Dweck's Mindset Theory as Context for Service Learning

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ABSTRACT

Undergraduate students tutored elementary school children applying Dweck's growth mindset model, while a concurrent class implemented an evaluation of the program. Tutors encouraged children to adopt a growth mindset while helping with homework, especially in mathematics. Research students designed and conducted pre- and post-interviews to assess children's beliefs about mathematics achievement and growth mindset. We describe these complementary service-learning courses and offer recommendations for improving interventions and assessment in a service-learning context.

Keywords: tutoring, engaged scholarship, partnerships, growth mindset

Bringle et al. (2016) argued that a greater integration of service learning into the psychology curriculum would advance the APA Guidelines for the Under-graduate Psychology Major 2.0 (2013), the most relevant being (1) developing knowledge and applications of the subject area, and (2) ethics and social responsibility. Meta-analyses have revealed that the benefits of service learning map onto both of these goals with documented gains for academic performance and civic engagement (Celio et al., 2011; Conway et al., 2009).

We capitalized on these benefits by designing two psychology courses, one in which students implemented a service-learning program and a concurrent course in which students assessed the efficacy of the program. Our objectives included the APA Guidelines listed above, plus an additional guideline, scientific and critical thinking. In the service-learning literature, this goal is described under the rubrics "scholarship of engagement" or "participatory community action research" (Bringle et al., 2016). We hoped that engaged scholarship would serve the dual function of enriching students' understanding of research methods and ethics, while also providing data about the benefits of service learning for our community partners.

The bidirectional nature of service learning underscores the need to document benefits to community partners (Bringle et al., 2016; Simon, 2017). Rinaldo et al. (2015) reported that these benefits are usually measured by self-report satisfaction scales and that community partners generally describe benefits that are both tangible (e.g., volunteer hours) and intangible (e.g., support for their mission). Karasik (2020) surveyed community partners from diverse agencies about the perceived benefits and challenges of working with service-learning students. The primary benefits to the agencies were additional staffing and the fresh perspectives that students provided. The agencies reported that students aided the communities they served by acting as role models but expressed the need for faculty to communicate effectively with the agencies and to prepare students adequately for the service experience.

Researchers using objective assessment have reported benefits to community partners across various disciplines (Hernandez et al., 2014; Vizenor et al., 2017). For example, Eppler et al. (2011) found bidirectional

benefits for college students tutoring elementary children. Service-learning students gained in self-esteem and coping skills, and, concurrently, children's reading scores correlated positively with the amount of tutoring.

Our service learning courses were embedded in a particular theoretical context, Dweck's mindset theory (Dweck, 1999; Yeager & Dweck, 2012). Students gained a deep understanding of one psychological theory, its applications in a community setting, and developed the research skills necessary to assess the impact of this application. Undergraduate psychology majors (hereafter referred to as "tutors") studied and applied Dweck's theory to tutoring in an after-school program serving elementary children from low-income neighborhoods while a second group ("research students") assessed whether the tutoring was effective. The courses met independently as students pursued different tasks. Both groups received a general orientation from the organization, interacted with the children and staff throughout the course, and engaged in final reflection with the community partners at the end.

We had worked with this organization for 10 years, initially emphasizing the development of reading skills. The tutors encouraged the children to adopt a growth mindset, albeit on an informal basis. Through our discussions with the staff over time, we realized that the children easily became frustrated with challenging academic work and that more deliberate growth mindset instruction could be beneficial.

THEORETICAL CONTEXT

Dweck's (1999; Yeager & Dweck, 2012) growth mindset construct has been linked to academic success and resilience in the face of challenge. Students who believe that intelligence grows with learning (growth mindset) tend to approach academic challenges by working harder and trying new strategies. In contrast, those who believe that intelligence is a stable entity (fixed mindset) are motivated to prove their intelligence, and when challenged, doubt their ability and opt for easier tasks to avoid failure. Parents' and teachers' praise plays a key role in determining mindsets (Gunderson et al., 2018; Mueller & Dweck, 1998). When praise is focused on ability and completing a task quickly and easily, this promotes a fixed mindset. In contrast, praise focused on effort and persistence in the face of challenges promotes a growth mindset.

We chose to emphasize mathematics because a growth mindset predicts higher levels of mathematics achievement (PISA, 2012). Many of the children in this program achieved below grade level and exhibited a fixed mindset in several ways. For example, the staff expected them to attempt their homework independently for 5-10 minutes before asking for help. Many children simply waited during this period and asked for help as soon as they were allowed. They often made remarks like, "I don't know how to do this," "I'm not good at math," or "This is too hard," and some shut down when they became frustrated. Finally, interventions have successfully increased growth mindset and improved mathematics performance. Blackwell et al. (2007) combined lessons about brain science with the message that effortful learning increases intelligence. Seventh graders who received the intervention improved both in positive motivation and mathematics performance.

Boaler (2016), applying Dweck's model to mathematics education, prescribed evidence-based practices to promote growth mindset in mathematics, including setting high expectations by (1) providing complex problems that require flexible thinking as opposed to rote memorization (e.g., timed multiplication tests) or application of a simple algorithm (e.g., area = base x height), and (2) teaching persistence by encouraging children to devise new strategies to solve challenging problems. Following the approaches of Dweck and Boaler, we aimed to foster a growth mindset and encourage the view that, with effort, anyone can acquire a deep understanding of mathematics.

COURSE DESCRIPTIONS

Field Experience Course

The tutors read and discussed articles describing Dweck's theory, intervention research, and applications of the theory to mathematics. Students tutored first through fifth graders one afternoon a week at the after-school program run by a nonprofit community organization. The tutors delivered growth mindset messages, stressing that challenging mathematics problems increase intelligence. They emphasized that making mistakes is a constructive part of the learning process and not a cause for embarrassment or discouragement. They encouraged children to persist with difficult problems and try new strategies, and they praised children for effort ("That was a hard problem. You really stuck with it.") rather than for ability ("You're so good at this. You're really smart!"). After assisting with homework, tutors introduced mathematics activities adapted from Boaler's YouCubed (2015) website. We gave third through fifth graders, who had been using flash cards to increase speed in multiplication facts, an alternative set of cards with multiple representations of facts (e.g., 7 x 7, 49, a 7 x 7 array of dots, 7^2) to promote fluency defined by flexibility rather than speed. Role-playing games based on the book *Mouse Counts* (Walsh, 1995) strengthened first graders' number sense.

The tutors also planned and conducted a Brain Fair, inspired by the success of Blackwell et al.'s (2007) intervention. They delivered short lessons on brain anatomy and function and related neuroscience to a growth mindset. Then they devoted an afternoon to games and activities illustrating various brain structures, including the cerebrum, hippocampus, prefrontal cortex, amygdala, and brain stem. For example, a response-inhibition game introduced the prefrontal cortex and the development of executive function and self-control. Children also played a charades game identifying and discussing emotions to introduce the amygdala and the notion of emotional intelligence. Although each activity emphasized the principle of positive brain growth, the children were sometimes more interested in changes that result from traumatic brain injuries, such as the tamping iron piercing Phineas Gage's brain (Fleischman, 2004).

The tutors discussed readings by Dweck, Boaler, and others in class. During discussions and in reflection papers, they related the readings to their tutoring experiences and their own academic growth and personal development. They shared these reflections with the community partners at the end of the course.

Directed Research Course

Our community partners expressed interest in documenting the benefits of the after-school program. As a first step in this direction, we devised a plan to assess changes in the children's fixed and growth mindsets across the school year. Undergraduates enrolled in a directed research course developed and conducted pre- and post-test interviews with the children designed to measure whether the children absorbed the growth mindset message and if they modified their attitudes toward mathematics. The research students expanded their knowledge and skills in psychology research and gained first-hand experience with the challenges of doing research in an applied setting. They assisted with all phases of the project, including developing the measure, conducting interviews, coding, and analysis. To ensure that the children felt comfortable during the interviews, the research students spent time with them, helping with homework. The research students were kept blind to the nature of the intervention and the tutors were not told the purpose of the research.

The fall research students developed the interview protocol and learned about cognitive development (writing age-appropriate questions), interviewing techniques, and ethics in research (completing the IRB ethics training). The spring research students followed the same syllabus, but used interview questions written the previous semester. After

conducting interviews, the research students transcribed children's responses and developed a coding system for open-ended responses. They then coded the data and established reliability through discussion and resolution of disagreements. All research students kept notebooks throughout the semester that included summaries of articles, ideas and questions sparked by the readings and working with the children, and reflections on tutoring and interviewing. They also shared their reflections with the community partners.

FINDINGS

The interview questions focused on children's growth versus fixed beliefs about mathematics ability (e.g., "Do you think that anyone can be good at math?," "Do you think if someone is not good at math right now that they can get better at it later?," and "What do you think it takes to be good at math?"). Based on their overall answers, the children were classified as having either a fixed or growth mindset. We did this separately for the pre-test and post-test interviews for the 27 children who participated in both interviews. Use of these data for the current paper was approved by our Institutional Review Board.

The children had some familiarity with the concept of growth mindset, as nearly two-thirds were classified as having a growth mindset on the pre-test, and there was an increase over the school year from 63% on the pre-test to 70% on the post-test. Correspondingly, those classified with a fixed mindset decreased from 37% to 29%. McNemar's non-parametric test for repeated measures revealed that these differences failed to reach statistical significance (Siegel & Castellan, 1988), likely due to the limitations that this was a small sample with a wide range of ages. Another issue was that the children already expressed a strong growth mindset at the beginning of the study. Most teachers believe that it is important to incorporate a growth mindset message into their classrooms but feel that they need more training in how to do so (Blad, 2016). Thus, the children had probably heard growth mindset slogans at school but perhaps had not internalized the messages in a way that impacted behavior. We noticed that the children sometimes contradicted themselves, agreeing that they could get better at math by trying harder (growth mindset), but then later saying that they did not like math because it is too hard (fixed mindset), both within the same interview session. Observations during tutoring described earlier, such as immediately asking for help, further demonstrate that the children had not internalized the mindset message.

Recommendations

In light of these disappointing findings, we naturally want to develop a more effective intervention. To that end, we are focusing on two aspects of intervention that would be relevant to any service-learning project: duration of intervention and outcome measures. Our initial impulse was to "double down" on the program, providing more frequent and longer messages and extending them to the parents and staff. This was misguided. Yeager and Walton (2011) concluded that brief interventions can be powerful in altering mindset and improving academic success for students in middle school through college, but that explicit repetition of the growth mindset message runs the risk of leaving students feeling that they are being targeted and in need of help. By extension, we realized that aiming the message at teachers and parents might imply they were doing something wrong. Yeager and Walton describe brief, "stealthy" interventions that impact mindsets without making students feel targeted. Our interventions, challenging mathematics problems, effort praise, and the Brain Fair, were based on empirical findings and seemed to be a natural part of the tutoring process, without focusing explicitly on children's mindsets.

In future semesters, we want to turn our focus to the quality of the tutor-child interactions, particularly to the message conveyed by effort praise. Children may interpret the message to "try harder" as evidence that they lack ability, especially if

they are low achieving students. Tutors need to combine effort praise with high expectations for performance. They need to express not only approval for effort but also for trying different strategies that lead to successful problem solving. We will have tutors read and discuss research related to this issue and check the fidelity of our messaging with more structured observation of the tutors interacting with children (Amemiya & Wang, 2018; Dweck, 2015).

We also need to broaden our measures by including more formal observation of the children's behavior (e.g., persistence with challenging problems, spontaneous comments while working on homework, how and when they ask for help, and academic performance) in addition to self-reported mindset beliefs. We hope these behavioral measures will reveal insights into how we can help children absorb the mindset message in a way that enhances their persistence and problem-solving strategies.

Whereas Dweck has demonstrated the positive effects of growth mindset on young children, intervention studies have been limited to students ranging from middle school to college. We are in uncharted territory with elementary children and will need to continue to look at outcomes to identify the most effective program.

DISCUSSION

Both classes gained skills and knowledge that dovetailed with the APA guidelines for psychology majors. Our tutors mastered a key theory of motivation and learned how to apply it in a community setting. The research students read and discussed research, and used that information to design and implement an assessment. Both classes developed ethical and social responsibility. The research students completed IRB ethics training, and the tutors read about and discussed issues related to equality of educational opportunity. And through their service, both groups gained first-hand knowledge about the challenges faced by these youth and the community agencies that serve them.

Reciprocally, the community organization benefited from our involvement by the quantity and quality of our tutors. Each tutor provided 30 hours of tutoring across the semester and provided fresh perspectives for the agency. The lead teacher indicated that the staff enjoyed working with the tutors because their interactions with the children reflected a strong belief in the growth mindset as they encouraged the children to talk through homework problems and to believe that hard work pays off. She appreciated the Brain Fair because it tied together lessons that the children were learning in school and in the after-school program. She mentioned that the staff had learned ways to communicate growth mindset messages, to use praise more effectively, and to avoid expressing negative attitudes about mathematics, reflecting Karasik's (2020) finding that agencies benefit from the fresh perspective of service-learning students. Finally, the tutors, some of whom were first-generation college students from socioeconomic levels similar to the children, modeled that it is possible to overcome challenges and achieve academic success.

The agencies Karasik (2020) surveyed expressed concerns about student preparation. In our weekly class meetings, our tutors were instructed in growth mindset as well as tutoring skills, mathematics education, curriculum resources, and behavior management. Karasik also emphasized the importance of communication and mutual respect between faculty and the agency. We worked closely with the staff of the program. They met with us before the year began, provided an initial student orientation, closely observed the students during tutoring, and met with them at the end of the course. As instructors, we communicated often with the staff to ensure that we were meeting the goals of the organization and were sensitive to their values. One of us was onsite most days. Nonetheless, due to the time constraints, we agreed that communication and coordination are continuing challenges for the future.

Throughout our collaboration, our partners have ensured the success and longevity of this partnership by taking a personal interest in our students and investing time in them. The staff saw their role as providing support and feedback to help the students develop professionally and personally. Tutors often reported that the organization became like a family that provided them emotional support. A successful partnership relies on an organization that values service-learning students and is committed to supporting them. Communication and commitment on both sides enhances the value of service learning for students and for community partners.

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