Embarking on Action

Catherine M. Brighton

anice Templeton, a 6th grade math teacher at Marshall Middle School,¹ is worried about her students. Marshall's students come from a wide range of ethnic and economic backgrounds and present highly varied academic needs. Some of Janice's learners readily engage with math content, but others are singularly uninterested in studying math and aren't mastering basic concepts. These disengaged students are predominantly female, black, or English language learners.

Janice worries that this pattern of disengagement fits in with the underrepresentation of females and minority groups in high-level math at the high school and college levels. She's been reflecting on reasons for this problem and the steps she, as a middle-grade teacher, could take to stem the attrition of underrepresented students from math classes. But she feels unclear on what steps or changes will be most productive.

It might seem that this teacher is in an unenviable position because she's unsure what to do next. In fact, as a teacher who has identified a specific area of classroom practice that warrants additional inquiry, Janice is in an excellent position to embark on an action research study. Action research is a reflective, systematic inquiry that focuses on a relevant problem in teaching or learning for the purpose of enacting meaningful change to address that problem.

Action research is distinct from other research designs in that it emerges from stakeholders themselves. Like other types of empirical research, action research has clear procedures that practitioners must follow, albeit more fluidly, to arrive at sound conclusions. Let's look at how Janice's action research project exploring how to better serve her underachieving students used tools common to action research and progressed through the seven basic steps of the action research process.

Step 1: Identify a Focus

Action research can be done by one practitioner or in collaboration with others. Kurt Lewin, often called "the father of action research"² identified three models:

■ First-person action research usually involves one teacher studying his or her own classroom to better understand his or her own behaviors, attitudes, practices, or context. The



goal is often personal change.

■ Second-person action research is collaborative and aims to better understand the issues or phenomena of a group. The goal of second-person action research is often to improve the dynamics of a group of interrelated individuals, such as a teacher team.

■ *Third-person action research* studies a phenomenon or issue more globally to develop a generalization about the issue's causes or the effect of solutions across varied settings.

With any of these models, the first step is simple: Identify an

Research

You know what's amiss in your students' learning, but not how to make it right. You're not stuck; you're ready for action research.

area of teaching or learning that you are concerned about. You should then become more familiar with this topic, focus on a specific issue that is causing problems with your practice, and specify the research question that will guide the study.

Janice's focus emerged over several months as she watched specific groups of students disengage. She noticed many girls hesitating to answer questions aloud during discussions and avoiding exploration and risk taking in independent assignments. She noticed that many students who had attended Eastside Elementary-many of whom were black, Hispanic, or from low-income families-seemed to completely tune out each day's lesson. She watched the pattern of decreasing homework completion, increasing apathy toward class activities, and escalating off-task behaviors spread in segments of her classes.

To gain more insight into the concept of math disengagement, Janice read articles from education journals, spoke with other middle school math teachers, and joined online discussion groups. She attended an institute on differentiating instruction in mixed-ability classrooms, which gave her practical ideas for how to set up a classroom more focused on authentic tasks.

Through this information gathering, Janice gained a wider view of the issue and formulated two questions: Why do



students from underrepresented groups frequently disengage from studying math? and What specific strategies increase students' willingness to study math?

She enlisted the help of other math teachers within her district. Because she noticed that students who had come from Eastside Elementary were particularly disengaged, Janice contacted 5th grade teachers there for their insights. She invited teachers from the high school to join the discussion. Most colleagues she contacted were eager to participate, and a core group agreed to meet every two weeks to investigate the issue of math disengagement and demographics, which gave Janice's inquiry elements of second-person action research.

Step 2: Develop a Plan of Action

The teacher formulates a plan, laying out what actions and measurements to take and what data to gather at various points—and who will do which tasks. Because the lineup of specific tasks may change as any project gains traction, this plan should include both tasks tied to specific classroom practices and goals connected to examining the issue in general.

Janice created a time line detailing when—over the course of a five-week unit on probability and statistics—she planned to collect information about students' perceptions of math and mastery of math concepts and when she anticipated that students with differing readiness levels would need to have guidance and support embedded in lessons. She knew that some students easily transferred data from numerical to graphical representations, for example, whereas others struggled mightily. So she planned lessons for both groups.

To create differentiated lessons tied to the same overarching learning goals, Janice looked over the 13 skills and objectives for this unit listed in the state standards and extracted four generaliza-



tions to guide the unit:

Data can be represented in multiple forms.

■ The functions of fractions, decimals, and percents are interrelated.

• Specific sampling strategies increase how well any findings can be generalized to a population from a smaller sample.

 Researchers can make effective predictions by following systematic procedures of probability and sampling.

Janice used these foundational principles to develop lessons that she hoped would increase student engagement and understanding of math.

The research team discussed how to begin the unit in an authentic manner. pointing out situations in which students might need to understand probability and statistics, such as in reporting sports players' achievements. Participants identified skills within the unit for which students' readiness levels varied widely, so that some would need more support and others would need opportunities to extend their learning. Together they designed a preassessment that enabled Janice to gather data on her students' attitudes, experiences, and familiarity with the skills she was about to teach.

To make this assessment nonthreatening, they designed it as a puzzle and gave it to students to complete well in advance of beginning the unit. Students matched puzzle pieces containing key vocabulary with pieces containing appropriate definitions and matched word problems with their corresponding solutions. Students also identified their favorite hobbies and interests.

The first differentiated lesson Janice developed focused on understanding, creating, and using tree diagrams to determine probability in a given situation. The lesson involved group work and offered students a choice of participating in one of three groups connected to their reported interests. One activity situated the question within the context of race cars. This group designed a tree diagram for all the possibilities (and therefore the probability) of race cars with various body styles, colors, and accessories. Another posed a scenario from the fashion industry ("Calculate the probability of two models wearing the same combination of fashion accessories when each is provided the same limited options for headwear, shirts, and shoes"). A third tapped into students' interests in pets.

Members of the research team were committed to observing Janice teach this lesson and other newly designed lessons within the unit, and they helped her determine how to assess what students had learned through these lessons.

Step 3: Collect Data

At key points in the project, the teacher gathers the data identified in the action plan. As with other types of research, the findings will be stronger if the researcher examines multiple types of data.

Janice collected student artifacts from all her learners, including preassessments of students' math skills, interest inventories, and work samples. Other artifacts included exit cards (containing each student's answer to an ungraded question used to check for understanding) and student products created as part of an end-of-unit performance assessment. As the unit progressed, she discussed these artifacts with her research team. Her colleagues helped her use insights she gained from examining student work to shape how she embedded students' interests within subsequent lessons.

Janice also used her personal reflections as data. While she planned and taught the new lessons, she kept a reflective journal noting which students sessions, she also collected and acted on student feedback about the new instructional approaches. Feedback revealed that although many students liked working in groups (and she noted which ones those were), others yearned for the opportunity to work on tasks by themselves.

Step 4: Organize the Data

Only a highly systemized method of organizing the volume of data gathered

The action research process facilitates meaningful teacher change.

showed increasing engagement and skill (and which strategies fed such improvement) and which learners still languished. After the tree diagram lesson, she wrote,

It was invigorating to have students work actively in teams of their choosing. The noise in the room was productive but lively, and students seemed much more invested in the study of math than they have been in recent days! The topics seemed to align well with their interests, and they all got involved. However, I have the nagging sense that some students aren't as challenged as they could be, so I need to go back to the team and get new ideas to extend the learning for those who are ready to go.

Janice noticed patterns in content and activities that students preferred. She found herself brainstorming additional ways she could tap into these preferences throughout the year.

Peer observations and student interviews rounded out the data gathering. Janice's team members visited her classroom, observed her guiding the newly developed lessons, noted students' responses, and shared their observations, which Janice recorded. These alternative perspectives to her recollections of how lessons transpired strengthened the validity of her findings.

Through informal focus group

during an action research project will reap the project's full benefits. This organizational system must be efficient, practical, and protective of sensitive or confidential information about specific students. Janice used only the students' initials and school identification number when she shared test scores during her team's sessions. She created a spreadsheet with cells such as pre-test score, interest areas, proficiency level, exit card score, and post-test score to reveal patterns across students and class sections. She calculated average scores for classroom tasks and plotted them on a chart, noting where clusters of students formed to inform her flexible grouping configurations.

Step 5: Analyze the Data and Draw Conclusions

This step of the process is ongoing as the teacher researcher continues to collect data. Use whatever analytic methods are appropriate to the research question(s)—both qualitative and quantitative—to interpret data. This step may require additional collaboration with guidance counselors, assessment specialists, or others within the school district who have expertise.

Janice and her team put their heads

together to analyze the individual data components and discern a pattern across data sources. They laid out student work samples and discussed what these artifacts brought to light in combination with Janice's self-reflections and peer observers' notes. This closer look at the data indicated that tapping into students' interests increased their willingness to engage in math activities and consequently their achievement on the probability and statistics unit's post-test.

Engaging students was the first step: Once a tie-in to their interests got learners actually attending to what Janice was teaching, they followed a series of steps that led to the end result of more solid learning. Students who were more actively involved in lessons during the unit were more willing to ask questions of one another and the teacher when they encountered difficulty, and those who asked such questions and posed alternative answers or ways to solve whole-group questions subsequently showed greater understanding of content as measured by exit cards, performance assessments, and pencil-and-paper tests. Also, students who had the chance to work in small groups on a shared task were more willing to discuss their mathematical thinking.

The team concluded that designing new lessons and strategies to tap into students' interests increased all students' understanding of the math topics under investigation, including formerly resistant or struggling learners. They believed the project supported the hypothesis that students must first be engaged before they are willing to persist and achieve.

Step 6: Disseminate Findings

Janice and her team first shared their preliminary findings with the administrators at Marshall Middle School. They discussed the overarching principles of tapping into students' interests to boost their zeal for math and punctuated these insights with anecdotes from Janice's journal and her peers' observations of these principles in action.

To put a human face on how the project threaded math skills into students' life pursuits in a way that ignited learning passion, they described José, a quiet young man, largely uninterested in math in September. When Janice created probability lessons formulated around his passion for race cars, José opened up and shared with his classmates in math. For one marketing project, students collected survey data on classmates' perceptions and displayed their findings in an appropriate format. José selected the topic of students' interest in competitive racing. When faced with the challenge of skewed results, he successfully tackled the sophisticated technique of purposeful sampling.

School leaders were intrigued and suggested that the team share its findings at a professional learning community

meeting that was investigating curriculum reform within the district.

Step 7: Develop a New Plan of Action

Ideally, the action research process results in the discovery of new information about improving learning conditions. Once this new information is acquired, the action researcher makes decisions about how to change practices to include this new learning-or whether to launch additional investigation. Janice and her team elected to revise additional math units to incorporate more avenues for students' interests.

Action Research and Teacher Growth

The action research process facilitates meaningful teacher change. The first two steps Janice Templeton took-identifying a problem and developing a plan

of action to investigate it-were necessary precursors to deep changes in her approach and effectiveness with learners like José.

Janice moved beyond harboring an intuition that something needed to shift to capture tuned-out learners to reaching data-supported conclusions that ultimately changed her conceptual frameworks about teaching. She not only helped students in one school district cultivate a taste for math but also grew in her understanding of how to confront achievement gaps. 🗉

'All names in this article are pseudonyms.

²Lewin, K. (1958). Group decision and social change. New York: Holt, Rinehart. Winston.

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