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Response to Question #1

The major problem that limits the performance of students in math and science is mostly the attitudes of the students themselves. Students seem to think that learning is always going to be quick and easy. When the content is new or challenging and the students find it difficult, most of the time the students simply give up or quit. The major problem that limits the performance of the teachers in science is the broad base of knowledge required to teach life, earth, or physical science. In addition, time demands placed on teachers during non-school hours for extra-curricular responsibilities add stresses and pressures that have nothing to do with aiding the teacher in the presentation of academic materials. In the middle school years, many teachers have specialized in one of the three areas of science and do not feel comfortable and are not totally prepared to present lessons in the other areas of science. In the primary school years, most teachers are not equipped neither academically nor experientially to present the science content. State mandated assessments in the state of Arkansas have just now, in the last three years, been put in place for our students. This assessment does not include any lab performances to be done by the students. It is my opinion that the single, most important step that the federal government should take to improve K-12<sup>th</sup> grade science education is to nationally align the teaching of science content in the United States. The situation needs to be so that if a student moves from Colorado to Arkansas or any other state that the same science concepts are being taught at approximately the same time of the year and to the same level of understanding at the same grade levels. A nationwide science curriculum could be posted on the internet for all schools to use. As students progress through the curriculum, standardized tests that all students in America would take could produce data which then could be used to award scholarships or grants to help students attend colleges, universities, vocational schools, or some specialty school. In order to produce students that can compete in the international stage of science, a greater degree of support in the form of resources, training, and organization must come from the federal government. This support must not be in the form of regulations and bureaucracy, but must be pragmatically directed at how these decisions will affect the individual student sitting in our classrooms. My experiences with the National Science Foundation are very limited. Associations with our local educational coop, the Arkansas State Science Teachers Association, and the National Science Teachers Association provide our teachers with opportunities for training and limited resources to aid in the teaching of science content. Our school is a NASA Explorer School and receives much quality training and resources to help present science to the students. The most important and effective components of these programs is the resource support.

## Response to Question #2

After interviewing my students this year concerning this question, I found that their opinion on how to motivate students in the sciences and keep their interest points to the fact that providing engaging activities is the key. Students in today's classrooms are not the same type of animal they were even a few short ten years ago. Technology is a must in the classroom in order for us to truly prepare our students for this new world and make them feel that they are one of society's major foci. Our society places its money where the priorities lie and our schools are being cut short. Teachers that are inspired about their content was also mentioned as a factor in motivating the students themselves. It is my opinion that teachers must be ready to "perform" for the students.

My personal experiences in teaching have shown me that if students can see a direct link between what they are studying and some real-life situation, then they have more motivation to learn. Guest speakers, field trips, and special presentations by other professionals in their field tend to increase the level of interest in students at all grade levels. I keep my junior high students motivated and excited about STEM by showing the connections between what I ask them to do and what they are going to need to be able to do when they enter the job market and adulthood. Many activities that occur in my classroom are student generated. As we were studying Newton's Laws of Motion, one of the classes asked if they could construct a trebuchet. I didn't pretend to know what the students were asking, but instead allowed a student to use the Promethean Board and research the topic on the internet. As the entire class viewed the research on the large screen, greater interest was generated. To make the story short, we constructed our trebuchet and were able to actually experience the laws of physics rather than just read about and work the math problems related to this usually boring and technical topic. I try to bring the teaching to life in my classroom. Other activities that have been huge successes are: solar powered electric cars, passive solar ovens, robotics, bridge building, basic and advanced dissections, GPS (global positions systems) Unit, plant growth from seed to seed, electric motors, electric circuits, and model rocketry. In all of these units, direct application of the learning is pointed out. When the students are guided in the construction of an actual working model such as a robot, they are excited and motivated to have achieved success and can see some concrete product as evidence. In these activities, students are required to measure, read and comprehend, and move through the problem solving process in order to succeed. This is another component that I believe helps me to motivate my students. That is, I try to connect the sciences to the other subjects the students are taking. Completing a reading comprehension activity with the use of science content and calculating a percentage grade requires the students to engage their literacy and math skills in daily class activities. At the beginning of the school year and various points throughout the year, I try to build community in the classroom. The students must be made to feel comfortable in the classroom in order to learn. The students must feel that both their learning and the learning by others in the classroom are connected. Peer teaching and learning takes place among the students as they work cooperatively in small groups during many of the learning activities. This builds respect for both the teacher and the learner. As the year progresses, the teacher and the learner roles are experienced by all in some manner. In summary, I keep my students excited

and motivated about STEM by being real and understanding with the students on a personal level and by being challenging and inspiring on a professional level.

### Response to Question #3

The challenges faced by teachers in improving student achievement in math and science education are multi-faceted. Concerning the assessment tool that indicates the level of achievement in the state of Arkansas, I feel that the data obtained from this exam is totally unreliable. It is a basic learning principle that states in order to learn the learner must be ready to learn and see the need to learn. We are assuming that students will perform their best when given the opportunity just because of their own intrinsic values. Students need to be given a reason to pass this test. Retention at grade level or remediation before passing to the next grade level might possibly work. It is very assuming and in my opinion a very false assumption for us to think that young people will perform at a high level of achievement without a reason other than it is what they “should” do! Our schools are being held accountable to a high degree relative to the test scores of the students, but we are not placing any accountability on the students. Challenges of the mind-set of the student when they arrive at school from a family setting that may not be a peaceful or a healthy environment also require attention and understanding from the teacher as it presents its own set of challenges.

Parents could better support the schools if they would simply not put down the public school system in general. Parents need to make sure that students have the simple necessities of food and rest that young people need to be ready to learn. Parents could try to provide a stable environment by remaining the primary care-giver for the child and not placing the responsibilities of raising the child on some aunt, uncle, grandparent, or baby sitter. The community could help if they would become involved in providing learning opportunities outside the school building. Business men and women could come and speak to the students about how what they are learning in the classroom will be applied in the job market. These individuals could also make the students aware of the social skills and behaviors that will be required to become a successful employee in their chosen field. As stated earlier, I feel that the government needs to step in and provide positive leadership and assistance for the states through finances, training, and academic alignment of the sciences in our public schools.

### Response to Question #4

One of the important elements of my in-service training that has been most helpful in meeting the daily demands of working with students has been the National Science Teacher Conventions that I was able to attend. This gathering of science educators from all levels of education has provided me with many, many tools in my box. I have been able to use methods and techniques of presentation that were presented during these conventions. I have made connections and created a support network from teachers all over the United States. Stimulating activities and projects that I have modified have proven very successful for my students. These ideas and innovations were all initiated

from meeting with other professionals in these workshops as well as informally in the down time of the conventions.

In-service trainings that keep veteran teachers up on the latest technologies that are available for the classroom have been most valuable. As technology has progressed over the last ten to twenty years, some teachers have been overwhelmed by new methods of using the technology to present content. It is vital that science teachers at all levels keep up to date on current technologies and information. This is also something that the government could help to provide as they ensure that good, quality in-service workshops are available for all teachers at the appropriate grade levels. At this time, we do not have any partnerships with the local colleges and universities to help with access to materials or professional development.