**Prosocial and Active Learning (PAL) Classrooms**

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# Prosocial and Active Learning (PAL) Classrooms - Narrative

## A. Significance

### A1. Overview

Gainesville R-V School District, the Curators of the University of Missouri Special Trust, and eMINTS National Center propose the *Prosocial and Active Learning (PAL) Classrooms* project to address **Absolute Priority 1 – Demonstrates a Rationale** and **Absolute Priority 2 – Field-Initiated Innovations – General.** The project is designed to improve student achievement and social skills in primarily **high-poverty, rural** schools.

Active classrooms that are technology-rich, collaborative, and problem-based enhance student learning. However, a persistent educational challenge is that such active-learning classrooms may overtax social skills of high-need students. This project will develop a model that promotes teacher competency in creating active learning lessons while also increasing student prosocial behavior. The project will provide one year of comprehensive professional development (PD) and in-classroom support for teachers. The model will be generalizable to all grades and subjects, but this project will focus on **5th grade mathematics and science**. The project will reach about 120 teachers and 2,520 students in rural, Title I schools in Missouri.

### A2. National Significance of the Proposed Project

The Every Student Succeeds Act calls for 21st Century classrooms where students collaboratively use technology to solve problems using higher-order thinking. Such learning is increasingly required for careers in a global economy that uses teamwork (Nagaoka et al., 2013). Students today face complex problems (e.g., energy shortages in a warming earth) yet have unprecedented opportunity to solve these problems with technologies that offer "ubiquitous information, at unlimited speed, about everything, everywhere from anywhere" (Wesch, 2010).

**A2i. Technology-rich, Collaborative, Problem-based Learning Promotes Achievement.** Problem-based learning (PBL) is a student-centered lesson format in which students learn about a topic (e.g., environmental science) through the experience of solving authentic, open-ended problems (e.g., what causes parts of our city to flood?) that emphasizes students' reasoning as they construct their own learning. PBL increases retention of content, critical thinking, engagement, enhanced problem solving, and increased self-direction (Dochy, Segers, van den Bossche, & Gijbels, 2003; Hung, Jonassen, & Liu, 2008; Roseth, Johnson, & Johnson, 2008). Technology facilitates deep learning with PBL by providing an avenue for discovering and presenting interesting problems, up-to-date information, tools for collaboration with experts and peers, and access to real audiences (Johnson, Adams-Becker, Estrada, & Freeman, 2015). Teachers in *PAL Classrooms* will design lessons for students to work in teams to solve complex, ill-structured problems for which no solution method is obvious (Hung et al., 2008); problems will be in students' zone of proximal development so that the tasks are challenging but not overly difficult. Students in *PAL Classrooms* will use Chromebooks® to access the PBL website, find and organize relevant information, collaborate with others inside and outside of the classroom, create products, and communicate ideas (Blumenfeld et al., 1991).

**A2ii. Technology-rich, Collaborative, Problem-based Learning Challenges Students' Social Skills**. Despite the advantages of technology-rich, collaborative problem-based lessons teachers resist using such lessons because **too many students lack the social skills that such lessons require,** such as cooperation, encouragement, turn-taking and supportive helping (Goodnough & Cashion, 2010; Holbrook & Kolodner, 2000). As many as 2/3 of elementary students may lack such social skills (Ladd et al., 2014). Teachers express frustration in terms

such as "my students are too immature" or "my students need more structure." They mistakenly view social skills as unmalleable.

Teachers can help students develop the prosocial behavior that makes collaborative problem-based learning effective. In one study, 9- to 13-year-old girls were trained to be prosocial group-work partners and then paired with boys who had behavior problems. The boys' behavior improved as they learned to cooperate with their prosocial partners (Watkins & Wentzel, 2008). In another study, high-poverty schools narrowed the achievement gap when good instructional practices were combined with prosocial behavior during group work (Ladd et al., 2014).

Some students—high-poverty, male, and ethnic minority—may particularly benefit from *PAL Classrooms* because they disproportionately experience harsh discipline. From preschool through high school they are more often referred for minor offenses, severely punished, and suspended than other students, even for similar infractions (Bradshaw, Mitchell, O'Brennan, & Leaf, 2010; Okonofua, Walton, & Eberhardt, 2016). Subgroup differences in discipline is a persistent national challenge known as the "discipline gap." Harsh, exclusionary discipline removes students from opportunity to learn at school, which leads to lower achievement and higher probability of dropping out (Noltemeyer, Marie, McLoughlin, & Vanderwood, 2015), magnifying the achievement gap. It also undermines school climate (Lamont et al., 2013) and may explain why high-poverty students tend to be less engaged in the classroom (Marks, 2000; Skinner, Kindermann, & Furrer, 2009; Z. Wang, Bergin, & Bergin, 2014). It jeopardizes teacher-student relationships, causes resentment and anger, results in less compliance over the long run, and does little to teach appropriate behavior (Epstein, Atkins, Cullinan, Kutash, & Weaver, 2008; Romi, Lewis, Roache, & Riley, 2011). One root cause of the discipline gap is that often students

want to behave well, but don't know how, and teachers don't know how to help them replace antisocial behavior with prosocial behavior (Epstein et al., 2008; Greene, 2011). *PAL Classrooms* will help teachers learn strategies to promote prosocial behavior among high-need, rural students. It will do so in a learning format that challenges students' social skills.

**A2iii. Need for High-quality Mathematics and Science Instruction in 5th Grade**. We focus on mathematics and science due to a national emphasis on the STEM pipeline. According to the most recent NAEP assessment, only 40% and 38% of 4th graders were proficient in mathematics and science, respectively. Students in impoverished, rural districts are at-risk for low achievement due to diminished access to high-quality education in mathematics and science (Assouline, Ihrig, & Mahatmya, 2017). Furthermore, students in free and reduced lunch programs consistently score lower across time in mathematics (Reamer, Ivy, Vila-Parrish, & Young, 2015). *PAL Classrooms* will promote students' mathematics and science achievement through improved instruction and positive learning climate.

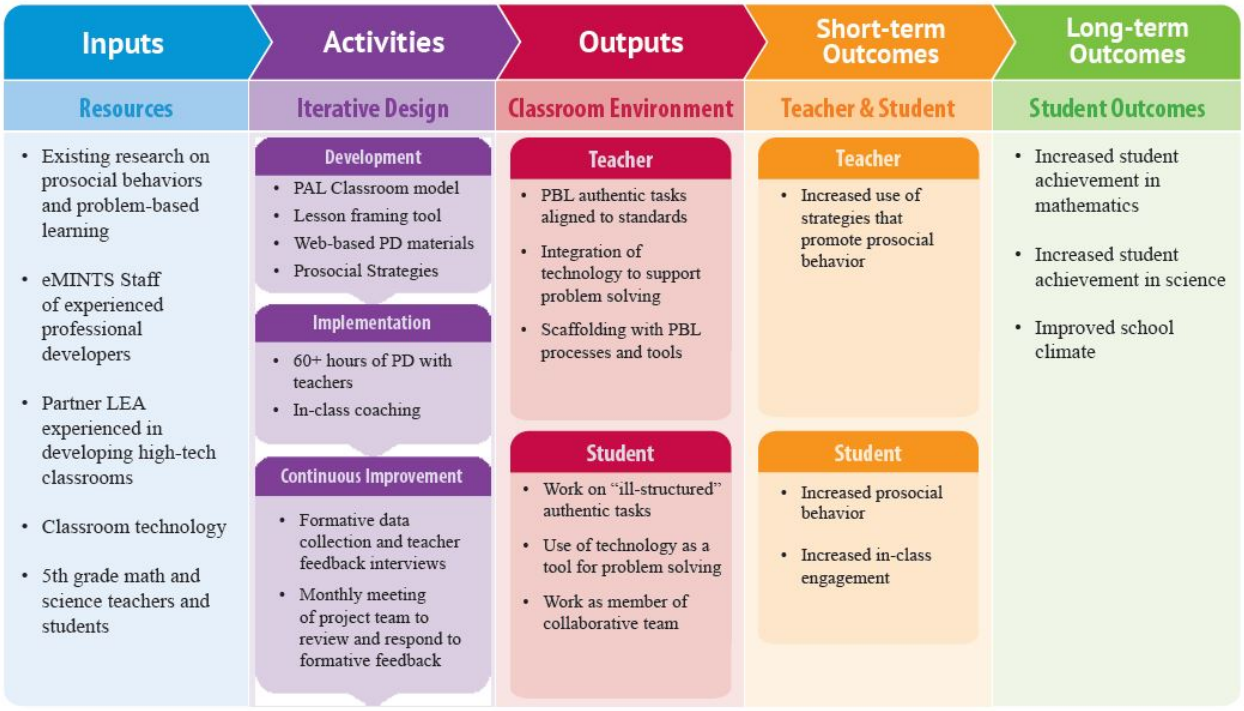
We focus on 5th grade because students at this age (1) are able to think abstractly, problem-solve, and argue logically during PBL and (2) are at the critical juncture between elementary and middle school. This juncture is linked to a dip in prosocial behavior (Bergin, 2014) and rise in bullying (Grunbaum et al., 2002; Nansel et al., 2001), as well as less school bonding, less interest in school, less extracurricular engagement, and lower grades (Juvonen, 2007; Skinner, Furrer, Marchand, & Kindermann, 2008), suggesting it is an age that would benefit from *PAL Classrooms*.

## A3. Promising New Strategies

**A3i. Logic Model.** Our logic model (Chart 1) depicts how developing *Prosocial and Active Learning (PAL) Classrooms* will help teachers acquire tools to promote students'

prosocial behavior, which is expected to increase engagement and create a positive classroom climate. As students develop more positive relationships with each other, enjoy working as a team and are successful problem-solvers, they learn more. Research supporting key linkages in our logic model is described next.

**Chart 1. *PAL Classrooms* Logic Model**




## A3ii. Rationale and Research Base for Logic Model.

***A3iia. Prosocial Behavior Predicts Engagement and Achievement***. Prosocial behavior is defined as any behavior that builds relationships and fosters others' well-being, such as sharing, helping, complimenting, and encouraging. Prosocial students tend to have higher achievement and engagement compared to peers (e.g., Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Galindo & Fuller, 2010; Miles & Stipek, 2006). Furthermore, students who have prosocial *classmates* tend to have higher grades (Griffith, 2002; Jia et al., 2009). For example, in one study 3rd to 6th graders' GPA was more strongly predicted by whether

classmates were friendly than teachers' instructional practices (Griffith, 2002). In two other studies, 5th- and 6th-graders who felt supported in a positive classroom had higher achievement and engagement (Pianta, Belsky, Vandergrift, Houts, & Morrison, 2008; Reyes, Brackett, Rivers, White, & Salovey, 2012). K -12 programs that increase prosocial behavior also raise achievement (on average 1/3 standard deviation), *even when there is not an academic component to the program* (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

Prosocial classrooms may be especially beneficial for high-poverty students (Griffith, 2002; Hoglund & Leadbeater, 2004). Impoverished students who are prosocial have higher grades and test scores compared to their less-prosocial impoverished peers (Bergin, 2014; Bierman, Torres, Domitrovich, Welsh, & Gest, 2009; Wentzel, 1993). Positive school climate can mitigate the negative effect of poverty on academic achievement (Berkowitz, Moore, Astor, & Benbenishty, 2017).

Why might prosocial behavior be linked to academic achievement? Prosocial behavior improves students' learning and engagement and reduces antisocial behavior (e.g., Epstein et al., 2008; Harel-Fisch et al., 2011; Kowalski, Giumetti, Schroeder, & Lattanner, 2014). Students who have prosocial classmates feel greater motivation, engagement, and social support for learning (Z. Wang et al., 2014; Wentzel, 2006). Students who are prosocial themselves show interest in schoolwork, work independently, take turns, listen, and stay on task (Bierman et al., 2009; McClelland & Morrison, 2003). They are also more likely to be calm, happy, well-liked, and socially connected in the classroom (e.g., LaFontana & Cillessen, 2002; Raposa, Laws, & Ansell, 2016).

***A3iib. Teacher Strategies that Promote Student Prosocial Behavior.*** Prosocial behavior is malleable. Training to become more prosocial can increase students' ability to work

harmoniously with others during PBL and their sense of belonging at school (Brown, Corrigan, & Higgins-D'Alessandro, 2012). Using a research-based text designed for teachers with practical suggestions and case studies (Bergin, 2018), teachers in *PAL Classrooms* will learn three strategies to promote prosocial behavior: (1) Use praise, (2) Use induction, and (3) Form positive teacher-student relationships.

Praise. Praise for prosocial behavior predicts increased prosocial behavior (Bryan, Master, & Walton, 2014; Epstein et al., 2008; Grusec & Redler, 1980; Mussen & Eisenberg, 2001). For example, in one study, the number of praise statements specific students received from their teacher in a 5-minute time period at the beginning of the school year predicted students' increased prosocial behavior several months later, after controlling for baseline rates (Reinke, Herman, & Newcomer, 2016). Despite such evidence, praise is not used effectively in most classrooms (Hardman & Smith, 2003). It is easy for teachers to get caught up in containing misbehavior rather than praising good behavior (Maag, 2001).

Induction. Use of induction during discipline also predicts prosocial behavior (Kochanska, Koenig, Barry, Kim, & Yoon, 2010; Padilla-Walker, Carlo, Christensen, & Yorgason, 2012). Induction is a type of discipline in which the teacher emphasizes reasons for obeying a directive. "Victim-centered" induction in which students are asked to focus on *others'* well-being (e.g., "Derek is angry because you took his turn …") is particularly important for training prosocial behavior (Radke-Yarrow, Zahn-Waxler, & Chapman, 1983). Induction leads to internalization of the disciplinarian's values, promotes self-control rather than other-control, and gives students information to guide future behavior while communicating caring and respect for students (Bergin & Bergin, 1999). Unfortunately, power assertive discipline, in which teachers emphasize power or resources to control students, is common in classrooms. In contrast to

induction, power assertion undermines prosocial behavior and may increase antisocial behavior over time (Bender et al., 2007; Coie & Dodge, 1998; Epstein et al., 2008).

Positive teacher-student relationships. Students with positive teacher-student relationships tend to have greater prosocial behavior, higher achievement (Bergin & Bergin, 2009; Jia et al., 2009; Roorda, Koomen, Spilt, & Oort, 2011), and fewer behavior problems (e.g., O'Connor, Dearing, & Collins, 2011; M.-T. Wang & Fredricks, 2014). Students are more motivated to pay attention, cooperate, take learning risks, and work hard in classrooms where they feel cared for (Matthews, Kizzie, Rowley, & Cortina, 2010; Murray, 2009; Spilt, Hughes, Wu, & Kwok, 2012). Generally, effect size is larger for high-poverty, male, and minority students. Unfortunately, as many as ¼ of students in elementary school have a poor relationship with their teacher, especially high-need students (O'Connor et al., 2011; Spilt & Hughes, 2015), yet these are the same students for whom a positive teacher-student relationship is especially powerful (e.g., Green et al., 2008; Osterman, 2000). Teachers in *PAL Classrooms* will learn to form positive teacher-student relationships by using strategies suggested by research such as being sensitive, perceiving interests and needs, having warm interactions, behaving prosocially toward students, and respecting their agendas (Bergin & Bergin, 2009; Jeffrey, Auger, & Pepperell, 2013; Wentzel, 1997). See Appendix G for more research on these strategies.

## A4. Foundational Work

Our partner, the eMINTS National Center, has a 15-year history of delivering PD for technology-rich, PBL classrooms. The **eMINTS PD program has a What Works Clearinghouse endorsement of "Strong Evidence" for increasing student achievement,** as well as increasing teachers' use of inquiry-based instruction, integration of technology, and construction of communities of learners in a large study (Meyers, Molefe, Dhillon, & Zhu,

2015). Other evaluations of eMINTS have also documented significant increased achievement, including among high-need students based on special education status, F/RPL, and race/ethnicity (Meyers & Brandt, 2010).

Despite eMINTS' demonstrated success providing PD for technology-rich, collaborative, problem-based learning, eMINTS has found that some teachers discontinue use of PBL lessons because such lessons challenge high-need students' social skills. Thus, in *PAL Classrooms*, eMINTS PBL training will be combined with training in promoting students' prosocial behavior.

Our MU faculty partner has published a "how to" text for teachers (Bergin, 2018) and one of the only quasi-experimental studies that addresses the kind of approach *PAL Classrooms* will take (Ramaswamy & Bergin, 2009). In the study, teachers used two strategies – praise and induction – to increase prosocial behavior in a small sample of high-poverty, primarily African American preschoolers. Teachers were taught to use these strategies through vignettes, modeling, and in-class coaching over 8 weeks. The intervention groups doubled or tripled frequency of prosocial behavior, while the comparison group did not change. The proposed study will **improve and expand upon this early study by using (1) an iteratively designed, more intensive intervention, (2) a stronger research design (randomized controlled study), (3) a larger sample, and (4) an older age group**.

## A5. Exceptional Approach

Many interventions have been enacted to improve K-12 students' behavior. One publication reviewed over 200 evaluations of such programs (Durlak et al., 2011). The *PAL Classrooms* project builds upon this existing research base, yet is exceptional in five ways.

(1) **The focus is on prosocial behavior, rather than negative behavior**. Most social skills interventions emphasize eliminating negative behavior rather than promoting prosocial

behavior, yet promoting prosocial behavior tends to reduce negative behavior and increase achievement. Studies suggest that the presence of prosocial behavior better predicts school success than the absence, or presence, of negative behaviors (Bierman et al., 2009; Jones, Greenberg, & Crowley, 2015; Malecki & Elliot, 2002).

(2) **Students' prosocial skills are developed in the context of technology-rich, collaborative problem-based lessons**. This lesson format challenges students' social skills, yet is considered essential for 21st Century learning. Teachers need support to promote the prosocial behavior required for students' teamwork with the cognitive rigor of solving standards-aligned, ill-structured problems that require higher-order thinking using technology.

(3) **There is no curriculum add-on**. Most school-based social skills interventions (e.g., Caring School Community, Positive Action, Incredible Years) supplement the academic curriculum with lessons, meetings, and small group activities. These programs stress an already over-full curriculum, and tend to produce inconsistent or small to null effects (Durlak et al., 2011; Social and Character Development Research Consortium, 2010; Vincent & Grove, 2012). In contrast, *PAL Classrooms* help teachers use strategies during simple, daily interactions as they enact the regular academic curriculum.

(4) **The focus is on math and science lessons**. Many social skills interventions take place in communication arts or social studies classes (Durlak et al., 2011; SCDRC, 2010).

(5) **The focus is on changing the classroom rather than just on changing individual "misbehaving" students**. *PAL Classrooms* seek to change teacher behavior and the classroom context, which are primary factors that affect student achievement in high-poverty schools (Farrington et al., 2012; Irvin, Meece, Byun, Farmer, & Hutchins, 2011).

In summary, the *PAL Classrooms* approach is unique and unstudied, but its components

have a strong research foundation. This study will contribute to greater understanding of how to promote prosocial behavior among rural, high-need students, while also promoting active, deep learning in math and science. *PAL Classrooms* is a readily scalable project because it does not add to the curriculum and because eMINTS already has a network of PD providers across the nation (Section B4).

## B. Quality of Project Design & Management

### B1. Goals, Objectives, and Measures

Table 1 outlines the four goals our project addresses and accompanying measures: 1) Develop a replicable model of PD that helps teachers create *Prosocial and Active Learning (PAL) Classrooms*; 2) Improve teacher practices that increase student prosocial behavior in the context of technology-rich, problem-based learning; 3) Increase student prosocial behavior; and 4) Increase academic achievement.

**Table 1. Project Goals, Objectives and Measures**

| **Development and Iteration Phase (Years 1-3)** | |
|---|---|
| **Goal 1 – Develop a Replicable PD Model for Teachers to Create *PAL Classrooms*** | |
| **Objectives** | **Measures*** |
| 1.1 Develop project processes and PD materials to guide teachers to increase student prosocial behavior during technology-based PBL.<br>1.2 Prepare and implement a successful pilot study.<br>1.3 Use evaluation input to inform iterative improvement of PD. | Project records & coach logs<br>Teacher and coach interviews<br>Teacher survey<br>Classroom observations |
| **Efficacy Study Phase (Years 3-5)** | |
| **Goal 2 – Improve Teacher Practices that Increase Student Prosocial Behavior in the Context of Technology-rich, Problem-based Learning** | |
| 2.1 Intervention teachers increase their use of strategies that promote students' prosocial behavior indicated by an effect of ≥.40 SD on quantitative measures. | Teacher survey<br>Classroom observations |
| 2.2 Intervention teachers increase their use of PBL strategies, indicated by an effect ≥.40 SD on quantitative measures. | Classroom Observations |
| **Goal 3 – Increase Student Prosocial Behavior** | |
| 3.1 Intervention students increase their prosocial behavior, indicated by ≥.30 SD on the PBS. | Prosocial Behavior Scale (peer report) |

| | |
|---|---|
| 3.2 Intervention schools improve in climate and engagement indicated by an effect ≥.40 SD on the student surveys. | ED School Climate Surveys<br>Classroom Engagement Inventory |
| **Goal 4 – Increase Student Academic Achievement** | |
| 4.1 Intervention students increase mathematics achievement, indicated by an effect of ≥.20 SD on the MAP. | Missouri Assessment Program (MAP) standardized mathematics assessment |
| 4.2 Intervention students increase their science achievement, indicated by an effect of ≥.20 SD on the MAP. | MAP standardized science assessment |

* For details on measures see evaluation plan and Appendix H.

## B2. Description of Intervention

Teachers will learn to create *PAL Classrooms* through 60 hours of professional development (PD) in 10 full days and six in-class coaching visits. eMINTS has success in providing PD for technology-rich, problem-based learning (Section A4). Our project builds on that foundation, but adds PD on promoting prosocial behavior.

**B2i. PD and Coaching Structure.** The eMINTS approach to PD and coaching uses research-informed best practices. PD is intense and sustained (see below). Teachers actively experience strategies and technology to be used in the classroom and develop their own instructional materials (Garet, Porter, Desimone, Birman, & Yoon, 2001; Rushton, Lotter, & Singer, 2011). Collegial interaction during PD helps teachers make sense of learning, interpret experiences, and share ideas (Mezirow, 1997). Each PD day begins by teachers reflecting on classroom practice – sharing strategies, successes, and challenges – to build community, followed by a PBL experience, and finally creation of a PBL lesson. Over the school year, teachers create, implement, and reflect on three PBL lessons.

In-class coaching helps teachers reflect on their practice and become self-sustaining decision makers (Smith-Maddox, 1999). Our coaching model focuses on teacher reflection and promotion of self-efficacy rather than evaluative, direct feedback (Foltos, 2007). Experienced and trained eMINTS coaches will model strategies and engage teachers in planning and reflective conversations. Combining PD and in-class coaching is effective in changing teacher

practice (Koh & Neuman, 2009; Swan & Dixon, 2006).

PD and coaching will take place over a summer and the subsequent school year (10 months). In the summer, three days of PD will focus on strategies to increase students' prosocial behavior. From August to October, teachers will receive three in-class coaching visits as they practice the strategies. From October to April, six days of PD will focus on technology-rich PBL. Three additional coaching visits will support teachers as they implement their PBL lessons and continue to promote students' prosocial behavior. Teachers will share successful prosocial strategies and PBL lessons with student products at a celebration meeting in May. They will earn electronic badges for successfully completing PD (with 80% attendance) and submitting one exemplary PBL lesson. Badges are micro-credentials that can be posted on websites or blogs and carry digital information about how the badge was earned. (See Appendix H for a preliminary PD and coaching schedule.)

### B2ii. PD and Coaching Content.

***B2iia. Prosocial Strategies***. Teachers in *PAL Classrooms* will learn to promote students' prosocial behavior using an approach similar to that used in our early experimental study (Section A4), but involving more intensive PD. The intervention will focus on three strategies discussed in Section A3iib: **1) Praise prosocial behavior. (2) Use inductive discipline to correct misbehavior,** with emphasis on "victim-centered induction." This refers to (a) pointing out how a student's misbehavior affects another, (b) asking the student to imagine being the other, and (c) suggesting acts of reparation. This teaches students to focus on others' well-being and provides practice of prosocial behavior as students make reparation (Bergin, 2014). **3) Form positive relationships with students** through being sensitive, responsive, and warm; using non-coercive discipline; and supporting students' autonomy (Bergin & Bergin, 2009). Research

indicates these three strategies are effective, yet teachers do not often use them (Section A3iib). Teachers will be introduced to research on each strategy using a textbook written for teachers (Bergin, 2018). Authentic vignettes of examples and contrasting non-examples will be discussed. Teachers will be asked to generate and role play examples/non-examples in small groups.

***B2iib. Problem-Based Learning Strategies***. Teachers in *PAL Classrooms* will use a PBL lesson planning framework supported by a web-based template that embeds processes to provide a consistent approach to problem solving. The PBL process involves nine questions: 1) What's the problem? 2) What do we know about this problem? 3) How can we define this problem? 4) What do we need to know to solve this problem? 5) What information is available to help us? 6) What are possible solutions? 7) What is the one best solution? 8) How will we present and defend this solution? 9) What did we learn? This process helps students build problem-solving skills that transfer to a variety of situations (Hung, 2006).

Problem Generation. Teachers will learn to develop high-quality PBL tasks that have multiple solutions that are not evident and that emphasize student inquiry. The 3C3R model–**content, context, and connection**–informs problem generation (Hung, 2006). Problems are centered on learning standards so that students acquire **content** knowledge. Problems are complex and ill-structured so that cognitive engagement is required and students are motivated but not overwhelmed. The **context** must relate to students' lives (Duch, 2001). Teachers will use technology tools to collect student interest data to inform development of student-relevant tasks. **Connection** must be made between the content and the problem. Teachers will use a "simple to complex" approach, increasing problem complexity as the school year progresses and overlapping concepts into more than one problem (Angeli, 2002; Hung, 2006).

Learning Scaffolds. The lesson planning framework provides a variety of scaffolding

tools such as action plans, graphic organizers, note-taking tools, and formative assessments (Barron et al., 1998; English & Kitsantas, 2013). Teachers will learn to use "hard scaffolds" to help students complete challenging tasks, such as goal setting, task planning, time management, and question generation (Brush & Saye, 2002). Information literacy tools aid students in finding accurate, valid Internet resources, organizing information, taking notes, and using data to draw conclusions and support solutions (Kim & Hannafin, 2011; Simons & Klein, 2007). Teachers will also learn to use "soft scaffolds" such as coaching and questioning to promote student thinking and persistence while maintaining the task's cognitive demand (Gresalfi, Barnes, & Cross, 2012; Hmelo-Silver, 2004). To ensure learning goals are met, teacher guidance is critical, yet students will be given sufficient autonomy to increase motivation, such as developing research questions or product expectations (Hung, 2006).

Technology Tools. Participants will not be required to have prior technology experience. After introduction to Chromebooks and Google Apps, we will embed development of technology skills into instruction, modeling higher-level technology use for the classroom. Technology simplifies the design of PBL lessons, saving busy teachers valuable time. Teachers add their task and supporting web resources to the lesson planning framework with its nine supporting questions, choosing from a library of learning scaffolds, and the lesson is ready for use.

## B3. Participant Recruitment

For Years 1-2 of the development phase, six rural, high-poverty schools from among these districts will participate: Gainesville R-V (lead LEA), Cabool R-IV, Plato R-V, Dora R-III, Raymondville R-VII, Summersville R-II, and Laquey R-V (see Appendix F for rural locale codes). They are members of Southern Ozark Area Redevelopment (SOAR), which is a consortium of **rural schools in some of the 100 lowest-income counties in the nation** (i.e.,

Missouri's Ozark region), as well as the Missouri Association of Rural Education (MARE). Both SOAR and MARE support the *PAL Classrooms* project (see Appendix C for letters of support).

For the efficacy study phase we will recruit 36 additional schools in 15-20 districts. Over 50% of schools will be rural (as defined by National Center for Education locale codes) and Title I school members of SOAR and MARE. Two grade 5 teachers will be recruited from each school; they may be self-contained or subject (math and science) area teachers. Participating schools may have previous experience with eMINTS, but none of the teachers will have participated in that training.

### B4. Management Plan and Timeline

A management team of representatives from Gainesville R-V School District, eMINTS, the University of Missouri faculty, and the American Institutes of Research (AIR), will oversee project implementation, the iterative design process, and data collection. (See Appendix B for project members' resumes.) Rural Gainesville R-V School District serves 621 students; 71% are F/RLP eligible. The eMINTS National Center, a unit of the University of Missouri created in 2001, has managed over $35 million in grants and contracts including a $12.5 million grant serving over 15,000 students that led to a What Works Clearinghouse endorsement of "Strong Evidence of Effectiveness" (Section A4). eMINTS has a network of more than 325 affiliate PD specialists across 10 states certified to implement the eMINTS PD and coaching model; they have trained over 4,000 teachers. We will draw on this extensive network to recruit project coaches.

Dr. Bergin, our MU faculty lead, has received 15 grants totaling over $31 million, conducted 24 program evaluations including field-based RCTs, and is the founding research

director of the *Network for Educator Effectiveness* in which over 1,800 administrators in 270 school districts are trained annually to coach effective teaching. AIR has 65 years of experience evaluating education interventions for LEAs, the U.S. Department of Education, and other agencies. All these partners have worked together successfully for several years. In addition, Kansas City Audio-Visual is serving as a corporate partner having **already secured most of the 10% match for all five years of the grant** (see Appendix C for letter of commitment).

The project will occur over five calendar years. This allows for a planning period, two development cohorts, and two efficacy cohorts, as outlined in Table 2. The number of students served each year is specified in Table 2; **in total approximately 120 teachers and 2,520 students will be served during the grant period**. Table 3 outlines the timeline, objectives, and major activities across the five years.

**Table 2. Project Timeline**

<table>
<tr><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th colspan="2">Year 5</th></tr>
<tr><td>OCT 2018–<br>JUN 2019</td><td>JUL 2019 –<br>JUN 2020</td><td>JUL 2020 –<br>JUN 2021</td><td>JUL 2021 –<br>JUN 2022</td><td>JUL 2022 –<br>JUN 2023</td><td>JUL 2023 –<br>SEP 2023</td></tr>
<tr><td colspan="3">Development & Iteration Phase</td><td colspan="3">Efficacy Study Phase</td></tr>
<tr><td rowspan="4">Planning &<br>Development</td><td rowspan="2">Cohort 1<br>3 schools,<br>6 teachers,<br>120 students</td><td>Cohort 1 (2nd yr)<br>120 new<br>students</td><td rowspan="2" colspan="2">Cohort 3 & 4<br>36 schools,<br>108 teachers,<br>2,160 students<br>(randomly assigned to treatment and waitlist control)</td><td rowspan="2">Cohort 4<br>(control group)<br>receives PD<br>1,080 new<br>students</td></tr>
<tr><td>Cohort 2<br>3 schools,<br>6 teachers,<br>120 students</td></tr>
<tr><td colspan="3">Data Collection, Analysis & Reporting</td></tr>
<tr><td colspan="2">Ongoing Iterative Design<br>(design, pilot, test, refine)</td><td colspan="3">Dissemination</td></tr>
</table>

*Note*. Blue row is grant fiscal years and white row is grant activity years

**Table 3. Project Management Plan and Timeline for Tasks**

| MILESTONES | BEGIN - END DATES | RESPONSIBLE PERSONNEL |
|---|---|---|

| **Development and Iteration Phase (Years 1-3)** | | |
|---|---|---|
| Contact pilot districts and partners regarding grant award | 10/18 | eMINTS |
| Establish management team and set schedule of meetings | 10/18 | eMINTS MU |
| Establish project team and identify key personnel | 10-11/18 | eMINTS LEA MU AIR |
| Plan PD activities (schedule, processes, and materials). | 10/18-4/19 | eMINTS LEA MU |
| Identify participants for Cohort 1 | 3/19 | eMINTS LEA |
| Plan for evaluation, implementation, monitoring | 10/18- 6/19 | eMINTS LEA AIR |
| Hold face-to-face meetings with evaluators | Annually | eMINTS MU AIR |
| Submit project for IRB review, update annually as needed | Ongoing | eMINTS |
| Create sub-awards and scope of work agreements | 2/19-4/19 | eMINTS |
| Cohort 1: Work with districts to set up Chromebooks | 7/19-8/19 | eMINTS |
| Cohort 1: School orientation meeting | 5/19 | eMINTS LEA MU |
| Cohort 1: Teacher PD participation | 7/19-5/20 | eMINTS LEA MU |
| Formative assessment data collection | 7/19-5/20 | eMINTS MU AIR |
| Iterative improvement based on feedback | 7/19-7/20 | eMINTS MU |
| Identify participants for Cohort 2 | 3/20 | eMINTS LEA |
| Cohort 2: Work with districts to set up Chromebooks | 7/20-8/20 | eMINTS |
| Cohort 2: School orientation meeting | 5/20 | eMINTS LEA MU |
| Cohort 2: Teacher PD participation | 7/20-5/21 | eMINTS LEA MU |
| Formative assessment data collection | 7/20-5/21 | eMINTS MU AIR |
| Iterative improvement based on feedback | 7/20-7/21 | eMINTS MU |
| **Efficacy Study Phase (Years 3-5)** | | |
| Plan for evaluation, analytic models, consent, fidelity data, classroom observations, survey dates | 1/19 | eMINTS LEA MU AIR |
| Pilot measures for use in efficacy study phase | 7/20-6/21 | AIR |
| Recruit additional districts for RCT Cohorts 3 & 4 | 10/20-1/21 | eMINTS |
| Assign school buildings to treatment and control groups | 2/21 | AIR |
| Identify participants, consent | 2/21 – 5/21 | eMINTS AIR |
| Cohort 3: Work with districts to set up Chromebooks | 7/21-8/21 | eMINTS |
| Cohort 3 & 4: School orientation meeting | 5/21 | eMINTS LEA MU |
| Cohort 3: Teacher PD participation | 7/21-5/22 | eMINTS LEA MU |
| Cohort 3 & 4: Implementation and outcome data collection | 7/21-5/22 | AIR MU |
| Obtain demographic and MAP data from districts and SEA | 9/23 | AIR |
| Cohort 4: Work with districts to set up Chromebooks | 7/22-8/22 | eMINTS |
| Cohort 4: School orientation meeting | 5/22 | eMINTS LEA MU |
| Cohort 4: Teacher PD participation | 7/22-5/23 | eMINTS LEA MU |
| Cohort 4: Implementation fidelity and outcome data collection | 7/22-5/23 | AIR MU |
| Data analysis and evaluation reporting | 1/20 – 9/23 | AIR |
| **Management** | | |
| Management team phone calls | Monthly | eMINTS LEA MU |
| Evaluation team phone calls | Monthly | eMINTS MU AIR |
| Progress Reports | Annually | eMINTS MU AIR |
| Project Directors meetings | Annually | eMINTS MU AIR |

| | | |
|---|---|---|
| Dissemination of products and publications | 7/21-9/23 | eMINTS MU AIR |

eMINTS = eMINTS National Center; AIR = American Institutes of Research; LEA = Participating districts, MU = MU Faculty Partners

## B5. Feedback and Continuous Improvement

The management team will guide continuous feedback and improvement using an iterative design process. In the first half-year, we will collaborate with teachers in partner LEAs to design PD experiences and materials. Then we will field test the PD with Cohort 1. Formative data will be collected to inform project revision as discussed in Section C1. This includes project records, teacher surveys, teacher and coach interviews, and classroom observations. The management team and all key personnel will meet monthly to evaluate data collected up to that time and determine what revisions are needed. Ongoing revisions will occur. This process will be repeated with Cohort 2.

In the final two years of the grant**,** external evaluators will conduct a randomized controlled trial of full implementation with 108 teachers from 36 schools. The treatment group (Cohort 3) will receive *PAL Classrooms*, whereas the wait-list control group (Cohort 4) will not receive *PAL Classrooms* until data collection is complete. The same formative data will be collected from Cohort 3 as from Cohorts 1 and 2 and will be reviewed monthly.

## B6. Broad Dissemination

To facilitate replication in other districts nationally, a project website will feature project achievements, classroom videos and PBL units. It will share results with the general public and serve as a media hub for our diverse communications efforts, and be linked to (1) the eMINTS National Center site and (2) the Network for Educator Effectiveness site which has 270 member districts and over 550,000 page views annually from educators. Collectively our project team has significant social media reach that will feature the project via Twitter chats, Facebook posts, LinkedIn (the project directors have 500+ educator connections each) and eMINTS Google+

which has thousands of educator members. The MU College of Education communications office will disseminate project results through news releases and development of a promotional video, as well as direct contacts to state education agencies. Our project will generate rich data that will be submitted to national professional and practitioner journals, and regional and statewide publications. We will submit results for presentation to regional and national conferences where we are regular contributors (e.g., ISTE, AERA, NSTA, and Missouri STEM Coalition). The project is scalable because of eMINTS' large network of affiliate PD specialists across 10 states. The final PD model will be permanently available to educators through the eMINTS National Center's PD program. Table 4 displays grant products that will be broadly disseminated through our affiliate network.

**Table 4. Grant Products**

| Codified Processes | PD Materials and Supports |
|---|---|
| • Technology infrastructure & installation<br>• Administrator information<br>• Parent information<br>• Teacher recruitment<br>• Process and tools for gathering project feedback and teacher input. | • Finalized PD model<br>• Coach guides for 60 hours of PD on prosocial strategies and PBL<br>• Web-based participant guides<br>• In-classroom coaching guides for coaches<br>• PBL Lesson planning framework |

## C. Project Evaluation

American Institutes for Research (AIR) will evaluate the *PAL Classrooms* logic model. During the development phase (Table 2) the evaluation will provide formative feedback (Section B.5) for project improvement and evidence on fidelity of implementation in two Cohorts. During the efficacy phase the evaluation will provide causal evidence of full-scale implementation on teacher practice and student outcomes using a 2-year randomized controlled trial in 36 schools. At least 50% of participating schools will be high-need, rural schools.

## C1. Development Phase Evaluation

**C1i. Design Overview.** AIR will examine implementation of *PAL Classrooms* in Cohort 1 across 2 academic years (3 schools, 6 teachers) and Cohort 2 for one year (3 schools, 6 teachers). Mixed methods will be used to address the following research questions:

1. Does *PAL Classrooms* deliver activities to teachers as planned?
2. Do teachers participate in *PAL Classrooms* activities as intended?
3. Do teachers incorporate *PAL Classrooms* strategies in the classroom as intended?
4. How does implementation and teacher experience vary across schools and contexts?

**C1ii. Sampling Plan.** AIR will collect annual project records for all participants and biannual teacher survey data from eMINTS. For participant experience feedback, each year AIR will interview all teachers in Cohorts 1 and 2, and their coaches. For classroom practice, AIR will conduct annual observations for each teacher in Cohorts 1 and 2 in the development phase.

**C1iii. Measures**. Measures of implementation of PD activities and classroom practice are included in this phase of the evaluation. (See Appendix H for details.)

***C1iiia. Measures of Implementation of PD Activities*.** For Research Questions 1 and 2, AIR will use two measures: (1) **Project Records**. eMINTS will record the number of *PAL Classrooms* modules delivered, activities conducted, and PD hours provided to teachers. Coaching visits are documented on a validated log instrument (Martin et al., 2008; Meyers et al., 2015), which includes time spent modeling instruction, lesson planning, technology assistance, reflective practice, and problem solving. Surveys administered by eMINTS will provide teacher feedback on participation and perceived quality of the PD. (2) **Teacher and Coach Interviews**. AIR will develop a protocol to elicit input from teachers and coaches about their implementation experiences, including facilitators and barriers, that will inform areas for improvement.

***C1iiib. Measures of Teacher Practice.*** For Research Question 3, AIR will conduct **Classroom Observations**. AIR will use the Classroom Assessment Scoring System–Upper Elementary (CLASS-UE, Pianta, Hamre, & Mintz, 2012) which includes items addressing the prosocial behavior strategies and active learning, including autonomy and choice, collaboration, opportunity for higher order thinking, connection to student lives and interests, and active participation. As per standard procedures for CLASS-UE, certified observers will conduct two 30-minute cycles per observation. AIR will incorporate a prosocial behavior and active learning checklist to capture teacher practices that are not included in the CLASS-UE. AIR will adapt an existing checklist protocol used successfully in a prior evaluation (Martin et al., 2008; Meyers et al., 2015) and pilot-test it prior to full-scale use in the efficacy phase.

**C1iv. Data Analysis Plan.** AIR will use a mixed-methods, multistep approach to identify specific indicators and thresholds for components of the logic model. For Research Questions 1 and 2, AIR will analyze multiple indicators of the degree to which *PAL Classrooms* activities and expected conditions are in place. AIR will aggregate these indicators across teachers and schools to provide frequency estimates of project activity implementation. AIR also will calculate dosage for each teacher (eMINTS considers 80% teacher participation in project activities necessary for quality implementation). For Research Question 3, AIR will conduct descriptive analyses of classroom observation data. For Research Question 4, AIR will use descriptive methods to examine how implementation varies across teachers and schools. These analyses will provide formative feedback of early implementation of project activities and uptake of teaching practices to inform adjustments to project development and delivery.

## C2. Efficacy Phase Evaluation

**C2i. Design Overview**. To examine the efficacy of *PAL Classrooms* on teacher and student outcomes AIR will randomly assign 18 schools within districts to treatment (*PAL Classrooms*; Cohort 3) and 18 schools to a waitlist control (business-as-usual; Cohort 4). Participants will be fifth grade teachers and their students. (Teachers and schools from the development phase are ineligible to be part of the randomized experiment in the efficacy phase.) The efficacy evaluation is designed to meet What Works Clearinghouse Evidence Standards without reservations, assuming low or uniform attrition (based on eMINTs history of low attrition). AIR will address these research questions:

5. Do schools and teachers assigned to *PAL Classrooms* implement it with fidelity?
6. What is the effect of *PAL Classrooms* on teachers' instruction and perceptions?
7. What is the effect of *PAL Classrooms* on students' (a) achievement in mathematics and science, (b) prosocial behavior, (c) engagement, and (d) perceptions of class climate, and does the effect vary by subgroup of high-need students?

Because we are using school-level assignment, we expect only minimal risks from contamination or other treatment crossover effects. It is possible that some participant students may move (leave or enter). As a precaution, after randomization we will ask participants not to share their treatment status with others outside of the study, minimizing student mobility that is related to treatment status. Also, we will collect the rosters of anticipated Grade 5 students in study schools prior to randomization to identify students entering the intervention schools after randomization and vice versa. These "joiner" students will be excluded from impact analyses.

**C2ii. Sampling Plan.** For Research Questions 5-7, AIR will randomly assign 36 schools (18 treatment and 18 control) across 10 to 15 districts (blocks). Two or more districts may be

condensed into one block for randomization in small, rural districts with fewer than four schools. Assuming three teachers per school (n = 108 teachers) and 20 students per teacher, the efficacy sample will include about 2,160 students. A power analysis estimated that the minimum detectable effect size (MDES) for student outcomes is 0.23.[1] This estimated MDES is comparable to results from research syntheses of elementary interventions using standardized achievement measures such as the MAP mathematics and science assessments, even with 5% school-level attrition (Hill, Bloom, Black, & Lipsey, 2008). Further, emerging meta-analyses (e.g., Piquero, Jennings, Farrington, Diamond, & Gonzalez, 2016; Uttal et al., 2013) indicate that students' behavioral outcomes may be more responsive to intervention (or malleable) than achievement outcomes.

**C2iii. Measures**. AIR will measure fidelity of implementation in treatment schools and student and teacher outcomes in both treatment and control schools.

***C2iiia. Measures of Teacher Perceptions and Practice***. AIR will examine fidelity of implementation in Cohort 3 (2021–22 and 2022–23) using project records and teacher surveys,

[1] We used PowerUp! (Dong & Maynard, 2013), assuming a level-2 intraclass correlation of .15 (as recommended by Hedges and Hedberg, 2007, for planning cluster randomized trials in rural education), 80% power, alpha level of .05, a level-1 $R^2$ of 0.70 (using preintervention measures of student achievement and demographic indicators), and a level-2 $R^2$ of 0.70 (using preintervention school-level student achievement outcomes and demographic composition, and blocking indicators). With 5% attrition at the school level, the estimated MDES is .23. The MDES for teacher-level outcomes, with 80% power, an ICC of .15, a level-1 and level-2 $R^2$ of 0.60 and 5% attrition it is .43.

similar to the development phase. Teacher outcome measures collected in treatment and control schools by AIR during the efficacy phase will include classroom observations using the protocols from the development phase.

***C2iiib. Measures of Student Outcomes***. Four student outcomes in the *PAL Classrooms* logic model will be measured in Cohort 3 and 4 (2021–22 and 2022–23): (1) **Academic Achievement**. Student achievement will be measured using extant Missouri Assessment Program (MAP) mathematics and science scores. (2) **Prosocial Behavior**. Students will rate their classmates' social skills (e.g., sharing, helping, complimenting, encouraging, and cooperating) using the 10-item Prosocial Behavioral Scale (Bergin, Wang, & Bergin, 2013). Unlike the other four measures, this measure will be administered both at the start of the academic year and at the end of the academic year. (3) **School Climate**. Students will rate their schools' engagement, safety, and environment using the ED School Climate Surveys student form (Wang, Murphy, & Kantaparn, 2016). (4) **In-Class Engagement**. Students will rate their level of engagement across three dimensions (cognitive, affective, and behavioral) using the Classroom Engagement Inventory (Wang et al., 2014). (See Appendix H for details.)

***C2iv. Data Analysis Plan***. Consistent with the analysis of implementation data in the development phase, AIR will use a mixed-methods approach. We will triangulate the multiple measures to identify which schools are effectively implementing *PAL Classrooms*. This information will be used for continuous improvement of the project. AIR will use multilevel modeling to account for nesting of students in classrooms, classrooms in schools, and schools in districts to estimate the effect of *PAL Classrooms* on teacher and student outcomes. (See Appendix H for additional details and our analytic model.)