

Project GEMS



**A JOINT PROJECT BETWEEN THE CENTER
FOR GIFTED STUDIES AT WKU AND THE
WARREN COUNTY PUBLIC SCHOOLS**

NAEP Results in Science



- 1% of fourth graders scored at Advanced Levels
- 2% of eighth graders scored at Advanced Levels
- 1% of twelfth graders scored at Advanced Levels
- 40% of twelfth graders scored below the Basic Level

Mind the (Other) Gap! The Growing Excellence Gap in K-12 Education



In both Grade 4 and 8, a much smaller percentage of low-income, minority, and English-Language learner students score at the Advanced Level in math on the NAEP

Fourth graders:

- Low income 1.5%
- Black .9%
- Hispanic 1.4%
- ELL .6%

Eighth graders:

- Low income 2%
- Black 1.2%
- Hispanic 1.8%
- ELL .5%



Low income White students outscored
non-low income Black and Hispanic
students.



Studies show that interest in science comes early, so it must be nurtured early in the school career.



ACT data show that fewer than **two in ten** eighth graders are on target to be ready for college-level work by the time they graduate from high school.

The Forgotten Middle, 2009

Project Design



- **Treatment One**
 - Cluster Group Classes – Problem-Based Learning in Science and Math
 - One-day-a-week magnet school: GEMS Academy
- **Treatment Two**
 - Cluster Group Classes – Problem-Based Learning in Science and Math
- **Treatment Three**
 - Control group

Research: Selection



- ITBS math subtest
- ITBS science subtest
- CogAT nonverbal
- Teacher identification form science
- Teacher identification form math
- Student self-report math
- Student self-report science

What have children gained from Project GEMS?



- Opportunities to engage in problem-based learning in science and math
- Classes where they are involved in thinking at high levels about key concepts in science and math
- New interests in science and math

What have teachers gained from Project GEMS?



- Professional development in problem-based strategies in math and science
- Professional development that is embedded in the school day – both modeling and coaching to practice
- Headstart in addressing strategies for 21st century learning

What have schools gained from Project GEMS?



- Curriculum and equipment for problem-based learning in math and science
- Substitute teachers during professional development
- Identification of students often not recognized as advanced in math and science
- Additional assessment data to guide instruction and identify students as gifted and talented
- Students who are becoming 21st century learners

2009-2010 Demographics in Cluster Classes



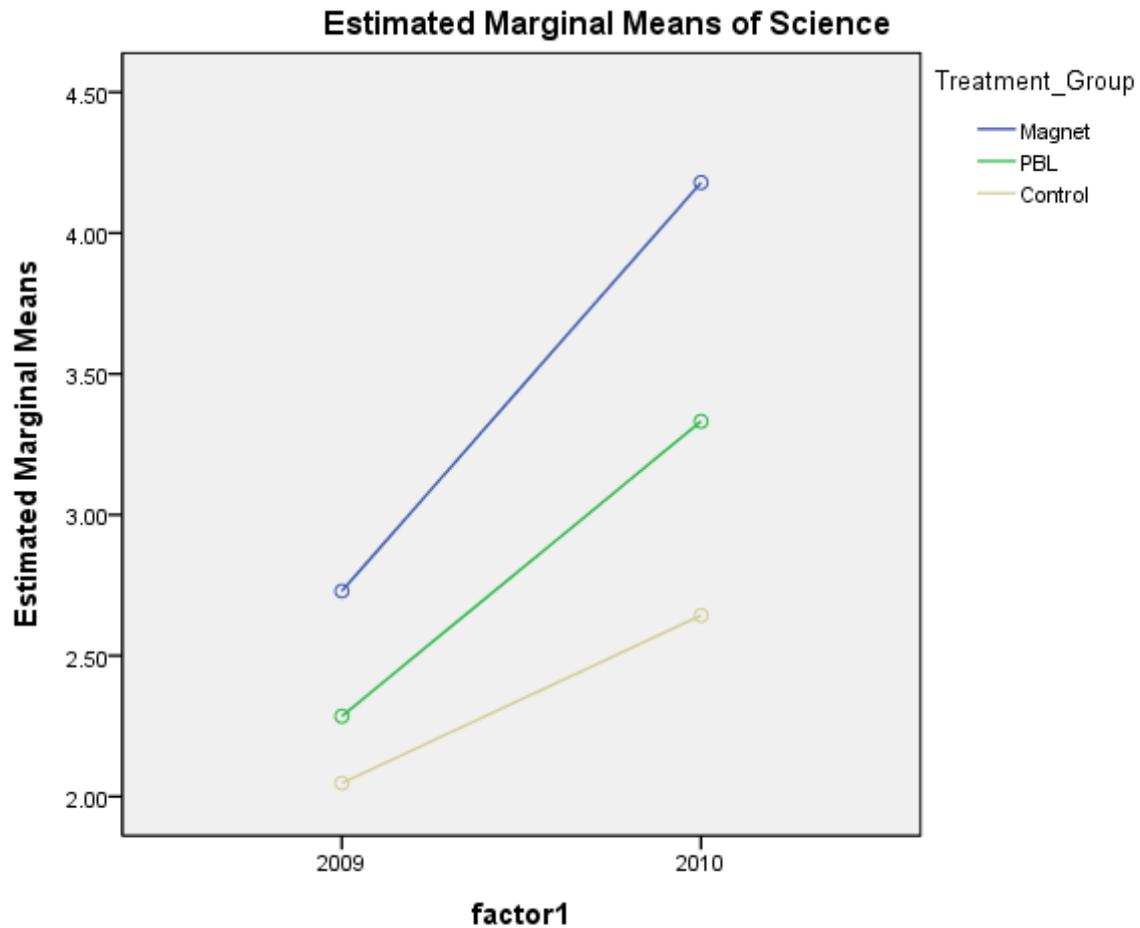
- Free and/or reduced lunch 47%
- Non-White 19%
- English Language Learners 6%
- Special Education 3%

Project GEMS Results Thus Far...

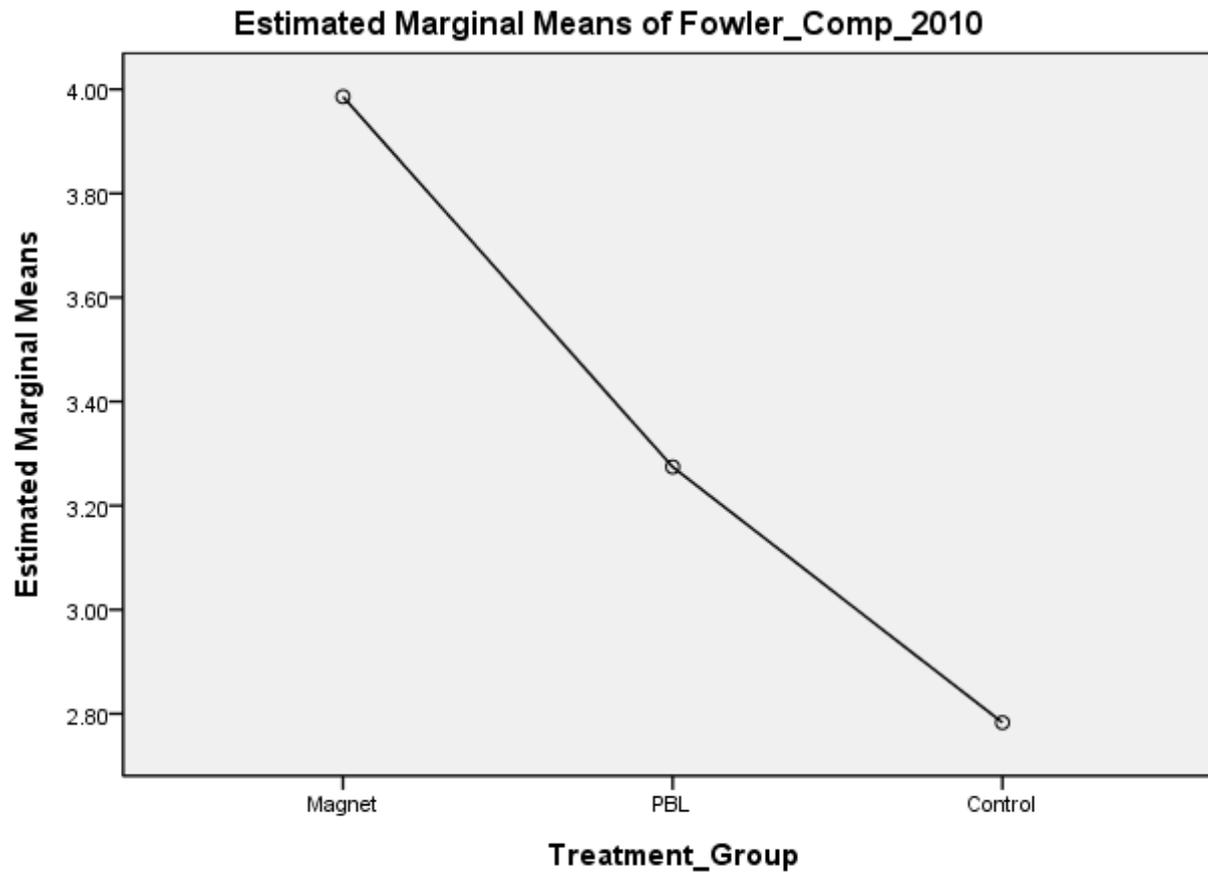


**COMPARING THE SELECTED
STUDENTS FROM TREATMENT 1
(MAGNET+PROBLEM-BASED
LEARNING),
TREATMENT 2 (PROBLEM-BASED
LEARNING),
AND TREATMENT 3 (CONTROL)**

Science Growth

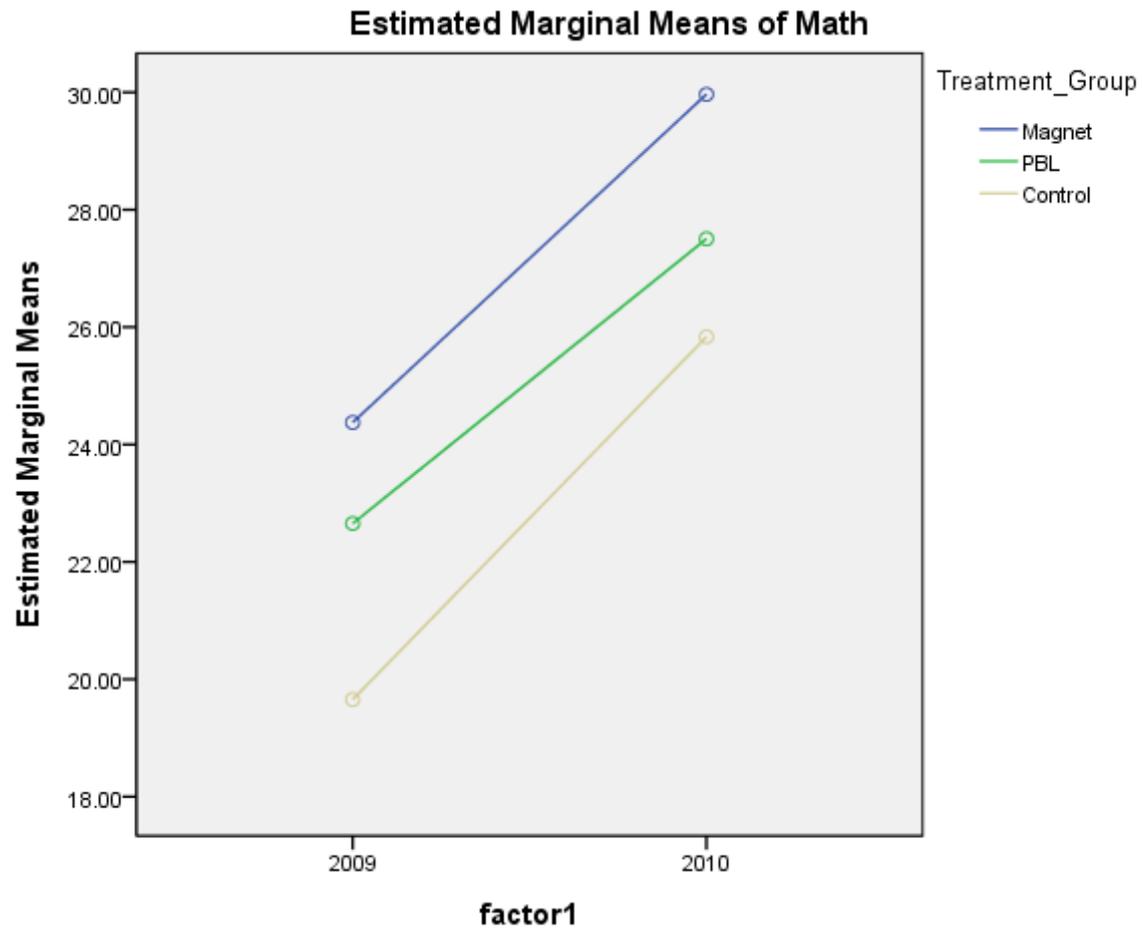


Science Differences

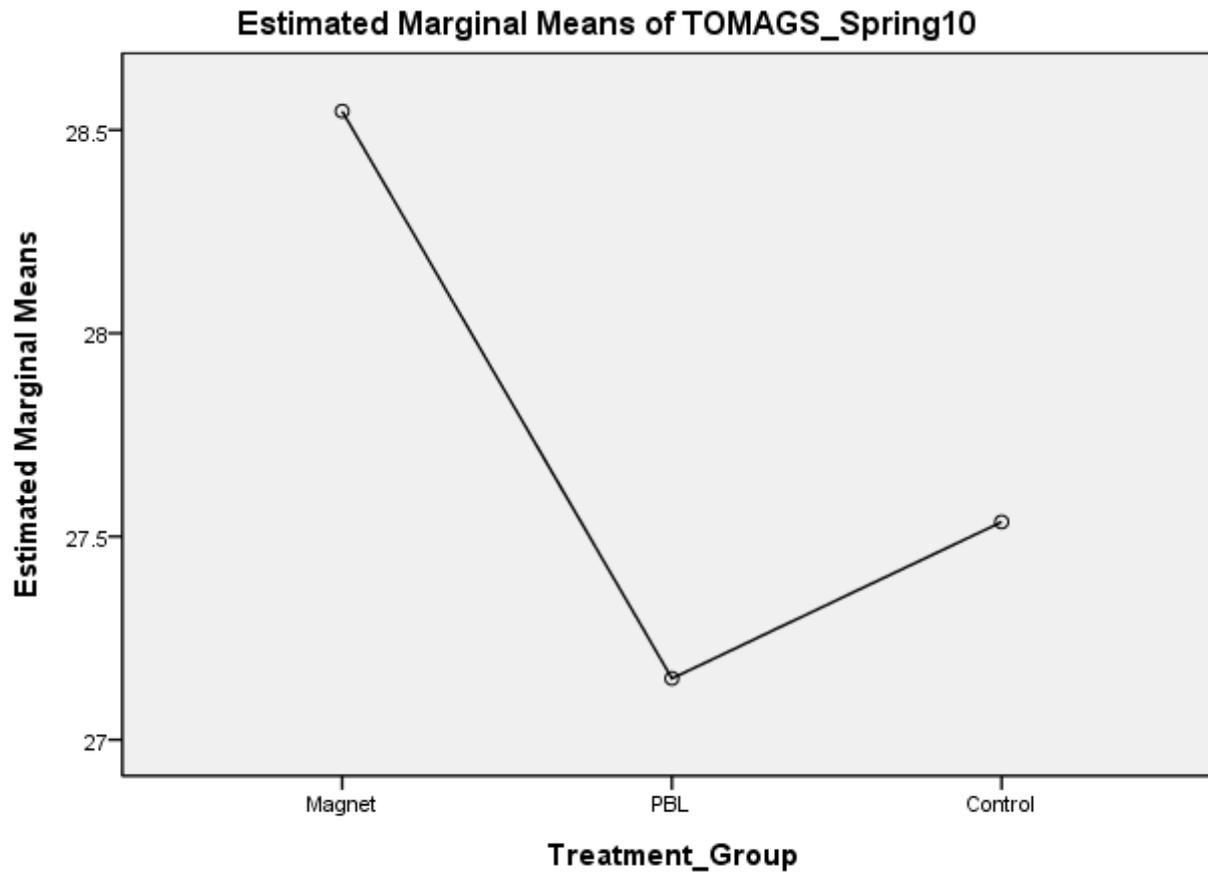


Covariates appearing in the model are evaluated at the following values: Fowler_Comp_2009 = 2.3313

Math Growth

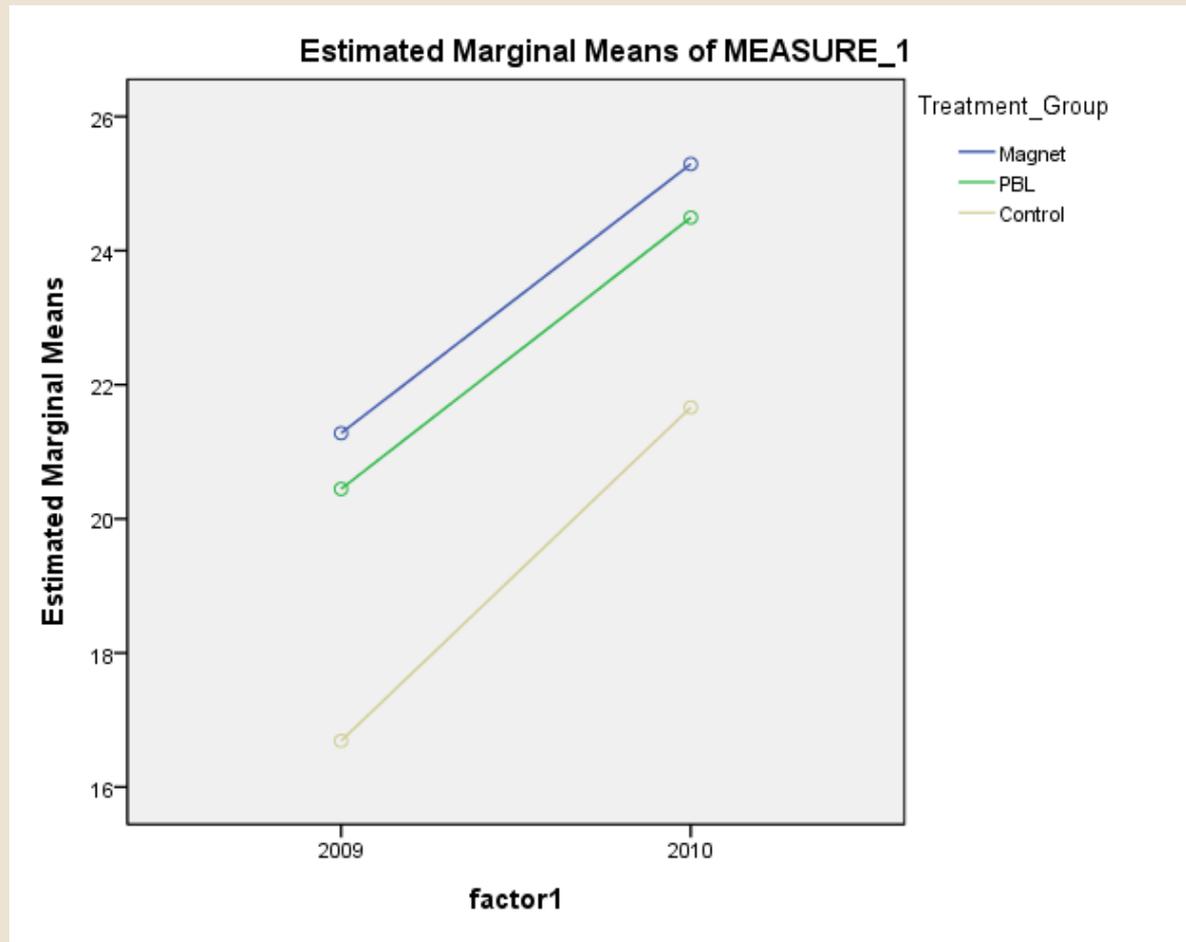


Math Differences

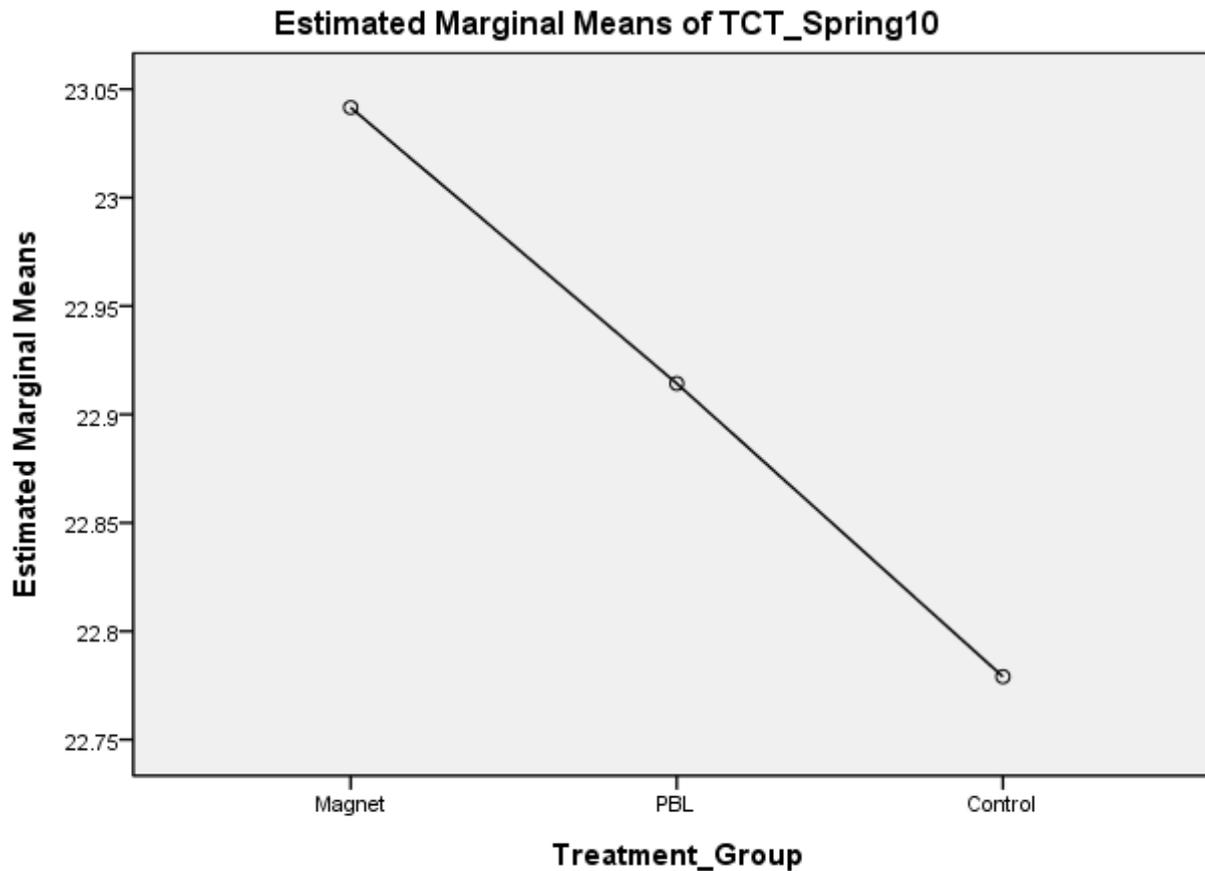


Covariates appearing in the model are evaluated at the following values: TOMAGS_Fall09 = 22.24

TCT Growth



TCT Differences



Covariates appearing in the model are evaluated at the following values: TCT_Fall09 = 18.85

Note. While there is a trend here, the differences are not statistically significant.

Teachers:

How has Project GEMS impacted students?



- “There is more math conversation between students, and students are becoming more math-minded.”
- “My students have gained more confidence in their science investigations.”
- “At the beginning of the year I asked students to describe themselves as students. Some words they chose were *friendly*, *kind*, and *helpful*. The last week of school I asked the same questions again, and now they describe themselves as *determined*, *organized*, and *intelligent*. I think this says a lot about the way they feel about their growth.”

Third Grader



This child is a twice-exceptional student who struggles with a reading disability but is extremely bright in mathematics.

Upon learning that she had been selected for the GEMS Academy, she told her principal, “I knew I was smart. I just knew it! How did you find out?” The GEMS Academy has given her a new found self-confidence and an opportunity to find idea-mates.

“I was very excited about being selected to go to the academy. I love going because math is my favorite subject, and we get to start the day with math at the GEMS Academy. I also love all of the technology that we get to use.”

Sixth Grader



He started GEMS in 5th grade, so this is his second year. The GEMS project has improved his test scores and given him a deeper understanding of the subjects. He has gained confidence learning in the target group.

It's fun because we get to do hands-on activities, and we talk about a lot of different subjects.

Sixth Grader



This student is in her first year at GEMS. She likes to work alone and thinks on a different level than most of her peers.

She is well read and thoughtful. She has progressed from always being alone to working in a group. She has taken a leadership role within group work and is able to express her opinion which is valued among the others. She's also made new friends and become more sociable.

GEMS gave me the opportunity to meet new people and gain a higher level of education.

Fourth Grader



This child is an outstanding fourth grade student of mathematics. Project GEMS has given him an opportunity to be challenged, and he met the challenge head-on. This student is a thinker, and he seems to enjoy the responsibility of thinking outside the box to grasp concepts. In doing this, he has built confidence in his ability to solve math problems and learn concepts.

I like the class because it challenges me to think deeply to learn. I would love to be in another GEMS math class!

Sixth Grader



This sixth grader is very bright and desperately needs challenge. However, it has to be challenge which will involve him actively and keep his interest. This is his second year in GEMS. Earlier in the year, he asked when the next GEMS science unit would start and was really excited for it to begin.

I used to finish early and just sit there, get bored and then maybe get in trouble. This math keeps me thinking.

Science helps you understand hypothesis— If you have a problem at home, you can think up a plan, research, use the reasoning wheel. You might do an experiment and figure out the problem.

GEMS gives us a better education in everything we do – not just math or not just science.

Educator Comments



- “Being a part of the GEMS grant has prompted me to be a better questioner. The trainings have reminded me that students must be thinking and not just receiving instruction.”
- “Through using PBL, I have noticed the students are asking more insightful questions. They are also expecting me to ask them higher order thinking questions. My students enjoy a challenge, and they get thorough questioning.”

Educator Comments



- “I feel being in a cluster class/core classroom encourages more depth of thinking as students bounce ideas off one another and spur discussion. Students truly influence each other’s thinking and learning. I also think these students learn to take risks and learn to focus a little more on the process and a little less on the end product. They learn to see possibilities without searching feverishly for the ‘right answer’ they think the teacher is seeking. This allows them to gain insight and understanding which is far more valuable than a single correct response.”

Educator Comments



- “The problem solving, reasoning and proof, and communicating of what is learned are valuable to student learning. The program is a challenge for the students as they think through concepts taught. Many rise to the challenge and learn to feel confident to work through the out-of-the-box learning situations. Actually, many students think this is fun.”
- “With the program being a thinking one, it has been an adjustment for those who automatically make an A. They have had to grow in their ability to solve problems.”

Educator Comments



- “I personally have gained in the way of challenging students to a higher level. I've been amazed at the 5th and 6th grade students and have enjoyed challenging them through science.”
- “GEMS has impacted my teaching because it has given me a broader prospective on math. I appreciate the support of Dr. Sheffield. She is a great teacher because she is able to relate to the classroom teacher and explain things on our level.”
- “Students understand that scientific experimentation has implications outside of the classroom. The results we get actually apply to things going on in the real world.”

Educator Comments



- “The impact has carried over to the other content areas. Students develop questions about characters they are reading about and why the author writes the way he/she does. This questioning technique also has carried over to social studies and math. They try to discover their own answers.”
- “I see that PBL learning has brought many successes to my classroom. Science is everywhere, and I was able to focus on allowing the children room and time to spend on investigations instead of covering more ground. Core content is imbedded within PBL learning, and it was important that I be aware of adjustments that I could make to the GEMS curriculum to make it work for my classroom.”

Educator Comments



- “Normally in most subjects, there is an answer key, but since there is not a ‘key’ or one right answer, it has encouraged me to think more in-depth because I don’t have the crutch of a key. GEMS has encouraged me to be more of a mediator during student discussion rather than leading students to the ‘right’ answer. This type of teaching also provides an opportunity for every student to share his/her response and be engaged. Some students who normally don’t volunteer or engage in the discussions are very involved and outspoken with their opinions.”

Parent Comments



- “I believe he is more knowledgeable in the area of science in regards to how science relates to things in daily life. For example, he explained how it is unlikely that one of our family members would catch the same virus twice. He understood why and explained it to me in a very accurate way.”

Parent Comments



- “GEMS has been of great value to my child. (His teacher) has been able to challenge, encourage, and instruct my son in a way that has increased his love for math!”
- “It’s challenging for my daughter in a good way. I don’t think she would have learned the things she has until later in life. The math includes algebra which she wouldn’t have learned until later in school. She never liked science until she did the GEMS science units. That’s what got her interested in science, and now she loves science.”

Parent Comments



- “GEMS has been a tremendous experience for my son. The problem-based learning and ‘think outside the box’ strategies have helped him grow in both knowledge and confidence. I appreciate a curriculum that doesn’t just give directions on how to do something, but encourages students to work and figure problems out for themselves using a hands-on approach. It’s been great seeing my son take the things he has learned and share them with his classmates and with us at home.”

An ECC at a control school commented...



- “A benefit for our school is being able to have additional data points on our students. This helps to better identify students for GAT and other programs.”