

EXECUTIVE SUMMARY

Arts Education Model Development and Dissemination

U351D080029

Math Artist Pathways

Puget Sound Educational Service District: Arts Impact

INTRODUCTION

Math Artistic Pathways, (MAP) was a U.S. Department of Education Arts Education Model Development and Dissemination project that investigated the impact of the Arts Impact professional learning model on middle school math teachers' effectiveness to infuse visual arts into math and on their math teaching in general. The project also investigated the impact of MAP on student achievement in math.

Key research questions were:

- How do visual arts-infused math units of study impact student achievement on the targeted math concepts?
- How does the Arts Impact model translate to the middle school setting?
- Do middle school math teachers improve their instruction as a result of Arts Impact professional development?

PROJECT DESCRIPTION

The project used a quasi-experimental design that compared student achievement on state and district level math assessments and teacher growth in attributes of Powerful Teaching and Learning, with control site students and control site teachers.

Six Tacoma Public Schools middle schools in Tacoma, Washington were randomly to either a treatment or control group. Treatment group general math teachers participated in the two-year Arts Impact professional learning program and control school general math teachers did not. Control schools were not asked to withhold any particular training or activities, but to carry on with normal instructional and training activities.

Implementation Plan and Timeline

The first year of the grant, 2008-09, consisted of curriculum development, refining the implementation and evaluation plans, establishing a data sharing agreement with the school district, establishing the leadership team with representatives from key stakeholder groups. Baseline data was collected from treatment and control group teachers and students.

Treatment group teachers completed 52 hours of professional development during each of the next two years, 2009-10 and 2010-11, for a total of 104 hours total. The final year, 2011-12, continued to follow treatment and control groups to determine sustainability of the professional development.

Evaluation Plan and Timeline

Treatment and control groups were evaluated using the following instruments:

- STAR Protocol – a classroom observation tool (teachers)
- Measure of Student Progress—the state high stakes test in math and reading (students)

- District Math Assessments – (students)

Treatment group teacher data was also gathered using the following measures and tools:

- Autonomy Rubric for Teachers (ART) an analytic four-point rubric to measure growth of teacher autonomy to infuse the arts
- Performance based assessments to measure teacher learning of arts concepts taught in the lessons
- Teacher interviews
- Professional Learning Communities

Treatment group students were also evaluated using the following measures and tools:

- Performance based assessments embedded in the MAP curriculum
- Student Perspective Surveys

OUTCOMES

Teacher outcomes showed that treatment teachers were very successful in learning visual art concepts and skills taught in the MAP curriculum. Treatment teachers also improved in their ability to infuse visual art with math. In comparison to control teachers, MAP teachers increased on all five of the STAR Protocol measures while control teachers increased in only two and decreased in three of the five indicators. MAP teachers reported that arts-infused, project based learning units were beneficial for students by improving understanding of difficult math concepts in proportional reasoning and creating a strong sense of community within the class. Additional student benefits reported included low math performing students excelling on the arts-infused concepts and skills and becoming leaders in the class, when in a regular math class, they would not have assumed a leadership role at all.

Student outcomes on performance-based assessments met the 70% target for meeting lesson criteria in the MAP curriculum. Over the course of the three years of the project student scores on the Washington State assessment Measurement of Student Progress gradually increased from 11% meeting standard in 2009-10 to 42% meeting standard in 2011-12, while control group scores decreased from 27% to 8% in the same time span. Because of extreme changes in sample size between the first and third years these results need to be viewed with some caution. However, the fact that treatment student scores increased so dramatically and control student scores decreased, gives some credibility to the outcomes.

BARRIERS

The MAP project experienced an inordinate number of barriers outside of Arts Impact's control. Barriers to implementation, impact and evaluation came from several different directions. District level leaders who helped develop and strongly supported MAP were all displaced when a new District Superintendent was hired, greatly impacting buy-in and commitment to MAP from the district. Tacoma School District received a U.S. Department of Education School Improvement Grant (SIG) that eliminated both a treatment and control school. A second control school was closed, and a change in building principal led to a second treatment school dropping out. The math faculty at the remaining treatment school changed drastically as a result of SIG schools taking many of those math teachers, leaving only two general math teachers, one visual art specialist, and one special education teacher who completed the full project training.

In addition to the change in participating schools and teachers, the district changed their math curriculum three times during the project, and the state assessment changed between the baseline year and the first implementation year, negating any comparison between baseline state assessment scores and scores at the end of the first year of the MAP intervention.

A final barrier to implementation of MAP is a systemic issue of the middle school student's daily class schedule. Project-based and infused learning as provided by MAP does not fit well into a schedule that teaches discrete subjects with no cross-discipline collaboration or integration. Teachers found it frustrating to spend the time required on a project-based unit when they already felt pressured to get through the full curriculum within the daily slotted time.

CONCLUSIONS

Despite these challenges the findings are valuable for advancing understanding about arts-infused teaching and learning.

Arts Impact training is effective at improving overall teacher practice

Both STAR Protocol and ART outcomes support the premise that Arts Impact improves teacher practice. Teacher survey responses also reveal that teachers find the professional development program, "transformational." Such reports raise the question of whether the arts actually heighten the effectiveness of the professional learning experience, and if so, why.

Student learning and dispositions improve through arts-infused learning

Student achievement data showed that treatment group high stakes MSP scores improved over time compared to the control group, which declined. Performance based assessment scores also remained at the targeted outcome for success. Additionally, teachers reported positive change in students' dispositions towards learning math as well as building self-confidence among the lowest achieving students. Teachers also reported that the classroom environment that results from more engaged and active learning builds community among students.

Traditional school structure impacts implementation of arts-infused instruction

Project based arts-infused learning works better at the elementary level than at the middle school level. The more flexible school day and the single teacher classroom in elementary grades allows teachers to adjust instructional times to accommodate arts-infused learning. The traditional six-period day, with discretely taught subjects does not allow for flexibility in scheduling learning times. Project based arts-infused learning is most successful with flexible scheduling and leveled visual arts classes are part of the infrastructure of the middle school. Neither of those systems was in place at the MAP schools.

Students need more experience, time on task, with hands-on learning

RECOMMENDATIONS

The following recommendations are made as a result of the outcomes and conclusions presented.

Further Research and Questions

The impact of arts-infused learning on student achievement needs additional research. The gains in the MAP treatment group scores compared to the control group suggest that there is a positive benefit. However, the hypothesis merits another investigation to see if similar results occur with more stable experimental groups.

Questions about the best school structure to support optimum learning in project based arts-infused instruction are raised by the outcomes of MAP. What are the ideal conditions for arts-infused instruction? Are there readiness to benefit indicators for these conditions, and if so, what are they?

District and building leadership buy-in and support

District and building leadership support is absolutely critical for successful research over an extended time frame. As a recipient of the negative impact of such frequent and sweeping change one wonders what the impact is on teachers and students. It seems that studying the impact of frequent leadership change could inform education reform at the policy level. It also suggests that language binding a district to remain committed to a federally funded project through its entirety, even if leadership change occurs, should be considered.

SUSTAINABILITY

Sustaining the MAP model during the middle school instructional day, without systemic changes, is most likely not going to happen. Some systemic changes needed for ongoing arts-infused teaching and learning indicated by the MAP project include: flexible and creative scheduling, collaboration time for teachers and art specialists, inclusion of arts-infused lessons as part of the math instructional calendar, and integration between subject areas as part of the schools overall approach to instruction.

Until such systemic changes occur, Arts Impact is collaborating with the Puget Sound ESD extended learning program to offer MAP units in after school programs as part of a 21st Century grant. The evaluation that accompanies the after school project will help us determine if extended learning is an effective environment for project-based arts-infused learning.