

Teacher Development – School-Site Support for Improving Teaching Practice

CURRENT STATUS

Many of the professional development opportunities for the mathematics and science teachers of Miami-Dade County Public Schools could be classified as “additive” professional development of new skills to an existing repertoire, which is necessary when teachers are beginning the process of change. Continued emphasis of this type of approach, however, will no longer meet the professional growth needs of Miami-Dade County Public Schools’ mathematics and science teachers if genuine change is to be sustained. It is the vision of the Division of USI Mathematics and Science to have all Miami-Dade County public schools implement a *Transformative Learning Model* of professional development at each school site. The Transformative Learning approach is defined as changes in deeply-held beliefs, knowledge, and habits of practice by teachers and by the organizations in which they teach. This approach is designed to help build a culture of continuous learning among the faculties of Miami-Dade County public schools, and a commitment to on-going improvement in the quality of teaching and learning.

A combination of increased mathematics and science course requirements, predicted teacher retirements, and the general attrition of mathematics and science teachers creates a dramatic need for the acquisition of more mathematics and science teachers to staff the classrooms of Miami-Dade County public schools. A master plan to increase the number of certified graduates prepared to teach science and mathematics, in collaboration with the local universities, is necessary and desirable.

The following goals represent the most important intended outcomes of this district comprehensive plan. These goals should be achieved over the next three years, and sustained as regular occurrences in subsequent years.

GOALS:

1. All teachers will utilize on a daily basis the best practices found in Appendix I, especially those that target curriculum, examining classroom practice, and collaboration among teachers.
2. All schools will build feeder pattern support teams that include feeder pattern educational specialists who are experts in mathematics and science, M-DCPS/FSU advanced degree teachers, and Eisenhower Resource Teachers to support the school site instructional improvement efforts.

GOALS Continued:

3. All teachers will develop an individual professional development plan as a part of PACES, and in compliance with Sections 231.085; 231.09; 231.29, F.S. These plans will focus on appropriate curriculum, instruction and assessment that support both local and national standards.
4. Feeder pattern educational specialists will disseminate information to parents within the community regarding how the local, state, national and international standards in mathematics and science have increased.
5. Principals and assistant principals will receive professional development designed to support mathematics and science instruction at their school, to promote mathematics and science careers, and to improve the quality of programs at the school site.
6. Elementary teachers will deepen their content knowledge and comfort level in teaching mathematics and science concepts.
7. Middle school teachers will deepen their content knowledge and increase their capacity to teach mathematics and science concepts within the context of effective learning theory for middle school learners.
8. Senior high school teachers will increase the use of effective pedagogy such as contextual learning to deliver the mathematics and science content to students.
9. Schoolwide instructional improvement teams will be created to implement the *Transformative Learning Model* of professional development for mathematics and science at each school site.

The following activities will provide the structure for the development and implementation of a rigorous and sustainable teacher development program across the district.

ACTION PLAN

1. Educational specialists will be responsible for facilitating the mathematics and science instructional improvement team, working with school-site administrators.
2. An intensive three-week summer leadership institute will be held for feeder pattern educational specialists assigned to feeder pattern support teams to reinforce the essential skills needed to provide effective support within each school to improve mathematics and science instruction and to model best practices. The school-site instructional improvement team will attend the last five days of this seminar.

3. The feeder pattern teams will provide support through follow-up visitations, advice, critiques of implementation of strategies, and opportunities to read and discuss the most recent research on teaching and learning mathematics and science.
4. Feeder pattern educational specialists will provide direct service to the schools by helping identify professional development needs in curriculum content in mathematics and science and facilitating appropriate inservice.
5. Feeder pattern educational specialists will facilitate sessions on a regular basis with the mathematics and science instructional improvement team to implement the specific strategies identified for professional development such as:
 - Deepening the content knowledge of mathematics and science teachers.
 - Coaching and guiding early career teachers in the curriculum areas of mathematics and science.
 - Supporting the efforts of the mathematics and science instructional improvement team to transform the teaching and learning within the school site.
 - Identifying exemplary teachers and schools.
 - Providing modeling of teaching strategies and teacher expectations of student learning.
 - Assisting in the development of assessment tasks that promote higher-order thinking skills in mathematics and science.
 - Examining student work with the mathematics and science instructional improvement team as a reflective process for professional development.
 - Reporting progress of the mathematics and science instructional improvement teams to the Region and the District offices.
 - Arranging access to people in the mathematics and science communities for experiences in real-world problem solving.
 - Providing constructive feedback to the improvement team about classroom practice.
 - Fostering leadership skills within the school-site instructional improvement team so that the team will eventually function on its own and sustain change in teaching and learning.
 - Investigating research, and planning collaborative lessons based on findings, documenting key learning in the areas of mathematics and science.
6. The mathematics and science instructional improvement team at each school will serve as teacher leaders for improved teaching practice, advocates of continuous, school improvement, and mentors of other teachers.
7. An Advisory Council to oversee the district plan will be created. It will be comprised of the Region Directors for Instructional Support, Lead Principals, supervisors of USI Mathematics and Science, and the feeder pattern educational specialists. Meetings will occur on a monthly basis to collaborate on the design framework for professional development at each school site. The focus will be to monitor, and evaluate the

progress of substantive and measurable improvement in mathematics and science instruction across the district.

8. *Equity in Mathematics and Science Education* will continue to be a critical topic in professional development for teachers, counselors and administrators.
9. *Equitable Practices in Mathematics and Science Education* will be expanded to include all instructional improvement teams.

EXPECTED LEARNING OUTCOMES FOR TEACHERS

Mathematics

The curriculum and evaluation standards entail mathematical reasoning, problem solving, communicating and connecting of mathematical concepts. They imply a significant departure from the traditional practices of mathematics teaching and focus on *what* is taught and *how* it is taught. Teachers and students have different notions about what is meant by “to know” and “to do” mathematics. Whether working individually, or in small or large groups, students should encounter, develop, and use mathematical ideas and skills in the context of genuine problems and situations. In so doing, they should develop the ability to use a variety of resources and tools when exploring “their” world of mathematics.

A. Worthwhile Mathematical Tasks

The teacher should be able to:

- Pose tasks that are based on problem formulation, problem solving, and mathematical reasoning.
- Engage students’ intellect and develop their confidence and disposition to do relevant mathematics.
- Expand students’ mathematical understanding and skills to increase their ability in communicating the mathematics in order to develop a coherent framework of mathematical ideas.
- Represent mathematics as an ongoing human activity.

B. Teachers’ Role in Discourse

The teacher should be able to:

- Pose questions and tasks that elicit, engage, and challenge each student’s thinking while listening carefully to his/her responses and ideas.
- Ask students to clarify and justify their reasoning orally and in writing.
- Decide when to provide information, when to clarify an issue, model it, lead the learner, or allow the student to struggle.

C. Students’ Role in Discourse

The teacher should be able to:

- Guide instruction so that students listen, respond and question each other to initiate other problems and questions.
- Structure a lesson so that students validate their conjectures and solutions through mathematical evidence and arguments.
- Provide situations where students need to use a variety of tools to reason, make connections, solve problems, and communicate the mathematics.

D. Tools for Enhancing Discourse

The teacher should be able to:

- Use computers, calculators and other technology along with concrete materials that enable modeling.
- Utilize pictures, diagrams, tables, and graphs.
- Include written hypotheses, explanations, and arguments.

E. Learning Environment

The teacher should be able to:

- Encourage the development of mathematical skills and proficiency.
- Provide and structure the time necessary to explore sound mathematics in a collaborative or independent manner.
- Use the physical space and materials in a way that facilitates students' learning of mathematics.
- Respect and value students' ideas and diverse mathematical abilities.

F. Analysis of Teaching and Learning

The teacher should be able to:

- Observe, listen, and gather information about students to assess what and how they are learning.
- Examine the effects of the tasks, discourse, and learning environment on students' mathematical knowledge, skills, and dispositions.

Science

The teaching standards for science describes what teachers of science at all grade levels should understand and be able to do. Effective teachers of science create an environment in which they and students can work together as active learners. While students are engaged in learning about the natural world and the scientific principles needed to understand it, teachers are working with their colleagues to expand their knowledge about science teaching.

A. Plan an Inquiry-Based Science Program

Teachers should be able to:

- Develop a framework of year-long and short-term goals for students.

- Select science content and adapt and design curricula to meet the interests, knowledge, understanding, abilities, and experiences of students.
- Select teaching and assessment strategies that support the development of student understanding and nurture a community of science learners.
- Work together as colleagues within and across disciplines and grade levels.

B. Guide and Facilitate Learning

Teachers should be able to:

- Focus and support inquires while interacting with students.
- Orchestrate discourse among students about scientific ideas.
- Challenge students to accept and share responsibility for their own learning.
- Recognize and respond to student diversity and encourage all students to participate fully in science learning.
- Encourage and model the skills of scientific inquiry.

C. Engage in Ongoing Assessment of Teaching and Learning

Teachers should be able to:

- Use multiple methods and systematically gather data about student understanding and ability.
- Analyze assessment data to guide teaching.
- Guide students in self-assessment.
- Use student data, observations of teaching, and interactions with colleagues to reflect on and improve teaching practice.
- Use student data, observations of teaching, and interactions with colleagues to report student achievement and opportunities to learn to students, teachers, parents, policy makers, and the general public.

D. Design and Manage the Learning Environments

Teachers should be able to:

- Structure the time available so that students are able to engage in extended investigations.
- Create a setting for student work that is flexible and supportive of science inquiry.
- Ensure a safe working environment.
- Make the available science tools, materials, media, and technological resources accessible to students.
- Identify and use resources outside the school.
- Engage students in designing the learning environment.

E. Develop Communities of Science Learners

Teachers should be able to:

- Display and demand respect for diverse ideas, skills, and experiences of all students.

- Enable students to have a significant voice in decisions about the content and context of their work and require students to take responsibility for their learning.
- Nurture collaboration among students.
- Facilitate ongoing formal and informal discussion based on scientific discourse.

F. Actively Participate in School Science Programs

Teachers should be able to:

- Plan and develop the school science program.
- Participate in decisions concerning the allocation of time and other resources to the science program.
- Participate fully in planning and implementing professional growth and development strategies for themselves and their colleagues.

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