers' mindset may change student mindset and performance, as measured by standardized examinations and surveys.

Practical Significance of the Study

Mindset and one's perception regarding failure has applications throughout life. For example, doing taxes, learning how to use new technology (i.e., cell phones, computers, blockchain software, etc.) and learning a new language is often difficult. So, persistence is critical to overcome obstacles, learn new skills, and have a positive impact in the world. Thus, applying factors that influence growth mindset in students, along with replicating prior results to demonstrate how adult's growth mindset can change, would boost evidence on how to increase persistence on hard tasks in academic and non-academic areas.

This research focuses on schools and how teachers' mindset may affect student mindset. First, Blackwell and colleagues identified that a belief in flexible intelligence predicted an upward trend in grades in middle school and increased classroom motivation; a belief about intelligence being static predicted no change in grades over the next two years (Blackwell et al., 2007). Next, Yeager and researchers focused on ninth-grade US students. They found that a less than 60-minute, online intervention improved the grades of lower achieving students and increased willingness to stay in more difficult math courses (Yeager et al., 2019). School contexts were determined to be important since peer norms appeared helpful to positively improve grades (Yeager et al., 2019). Another study by Yeager and colleagues suggested that a supportive context (i.e., teacher mindset) may foster the development of student growth mindset beliefs (Yeager et al., 2021).

Research explores the relationship between teacher mindset and student outcomes, but more details are still ready for further exploration. Canning and colleagues found a relationship between American STEM (science, technology, engineering, and mathematics) college professor mindset and the achievement of students, especially minority students (Canning et al., 2019). Fixed professor mindset was associated with worse student performance regardless of race. Further, under-represented minority students performed significantly worse than other students when taught by a teacher with a fixed mindset (difference in GPA of 0.19 versus 0.10) (Canning et al., 2019). Mesler and researchers found that teacher mindset is associated with student mindset; the effects were mildly positive and significant with boys being most influenced (Mesler et al., 2021). However, a randomized controlled trial does not exist that measures changes in teacher mindset to determine if this promotes a change in the mindset of the teacher's students, which is a limitation in current literature.

There is mixed evidence describing the impact of teacher-delivered growth mindset activities on student mindset and performance. Two large randomized controlled trials performed in England aimed to assess this gap and included 286 (Rienzo et al., 2015) and more than 5000 students (Foliano et al., 2019), respectively. The studied populations were year 5 and year 6 students (comparable to fourth and fifth grade American students), but there were no significant associations found on standardized test scores or other non-cognitive skills (intrinsic value, self-efficacy, test anxiety, and self-regulation) (Foliano et al., 2019). The study by Rienzo and colleagues (2015) included an active comparator group while Foliano and others (2019) used a waitlist of interested schools as the comparator group. This is significant since it shows that a diversity in control conditions led to similar results. Some possible explanations for the non-significant results may be the younger age of the students, the widespread use of growth mindset instructional learning in England, or the lack of ongoing teacher support throughout the year (Foliano et al., 2019; Porter et al., 2022). In the United States, Porter and colleagues conducted a randomized controlled trial in sixth and seventh grade students with a population of 52 teachers and over 1800 students. The intervention used Brainology, which is a teacher-delivered growth mindset intervention. Teachers received video-based resources, in-person training, and instructional strategies for teaching growth mindsets. It showed an increase in report card grades of 0.27 standard deviations or 2.81 points. Of note, since students were older in this study versus the other randomized controlled trials that showed no benefit, this could have played a role in the final conclusions. Further, the grading metric, report card grades as opposed to national standardized examination scores, may have been another confounding factor for these conclusions. Of note, this study had a conflict of interest from the one of the authors, Blackwell, who cofounded

the company that created Brainology (Porter et al., 2022). Thus, additional replication of this result is warranted.

A critical element of the present research proposal is the goal to change adult mindset. First, professional development for teachers has been minimally effective in many situations (TNTP, 2015). The following suggestions may improve the effectiveness of teacher professional development: 1) Define a teacher's performance and progress; 2) Encourage development through incentives and consequences; 3) Evaluate the effectiveness of improvement activities; 4) Recreate processes for training teachers to improve their skills. (TNTP, 2015). In addition, a survey of approximately 1300 teachers in China indicates that teacher self-efficacy influences growth mindset, which can improve teaching strategies. This shows that another variable, self-efficacy, is important to consider when creating professional development activities. Two small studies of American middle-aged and older adults (average age of 66 years) showed positive effects of a fifteen-week intervention on the development of growth mindset, as well as on knowledge acquisition. The procedure from this study (Sheffler et al., 2022) included discussions and videos that were slightly modified in this research proposal to be more relevant as a teacher specific activity (discussed in the methods below).

Overall, prior research has shown that growth mindset can be cultivated through interventions in American school children (Blackwell et al., 2007; Yeager et al., 2009) in addition to being replicated in Norway (Rege et al., 2021). Teacher mindset has been found to be associated with student mindset (Mesler et al., 2021), and racial achievement gap (Canning et al., 2019). However, two randomized controlled trials conducted in fourth and fifth grade students in England (Rienzo et al., 2015; Foliano et al., 2019) showed lack of benefit from teacher-delivered mindset interventions. Porter et al. conducted a randomized controlled trial in the United States in sixth and

seventh grade students that showed increased performance on report cards for the group that used the mindset intervention activity (Porter et al., 2022). Lastly, adult mindset has been shown to change following a fifteen-week activity (Sheffler et al., 2022). Despite significant research on attribution and goal orientation theory, attempting to alter teachers' mindset and measure the impact on student mindset and performance has not been published previously.

Methods

Participants

The research focuses on American fifth grade teachers (year six teachers in England) and American fifth graders (year six students in England) (Comparative ages, grades and exams – US vs UK., 2015). Teacher recruitment would occur over the spring to allow for teachers' individual intervention activities to take place in the summer when there are less demands on their time. The goal would be to evaluate 480 fifth-grade students and 24 fifth grade teachers (estimate about 20 students per classroom; 240 students would be randomized in each group). Goal recruitment would be approximately 50% of recruitment from US and 50% from England. Attrition is estimated at 15% for English students/teachers and 33% for American students. The reason for the expected difference in dropout rate is because the Key Stage 1 and 2 SATS Exam would be elective for American students, but mandatory for public students in England (Department of Education, 2011).

Measurements

Three different measurement scales would assess the following variables: 1) Broad Learning Adult Questionnaire (BLAQ)—measure teacher mindset; (Sheffler et al., 2022) 2) Adapted version of Motivated Strategies for Learning Questionnaire (MSLQ)—measure student

mindset; (Foliano et al., 2019) 3) Key Stage 2 SATS Exam—measure student’s numeracy and literacy scores (Foliano et al., 2019).

Teacher Mindset: The Broad Learning Adult Questionnaire (questions below) will measure teacher mindset, with each question being scored on a six-point Likert-scale (1= Strongly disagree to 6= Strongly agree) (Sheffler et al., 2022):

1. Lifelong learning will keep my mind sharper than my peers who do not continue learning.
2. Regardless of whether I am of high or low intelligence, I can still learn new skills.
3. When learning a new difficult skill, such as speaking a new language, I know that although I may not be good at that task now, I can eventually become better at it through practice and dedication.
4. Through practice and dedication, I can be proficient in anything that is difficult.
5. Even if I don’t have the talent to do something, I can still learn to do it well.

Student Mindset: Adapted version of the Motivated Strategies for Learning Questionnaire (below) will measure student mindset and each question is scored on a six-point Likert-scale (1= Strongly disagree to 6= Strongly agree) (Foliano et al., 2019):

1. You have a certain amount of intelligence, and you really can’t do much to change it.
2. Your intelligence is something about you that you can’t change very much.
3. You can learn new things, but you can’t really change your basic intelligence.

Numeracy and Literacy: The Key Stage 2 SATS Exam is a national standardized examination in England that will be used to measure performance in numeracy and literacy for all students. This metric was selected since it’s mandatory for English students. In addition, no language translation would be necessary, which may reduce potential study confounders. American students selected for this study would complete the “SATS - Reading Writing/Maths/English” examination in first

grade (along with English students) and then complete the Key Stage 2 SATS Exam in fifth grade to allow for direct comparison of numeracy and literacy among students from different countries (Comparative ages, grades, and exams - US vs UK., 2015). Increased US recruitment of 50% higher than desired (goal of 360 American students to enroll and complete the England examination with a projected completion rate of 67%) will allow for 240 American students to complete the Key Stage 2 SATS Exam in fifth grade. The reason why this national examination was chosen is to allow for a more standardized metric to compare across countries, as opposed to report card grades. A limitation for this approach is that the test itself may confound results between English and American students to allow one group an advantage.

Procedures

The procedure would include interventions for the American fifth grade teachers (year 6 teachers in UK), along with their students. First, half of the teachers would complete an intervention designed to increase their growth mindset. The teachers in this intervention group would participate for fifteen weeks (total of 6 hours per week) and focus on developing three novel skills: 1) Designing Effective Online Instruction; 2) Introductory Conversational Spanish and 3) Painting. In addition, there would be one-hour weekly motivational lecture/discussion sessions discussing growth mindset, grit, motivation, and neuroplasticity. This would all occur prior to the school year beginning in the fall. Teachers would be compensated for their time to complete these activities at a rate of \$15 per hour (total cost for 12 teachers to be paid for the 105-hour training is \$18,900—compensation is allocated per National Institutes of Health grant). All teachers (including the group that did not participate in the professional development over the summer) would then receive additional professional development instruction (no additional compensation

dispersed) over eight consecutive weeks during the school year to integrate growth mindset strategies into their classrooms.

As for the students, this study will assess their mindset change and performance on a national standardized exam. At the beginning of the school year, all students will complete three questions to assess their mindset from the Motivated Strategies for Learning Questionnaire (MSLQ). Then, all students will receive instruction from teachers who have completed the eight-week professional development support. The only difference will be that half of the students will have teachers who participated in the additional intervention that aimed to change their growth mindset over the preceding summer. At the end of the school year, all students will complete the same Motivated Strategies for Learning Questionnaire, along with being assessed based on the Key Stage 2 SATS (all students will have completed the “SATS - Reading Writing/Maths/English” in first grade/year two). Finally, students’ mindset will be further assessed via the MSLQ at the end of the second school year to determine if they have additional mindset changes over time.

Data analysis

Mixed multilevel models will be used to reduce the confounding risk due to students’ scores potentially being correlated within individual schools. Academic performance will be controlled by adjusting the Key Stage 2 examination score. The score will be adjusted based on the change in a student's percentile rank between Key Stage 1 and Key Stage 2 examinations. This aims to reduce bias based on differences in baseline performance. Statistical significance will be assessed by using two-tailed tests at the 5% level. Effect sizes will be calculated based on adjusted mean difference between the intervention and control group. Subgroup analysis will be performed based on country (US or UK), along with student gender, to test for difference in outcomes based on assignment group (Foliano et al., 2019).

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