

**Testimony of
Dr. Karen Lozano
Before the House Science Committee on
“The Exploravision (NSTA-Toshiba) 2011 competition”
June 16, 2011**

Good morning committee members and Exploravision winners. My name is Karen Lozano. I am a professor of Mechanical Engineering at the University of Texas Pan American, and the mentor and parent of one of the team members of the k-3rd first place national winners.

As I started my college years, I realized that Engineering was not a popular major, even less among girls, I was the 5th women to graduate with a Mechanical Engineering degree in 25 years that my University had existed. Pursuing later a MS and PhD degree at Rice University and joining later the faculty at UTPA, I kept on realizing how little people knew about engineering and how severe the stereotypes were for girls. I was blessed that my mom supported me when deciding to study engineering and was blessed to have a PhD advisor that was highly committed to k-12 education, therefore, it became natural to me that the only way to change perceptions was to be active in our community and be there to talk to kids and parents as well. At least once a month I give Magic and Science shows, talk to parents of middle and high school students, participate in science fair judging or offer lab tours to k-teachers. I have seen how important these activities can be and have also observed interesting patterns in science attraction of kids. Being involved in these activities, I was very attracted to participate in Exploravision when my older son's teacher brought it to my attention back in 2006. I read the rules and visited the website and observed how many of the winning ideas expressed by kids 10-15 years ago were now in the market. Miss Jessica Vera and myself worked with the first team of third graders, I was amazed how kids could come up with great ideas and when guided into the technology behind their ideas, they learned and grasped technical concepts otherwise not taught until later in high-school/college level. In 2006, the team won Honorable mention, in 2007 now the kids in 4th grade, they became 1st place national winners, the experience was even better, now the kids not only learned about a technology but needed to communicate it verbally in front of an audience, this ability has proven extremely beneficial for these kids now starting high-school next fall. In 2008, a different team of students (5th and 6th graders) won 2nd place national award. In 2009 I mentored two teams, with ages ranging from 1st to 6th grade and this year one team of 3rd graders. Besides being a mentor I have incorporated Exploravision rules in my college classes, the ability to be creative while incorporating scientific knowledge is one of the basic definitions of engineering, therefore it has worked very well in my upper division classes. The Exploravision competition is extremely well designed and at a young age allows the kids to “dream”, at a college age allows kids to develop technologies based on their current learned material, as I asked them for example, in a Polymer Engineering class, to look for applications where polymer are not used yet and evaluate their implementation according to the exploravision rules or in the Nanotechnology class, to develop a new application.

Let me explain the methodology that we follow when preparing for an Exploravision competition, the kids, teacher and myself meet for about 5 months, one afternoon a week at a local library room (to avoid distractions), the first 4-5 meetings are basically to come up with an idea, it is interesting to find out how their ideas are quite novel, many of those already being researched or coming to the market though the kids were not aware of, therefore for them were novel ideas and I have been very impressed how if they are encouraged or motivated to be creative they are full of surprises. This ability is many times lost in school age as time passes and kids stop play-pretend, it is very important to keep sparking technological creativity. How can society be benefitted by one of your ideas? A question that age school kids can be asked every year. After voting for an idea, students were asked to choose areas that they were most interested in working on though all of them needed to research all areas, as you are probably aware of, the Exploravision sections are (I will use the current winning project I.STREETS as an example, in this project they decided to incorporate traffic lights within the windshield of the car):

- 1) Present technology; students researched how traffic lights work
- 2) History: learned about the history of traffic lights
- 3) Future Technology: this area is where they explained how they envision their idea to work in the future though also need to explain it with some science principles; this is where the help from a mentor, especially for the k-6 age groups, come into play. In this case, as a mentor, I explained to them the electromagnetic spectrum (infrared waves, visible waves, radio waves), explained to them about smart films that could respond to a signal with colors, it is surprising how they grasp the information right away and then they are able to explain it.
- 4) Breakthroughs: they basically explained why their technology is not possible now, besides other aspects in their case is because we do not have yet a translucent film that could respond to a signal in only red, yellow and green colors in order to be glued between the windshield glass.
- 5) Design Process: the kids basically do this section on their own, explaining how they worked, when they met, and what other ideas they thought of.
- 6) Consequences: here students find that all they invent will always have positive and negative results, they can also do this completely on their own and they come up with important ideas.
- 7) References: they learned that every time they research something they have to give credit to the one that had the idea first.

As you can see, the Exploravision competition is a project that not only encompasses technological creativity but encourages students to think beyond the technology and incorporate within the learning process, team work, history, entrepreneurship, and ethical issues (consequences) among other issues. Even though one student is the one that usually has the idea first, carrying out the project allows for a full development of the idea from conception to implementation therefore at the end all of them are considered inventors of the idea.

As you can tell I am particularly impressed with the Exploravision competition and have enjoyed working with all students since 2006. They usually have formed the team based on friendship, not necessarily they have been from the same school and

actually if it is not carried out as a school project has proven beneficial to meet outside of school at a local library. I personally do not think this project is a matter of resources for the school; they are no costs that participants incur in rather than their time. I am aware that some schools do it as part of a class project and I believe that is a great idea and from grades k-6 could be incorporated within their curriculum where the different sections will be carried out during different courses (history, science, cultural...). For the older age group kids, they can do it on the science class as a semester project. Just by asking the questions about inventing something, students will go around their life looking at what can be improved one way or another, you encourage them to keep their creative nature (as born all kids are engineers, always looking around, building and connecting dots) and problem solving skills rather than teach them to wait for information to be provided and expecting them only to learn what they are asked to learn. When kids are given the opportunity to explore thru a project like Exploravision they can surprise us greatly. Such as one of the other winning teams that I had the pleasure to work with where they invented a spray that when placed in the tongue changes the taste buds so broccoli could taste as chocolate and sweets will taste as broccoli, it was as I-Streets and the other projects very interesting.

As for parents and teachers participation, I believe their role is extremely important, as I always tell my graduate and undergraduate students when we are invited as judges for science school fairs of young kids, we will find projects that clearly you can tell that parents have been involved and that is absolutely great as long as the child can explain what they did and is excited about it. Parent participation is definitively very important and has proven vital for student success in academics, sports, arts, etc.

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