

Ms. Monica Colucci, Vice Chair

Co-Sponsors:	Ms. Maria Teresa Rojas, Chair	}	A D D E D
	Mr. Roberto J. Alonso		
	Ms. Mary Blanco		
	Mr. Danny Espino		
	Dr. Steve Gallon III		
	Mr. Joseph S. Geller		
	Ms. Luisa Santos		

SUBJECT: INQUIRY BASED SCIENCE LABORATORIES IN ELEMENTARY SCHOOLS

COMMITTEE: ACADEMICS, INNOVATION, EVALUATION & TECHNOLOGY

LINK TO STRATEGIC PLAN: SAFE, HEALTHY, & SUPPORTIVE LEARNING ENVIRONMENTS

Inquiry-based science in elementary schools refers to a teaching approach where students actively explore scientific concepts by asking their own questions, conducting investigations, analyzing data, and constructing their own understanding through hands-on activities, rather than passively receiving information from a teacher; essentially, it encourages children to "do science" by investigating phenomena around them, fostering curiosity and critical thinking skills.

Establishing a science laboratory at an elementary school can be an impactful endeavor. It is important to balance efficiency with thorough preparation to ensure the laboratory is both functional and safe for young students. There are many benefits to science laboratories in elementary schools:

- Students engage more actively with the material, leading to a better understanding of concepts;
- Students are motivated to learn because they explore topics they are personally interested in;
- Students learn how to approach problems, analyze data, and make informed decisions;
- Inquiry-based learning helps students become more autonomous in their learning process.

Research on inquiry-based science education in elementary schools consistently indicates that this approach significantly improves students' conceptual understanding of science concepts, enhances their critical thinking skills, fosters positive attitudes towards science, and develops their ability to apply scientific inquiry processes, all while promoting deeper engagement in learning through active exploration and questioning.

The following research findings demonstrate that inquiry-based science education is a powerful approach that enhances elementary students' conceptual understanding of science. The approach also has broader implications for developing skills that students need to succeed both in science and in life.

- **National Research Council (NRC, 2000):** The report *Inquiry and the National Science Education Standards* emphasized that inquiry-based learning promotes students' deeper understanding of scientific concepts. The NRC concluded that students who engage in inquiry develop the skills necessary to think scientifically and make sense of complex concepts.
- **Study by Furtak et al. (2012):** A meta-analysis of sixteen studies on inquiry-based science instruction found that students in inquiry-based classrooms demonstrated significant gains in their ability to understand science content compared to those who experienced traditional, lecture-based instruction.
- **G. M. Martin et al. (2012):** This study highlighted that inquiry-based science teaching enhances students' ability to solve scientific problems, especially when it involves hands-on experiments and encourages student autonomy in the learning process. It was found that students who participated in inquiry-based science activities were better able to apply their understanding of science in novel situations.
- **Anderson (2002):** In *Active Learning in the Science Classroom*, it was found that inquiry-based approaches helped elementary students develop scientific reasoning skills that enabled them to understand and apply core scientific principles.
- **K. S. Bell et al. (2005):** Their study on elementary students involved in inquiry-based science activities showed that such activities helped students develop critical scientific skills, including forming hypotheses, conducting experiments, and analyzing results, which significantly improved their conceptual understanding of science.
- **Study by Minner et al. (2010):** Their meta-analysis of nineteen studies found that inquiry-based science instruction was highly effective in promoting students' ability to transfer scientific knowledge to new situations. The authors noted that students involved in inquiry-based learning outperformed those who participated in traditional, didactic instruction in terms of both conceptual understanding and the ability to apply that knowledge in real-world scenarios.
- **Barab et al. (2007):** In their study, they found that inquiry-based science activities increased student engagement and motivation, which, in turn, led to better understanding and retention of scientific concepts. Students were more likely to take ownership of their learning, leading to more meaningful and lasting learning experiences.

This board item directs the Superintendent to survey and assess all schools and determine the feasibility of establishing a science laboratory at every elementary school and K-8 Center within the District, support elementary school and K-8 Center teachers in delivering inquiry-based science lessons and labs, by assessing their needs and providing relevant opportunities for professional development, as needed. Assess available spaces at elementary schools and K-8 Centers and determine the viability of using a paraprofessional, volunteer, or other staff member to prepare the science labs for teachers by having them assist in various tasks that ensure the labs are ready and organized for the lessons, thereby maximizing the teacher's time, and explore federal and state grant opportunities to fund expenditures associated with establishing inquiry based science laboratories at elementary schools and K-8 Centers .

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This item has been reviewed and approved by the Office of the General Counsel as to form and legal sufficiency.

**ACTION PROPOSED BY
MS. MONICA COLUCCI:**

That The School Board of Miami-Dade County, Florida, direct the Superintendent of Schools to:

1. Survey and assess all schools to determine which schools have a science lab, and assess feasibility of establishing a science laboratory at every elementary school and K-8 Center within the District;
2. Support elementary school and K-8 Center teachers in delivering inquiry-based science lessons and labs, by assessing their needs and providing opportunities for professional development, as needed;
3. Assess available spaces at elementary schools and K-8 Centers and determine the viability of using a paraprofessional, volunteer, or other staff member to prepare the science labs for teachers by having them assist in various tasks that ensure the labs are ready and organized for the lessons, thereby maximizing the teacher's time;
4. Explore federal and state grant opportunities to fund expenditures associated with establishing inquiry-based science laboratories at elementary schools and K-8 Centers; and
5. Present recommendations by the February 5, 2025, Academics, Innovation, Evaluation, & Technology Committee meeting.

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