

# STRENGTHENING MATHEMATICAL LEARNING WITH CLASS ATMOSPHERE AND DESIGN IN ELEMENTARY SCHOOL

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## Abstract

Engagement in mathematics should be expected of all students, and the learning environment should be one where students are actively involved in doing mathematics. Challenging problems should be posed and students should be expected to work on them individually and in groups, sometimes for extended periods of time, and sometimes on unfamiliar topics. They should be encouraged to develop traits and strategies—such as perseverance, cooperative work skills, self-assessment, self-confidence, decision-making, and risk-taking—which will be key to their success in mathematics. No need to say that class atmosphere plays important role for students and encourage and discourage them for study, in particular mathematics. Children are naturally curious about themselves and their environment. A natural way with which they try to satisfy their curiosity is to ask questions. The main theme of this regular lecture is to argue that student questioning should be made a stronger part of classroom teaching and learning of mathematics than is currently practiced in many countries. It is not very easy for teachers just with the talking gain the student attractions in mathematic classes. Mathematic is science, literature, geography or history that teacher be able to create a story. This research shows ideally, to promote student engagement in learning, two sets of factors must align. The first set of factors include that the students have the requisite prior knowledge, the curriculum is relevant to them, the classroom tasks interest them, and the pedagogies and assessment regimes match their expectations. The second set of factors relate to their goals for learning, their willingness to persist, and the extent to which they see participation in schooling as creating opportunities.

## Introduction

According to the principles and standards of the National Council of Teachers of Mathematics (NCTM), all seventh grade students must learn how to analyze data in a contextual situation using tables and graphs. This is a very important concept. Students must master this crucial step in order to build their background knowledge up to algebra concepts. Variables and patterns are important concepts in which teachers can encourage students to build a background in learning new concepts. Hence, students may understand the rules better and be able to write and solve equations to find unknown variables in later required lessons. The methods of teaching strategies that work with one concept will also work with others. Data analysis is an important concept in middle school which encourages students' background knowledge in mathematics. This background knowledge includes basic math skills such as adding, subtracting, multiplying, and dividing. Fractions, decimals, and percentages may also be included. Students have to be able to comprehend what they read and be able to use their skills to analyze the data and make predictions. (Espinoza, 2011).

### To help all students achieve mathematical self-confidence, teachers should;

- ✍ Believe themselves that all students can learn mathematics, even when their students are experiencing difficulties.
- ✍ Set high expectations for all students, expect students to take responsibility for their own learning, and provide the increased support necessary to help students meet these higher standards.
- ✍ Build self-confidence in each student by making mathematics understandable, using effective and meaningful teaching methods, relating past learning to concepts currently being taught, establishing short-term, obtainable goals, and providing mathematical experiences at which students can succeed.
- ✍ Help students make appropriate attributions about effort, persistence, and strategy; student “failures” are often due to the choice of an incorrect strategy or to a lack of effort or persistence, rather than to a lack of ability (WONG, 2012).
- ✍ Convey to students that their effort and persistence are critical to their success, and will lead to their success. And our efforts to do this must also be persistent and creative. While New Jersey Mathematics Curriculum Framework—Standard 17—Keys to Success—553

Jersey's Mathematics Standards asserts that all students can succeed in mathematics, all the recommended changes in curriculum, instruction, and assessment will have little impact on students who are unwilling to make the effort. Students should be actively involved in the learning of mathematics. Although some students absorb mathematics through teacher presentations, all students learn better when they are actively engaged in

the learning process. Students need to be active participants in their mathematics classes, discussing mathematics with the teacher and with each other, engaged in activities which enhance their learning. They need to be prepared to propose strategies for solving problems, to provide explanations for why things work as they do, and to make conjectures for the consideration of their classmates. In order for them to do this, they must have a supportive classroom environment which encourages diversity of thought.

### **Limitations**

This briefing paper on class time and student learning includes the following limitations:

- ⌘ Scientifically based research on the effects of class time on student achievement is difficult due to the number of additional factors that affect student learning, ranging from a teacher's effectiveness to the education policy of a district, state, or nation. Thus, what works in one setting may not hold true in a different setting.
- ⌘ Most of the research reviewed involved case studies, not randomized control trials.
- ⌘ Lengthening the time spent in the classroom does not automatically translate into more time spent on learning.
- ⌘ Due to the abbreviated length of this document, a limited number of research sources are cited (Sullivan et al., 2007).

### **Measuring student leaning level and develop their mathematical thinking**

According to the literature I have reviewed, students will develop a better conceptual understanding when they have the opportunities to take an active role in the instructional process. For example, students can take an active role in offering conjectures, responding to each other's ideas, justify their ideas and opinions. In addition, students will be encouraged to communicate and organize their mathematical thinking and share their ideas on how to defend their answers. In my action research, I taught the students how to justify the answer. I used different question techniques to guide them through the process. Students were asked to propose and explain their own problem solving methods. During the first two weeks of probing the intervention process, I began to administer communication skills in which students were taught to organize mathematical thinking. I proceeded to teach disabled students how to share their ideas coherently with their classmates. The literature I reviewed also stated that students with learning disabilities would benefit from mathematical instructions. Hence, these instructions encourage students to gain the knowledge of recognizing the mathematical concepts (Cawley, 2002). In the remaining ten weeks, we worked on the problem---solving assignments. On the last week, the students and I accomplished a sense of analyzing and evaluating mathematical thinking that expressed precise and concrete ideas.

### **Role of teachers on mathematic teaching**

Students begin school with great interest in solving puzzles and problems, and an enthusiasm for measuring and counting. Over the next few years, many come to believe that mathematics consists of rules which are unintelligible to them, and that math class means rote problems which are not connected to their reality. It is important to convey to students that mathematics is a dynamic human activity to which they can relate.

### **To help students develop a positive disposition to mathematics and to mathematical activity, teachers should**

- ⌘ ?Convey their own enthusiasm for and enjoyment of mathematics and solving mathematical problems.
- ⌘ ?Model persistence, confidence, self-reliance, flexibility, curiosity, inventiveness, and enthusiasm during problem solving, and many students will imitate those traits.
- ⌘ ?Structure their lessons so that students have fun doing mathematics; of course, this should not diminish the message that learning mathematics is often hard work and is not always exciting.
- ⌘ ?Make mathematics meaningful through the use of concrete models and discovery lessons.
- ⌘ ?Demonstrate the usefulness of mathematics in everyday life and relate mathematics frequently to careers. This is extremely important in the middle grades and high school, as students begin to make choices about their futures.

- ≈ ?Consider students' interests when planning instruction; field trips, guest speakers, and videos may help spark interest and communicate the ever-present nature of mathematics.
- ≈ ?Promote students' intrinsic motivation to learn mathematics by stimulating their curiosity, and provide students with choices and some control over the learning environment, especially in the middle and secondary grades.
- ≈ ?Recognize that students have different learning styles and address those different learning styles regularly to ensure that all students remain engaged with mathematics.
- ≈ ?Recognize that some students will take more time than others to develop their understanding of a specific topic. Teachers should ensure that students who are proceeding more slowly than their classmates receive the additional support they need and do not become discouraged.
- ≈ To help students recognize the power of mathematics, teachers should;
- ≈ ?Provide students with worthwhile mathematical tasks. Such tasks are inherently interesting to students, helping them to develop mathematical concepts and skills, and drawing on their own experiences. They stimulate students to connect mathematics to itself and to other subjects, they encourage students to communicate about mathematics, and they help to develop the students' dispositions to do mathematics. Worthwhile mathematical tasks help students develop a coherent framework for mathematical ideas and present mathematics as an ongoing human activity (NCTM Professional Standards for Teaching Mathematics).
- ≈ ?Introduce a variety of activities since different students make mathematics their own in different ways; some students learn best by constructing actual models, others learn best by hearing someone else talk about a mathematical idea, still others learn best by writing down the mathematical concepts for themselves or explaining them to others.
- ≈ ?Arranges the journey for the students through the world of mathematics, filling the journey with rich, important experiences which will allow the students to achieve mathematical power.

### **Teaching strategy and class time**

It should be evident that many factors must be in place for an extended-time strategy to be effective. For example, the strategy would likely be unsuccessful in a poorly managed school with ineffective teachers. In order for extended time efforts to engage students in productive learning, essential elements—strong leadership, rigorous and continuous professional development, a focus on teacher quality, a positive school culture, and strong family engagement—must be in place within the school system (Patall et al., 2010). Expanding learning time is especially problematic at the high school level because it often entails building partnerships with organizations outside the school, such as employers, cultural institutions, community-based organizations, and college and universities (Pennington, 2006). An inherent fiscal challenge is that the optimal added time, that balances costs and benefits, is unknown. This places a burden on education researchers to determine when, for whom, and under what conditions added school time will yield the greatest benefits (Patall et al.)

Another issue with the current school calendar is summer vacation. The biggest problem with summer vacation may be its impact on the academic achievement of low-income students, because those students lose significant academic ground compared to their more advantaged peers (Pennington 2006). Cooper, Nye, Charlton, Lindsay, and Greathouse (1996) determined that over time the summer learning loss ultimately increased gaps between middle class and poorer students. This had a particularly detrimental effect on low-income students. Even in those cases where disadvantaged students attended some type of traditional summer program, Silva (2007) found that they "provide only remedial, intermittent support to students and suffer from low academic expectations, limited advanced planning, teacher fatigue, discontinuity between the summer curriculum and the regular-school-year curriculum, a lack of emphasis on core academic skills, and poor attendance among older students"

## Conclusion

The impact of class time lengths on student achievement appears to be a complex issue with no definitive answers. A major theme across many of the studies reviewed is that the amount of instructional time is not so important as how that time is spent. It is the job of the teacher to match the particular strategy of teaching with the topic of the lessons and to utilize as wide a variety of strategies as possible. Using a variety of strategies helps to make the mathematics classroom more interesting to students and to make the subject of mathematics come alive as they learn. The mathematics teacher must plan the most effective strategies to engage students in learning, retaining, and applying important mathematics.

“The most useful metaphor for describing the modern teacher is that of an intellectual coach. At various times this will require that the teacher be

- ≈ A role model who demonstrates not just multiple paths to a solution but also the false starts and higher-order thinking skills that lead to the solutions of problems.
- ≈ A consultant who helps individuals, small groups, or the whole class to decide if their work is keeping 'on track' and making reasonable progress.
- ≈ A moderator who poses questions to consider but leaves much of the decision making to the class.
- ≈ An interlocutor who supports students during class presentations, encouraging them to reflect on their activities and to explore mathematics on their own.
- ≈ A questioner who challenges students to make sure that what they are doing is reasonable and purposeful and who ensures that students can defend their conclusions.”

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