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1. INTRODUCTION

The conference committee of the IEEE (Institute of Electronics and Electrical Engineers) Aerospace Conference has chosen to foster interest in engineering and science in school age children by sponsoring a Junior Engineering and Science Conference in conjunction with their annual conference. This unique conference allows children in grades K-12 to make technical presentations in a professional setting. The younger children typically do literature reviews at their particular level. The older participants are encouraged to include some original research in their project. Each participant has up to 20 minutes to present a topic to an audience of scientists and engineers as well as the other participants. The conference is not competitive and emphasizes encouraging each participant to do her or his best and obtaining positive feedback from the audience.

The Junior Conference has grown from one participant in 1995 to 13 participants in 2001 (see Table 1). In general, the participants express a sense of extreme accomplishment after their presentation. They feel that they have grown not only in their ability to accomplish a major project and present it in public, but also in their sense of self-esteem and confidence.

TABLE 1. Change in number of participants

Year	Number of Participants
1995	1
1996	3
1997	6
1998	7
1999	10
2000	6
2001	13

2. CONFERENCE ORGANIZATION

The organizational aspects of the Junior Conference are similar to those of a major scientific or engineering conference. However, a bit more personal care must be taken in dealing with children. As for most conferences, the first step is

recruiting speakers who are willing to do appropriate scientific research projects. This process is done in a couple of ways. The first is via a Call for Papers specific to the Junior Conference. Currently, this Call is embedded in the packet sent to potential Aerospace Conference participants and on the Aerospace Conference website: <http://www.aeroconf.org/>. At the website, the Junior Conference is advertised both on the general on-line Call for Papers as well as on a web site set up specifically for the Junior Conference.

Since the most likely Junior Conference participants are guests of adults who plan to travel to the conference, registrants of the Aerospace Conference are sent an email to inform them of the Junior Conference.

Once a child has expressed interest in doing a project for the Junior Conference, they are encouraged via email by the Junior Conference organizers (the authors). We have found that having examples of presentations from prior conferences available via the web is invaluable in demonstrating to participants the type of projects appropriate for presentation. Lists are kept of likely Junior Conference participants so that communication can be frequent. About a month before the conference, participants send hard copies of their slides or viewgraphs. These are collected and assembled into a Junior Conference Proceedings to be distributed to participants at the conference. Acceptance letters are sent to each confirmed participant

3. THE JUNIOR CONFERENCE TALKS

The Junior Conference is typically held at a time that does not conflict with other talks at the Aerospace Conference. This encourages the engineers and scientists to attend the children's talks. Attendance is typically quite good with between 50 and 100 professionals in the audience in addition to Junior participants.

The presentations are in similar format to that of scientific and engineering conferences. The speaker is announced and has a maximum of 15 minutes to present a talk. Talks are typically in PowerPoint or transparencies. Over the years, the quality of the visual aids have improved so that they are generally better than most of the adult talks. After the presentation, there is a question

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and answer period. The participants demonstrate a high level of knowledge of their topics through the answers to detailed questions posed by professional scientists and engineers. The audience is always very supportive and encouraging.

Participants in the past have ranged from first graders through high school seniors. The level of the presentations varies accordingly, but is typically quite good for the age level. The topics for the 2001 participants are listed in Table 2. Nine of the 13 were girls. Many of the participants had obviously spent a large amount of time in their investigations. Many of the older participants have done original research which foreshadows a potential career in science or engineering.

TABLE 2. Junior Engineering & Science talks, 2001

Age	Presentation Title
15	Detection of Spore Germination for Sterilization Processes
11	Quick Scatterometer Mission
10	Robots
13	Horse Survivor
11	How a Nebula is Made
8	How to Defrost a Turkey OR A Study of Energy Transfer
9	An Experiment About Paper Airplanes
16	The Truth and Uncertainty of Fuzzy Logic
14	A Finger Temperature Nightmare (Does the "Fight or Flight" response occur in dream sleep?)
8	Weather Watching
15	Methane Hydrates—Friend or Foe?
9	Gears
7	Secrets of the Rain Forest

After the presentations, the participants are each presented a personalized plaque commemorating their participation. Children have expressed treasuring their plaque for years to come.

After the conference, each participant is sent a letter thanking them for his or her participation. The past year, we included both a survey to evaluate the experience and a release form to allow use of their photos on the Junior Conference website. In general, the participants are thrilled with the experience. Most expressed some level of fear prior to giving their talk. However, they universally acknowledged that the experience gave them a heightened level of confidence. Some responses on the surveys included: "This talk gave me more confidence, because I learned that I could have fun giving a talk." (third grader) "[This talk has given me more confidence] in public speaking and preparing a research/technical paper." (eleventh grader) "I am more confident because I talked in front of a big group." (third grader) "I can public speak better."

(eighth grader). Most of the speakers also expressed an interest in pursuing a career in a technical field.

After the conference, many of the PowerPoint presentations are collected and put on a website for public viewing. Not only are these useful for encouraging future participants, but they are often seen by a wider population looking for scientific information. The author was contacted by an educator in another part of the country last year concerning using the on-line PowerPoint presentation as an example of how children can do a good job of researching scientific topics and presenting it professionally. Another web user contacted us to determine how accurate some numbers were in one of the talks since the calculations comparing grains of sand on a beach to the number of observable stars in the sky were quite interesting. We were able to put him in touch with the participant's father, a mathematics professor.

3. CONCLUSIONS

The Junior Engineering and Science Conference sponsored by the IEEE Aerospace Conference has been successful in motivating young students in the engineering and science professions. The participants learn how to integrate information, gain a deeper understanding of an area of engineering or science, prepare and deliver an oral presentation with visual aids, and experience answering technical questions in front of an audience. It also effectively enhances their self-esteem by demonstrating that they can do a good job at a difficult task. Many of the participants practice their talks in their classroom prior to the conference, disseminating the experience to a much larger number of children. Many of the participants express a newfound interest in pursuing a career in a scientific field. In addition to conference participants, many other students are typically impacted. For instance, the participants are encouraged to practice their talks in front of their school classrooms or other group (such as a scouting troop or club) before the actual conference presentation. In this way, other children are able to observe how much one motivated child can accomplish, as well as the fun she/he had learning about science or technology. One of the participants was asked to give her presentation to her entire school during Engineering Week and was able to impact up to 300 children. These excellent peer examples have potential to motivate a large number of children to pursue scientific investigations.

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