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The NASA Goddard Space Flight Center Virtual Science Fair

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National Aeronautics and
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Greenbelt, Maryland 20771

June 2002

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Abstract

This report describes the development of the NASA Goddard Space Flight Center Virtual Science Fair, including its history and outgrowth from the traditional regional science fairs supported by NASA.The results of the 1999 Virtual Science Fair pilot program, the mechanics of running the 2000 Virtual Science Fair and its results, and comments and suggestions for future Virtual Science Fairs are provided. The appendices to the report include the original proposal for this project, the judging criteria, the user's guide and the judge's guide to the Virtual Science Fair Web site, the Fair publicity brochure and the Fair award designs, judges' and students' responses to survey questions about the Virtual Science Fair, and lists of student entries to both the 1999 and 2000 Fairs.

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Introduction

This document describes the creation of a Virtual Science Fair (VSF), one of the accepted proposals funded by the 1999 NASA Goddard Space Flight Center (GSFC) Director's Discretionary Fund (DDF). This project was subsequently extended and funded through 2000. This report details the history of the VSF, the results of the 1999 pilot program, the mechanics of running the 2000 VSF as well as its results, and comments and suggestions for future VSF efforts. This report will not describe the details of the layout of the VSF Web site. The reader can best understand the general functionality of the VSF Web site by visiting *http://scifair.gsfc.nasa.gov*.

The appendices of this report contain supporting documentation for the Web site as well as additional documents developed as part of this project.

History

NASA has always been a strong supporter of science fair programs by providing judges and recognition at various levels of competition. This has been an excellent way to encourage student participation in science and engineering research. The prestige and history of the NASA name gives this recognition and encouragement extra weight. The VSF is a new step in that tradition. To understand the VSF, it is necessary to understand the factors that encouraged its creation.

Regional Science Fairs at the Goddard Space Flight Center

As part of NASA's support of regional science fairs, NASA had empowered its field centers to present NASA awards at regional science fairs in their respective educational outreach region. For local fairs, the Goddard Space Flight Center would send its own scientists and engineers to judge. NASA contractors or other proxies obtained through the local science fair coordinators often judged the more remote fairs.

As budgets shrank and changed, the financial responsibility for the regional NASA awards shifted completely to the NASA centers. Since Goddard's educational outreach area stretches from Washington, D.C. through Maine, it became logistically and fiscally impractical for Goddard to support all such regional fairs.

Inception of the Virtual Science Fair

Originally, a group of Goddard engineers and scientists proposed to the Education Office the possibility of reinstating the NASA award on a more local level, supporting only those fairs that could be reached by Goddard volunteers without travel expenses. Aside from cost issues, the main problem with this proposal was that it would not equitably represent all of Goddard's educational outreach area. In order for a Goddard regional science fair award to be considered, it needed to be accessible to a broad range of students from throughout the educational outreach area. The solution proposed was to create a Virtual Science Fair.

But just what is a Virtual Science Fair? The idea was to use the Internet as a way to reach students in the educational outreach area in the most efficient manner. Most students have access to the Internet and many already use computers in conjunction with school work. Thus, Goddard would demonstrate the feasibility of moving from a traditional science fair to the electronic — or virtual — world.

In a virtual science fair, students present their projects using electronic media such as Web pages, electronic images, word processing documents, sound and video. The judges and the students communicate electronically using e-mail and possibly even more sophisticated techniques such as video conferencing.

By using the Internet, judges would also be able to evaluate projects over several days and at their own convenience. This allows NASA scientists and engineers — who might not otherwise judge a science fair — the opportunity to interact with students.

VSF Pilot Program

The broad goal of the DDF proposal (see Appendix A) was to provide a Virtual Science Fair for 9th to12th grade students in the Goddard educational outreach area. The 1999 Fair was a pilot program. The specific goal was to prove the viability of the VSF concept and use the feedback from the pilot program to refine and improve the process.

VSF Structure

The Fair focused on Goddard's Enterprise areas and had three categories for projects: Earth Science, Space Science, and Space Technology. The Internet format would provide students with unprecedented access to NASA scientists and engineers.

The funds from the DDF purchased the hardware and software necessary for a computer to act as the VSF Web server. Some of the funds were intended to procure external support in creating and maintaining the Web site as necessary.

The VSF was designed to duplicate the format of a traditional science fair. Students would prepare presentation material, and judges would evaluate that material and interview the students. In the case of the VSF, however, that entire process would take place over the Internet. Guidelines for entries were developed to give students the greatest amount of latitude possible. Students could submit projects as Web pages or in a variety of electronic formats. It was hoped that by allowing this variety of electronic submissions, students with limited Web authoring skills would not be penalized.

Judging criteria for the VSF were developed based on evaluation guidelines for the traditional NASA award, with a focus on Goddard missions and Enterprise areas (see Appendix B). One of the goals of the VSF was to reward good research projects, especially those most relevant to the Goddard Space Flight Center. This, it was hoped, would encourage students to find out more about Goddard when developing and presenting their project. In this way, students would be more likely to take advantage of other Goddard educational outreach resources.

Implementation

With the framework designed, a Web site was developed for the VSF. In order to be prepared for the spring science fair season, a relatively unsophisticated Web site was developed to host the Fair. The site contained the rules and deadlines for the Fair and instructed students to e-mail project information to the VSF coordinator. In order to reduce the risk of overwhelming VSF resources, this pilot program was restricted to 12th graders in the Goddard educational outreach area.

Advertising and promoting the VSF proved to be the most difficult and challenging part of this project. The Goddard Education Office announced the fair to schools throughout the outreach area. Educational newsgroups on the Internet and Goddard news publications also promoted participation in the VSF. These methods resulted in a very limited response. Even when participation in the fair was opened to 11th graders, Goddard received few intents to enter.

In the end, five students each indicated an intent to enter the Fair. Four of those students actually submitted a project. The titles of the projects, the students, and their respective schools are listed in Appendix C. All of these students were from the immediate Goddard geographical area. (The one project that was not submitted was from the Philadelphia vicinity.) For whatever reason, word of the VSF was either not getting out or not attracting student interest.

In spite of the small number of entries, the pilot program proceeded. At least one project was received for each of the three categories. However, with so few projects, we decided to evaluate all projects in one round of judging rather than judging each individual category and then proceeding to a grand prize judging.

We recruited several judges to evaluate the projects, all of which were presented on Web pages that the students designed themselves. Judges posed questions to students by e-mail and the students responded in kind, sometimes including additional supporting documentation on-line. Using project score sheets and participating in group discussions, the judges came to a consensus on the final VSF award placements.

All students received certificates and the two top projects received plaques. The award certificates were designed in-house by Goddard graphic artists.

1999 VSF Conclusions

Although student participation was much less than originally hoped, the 1999 VSF showed that the concept of a virtual, on-line, science fair could be applied to a NASA Goddard science fair structure. The students and judges gave comments that helped us prepare the VSF for the year 2000. This put the project a step closer to the goal of an all-Internet science fair used by students throughout the educational outreach area.

Virtual Science Fair 2000

Planning for the 2000 VSF began almost as soon as the 1999 Fair concluded. DDF funds were not available in time to purchase hardware and software necessary for the 1999 VSF, so that fair was hosted on an existing computer. For the 2000 VSF, a new Windows NT server was purchased along with supporting software, and a summer student was hired to bring the server and Web site up to speed.

Web Site Upgrades

A primary goal for the VSF summer student was to automate the VSF significantly. The 1999 VSF, although on-line, was almost completely manual. Students had to send e-mails with the requested project entry information. Judges had to print out score sheets, and those sheets had to be processed and tallied by hand. In order to streamline the process, we used Web forms and other scripting programs to process project entry information and allow judges to view those projects and score them completely via the Web. The Perl scripting language was used for the bulk of these tasks. The reader can find details of these scripts in *The NASA GSFC Virtual Science Fair Web Page User Guide* (Appendix D) and the *Index of Perl Scripts* (Appendix E).

Student Entry Processing

Forms were created for students to input all necessary project and personal information. Perl scripts processed those forms to create the necessary files to be used by judges, as well as to confirm receipt of entry forms by the VSF coordinator.

In addition, an e-mail list server was installed to provide a simplified tool for communication between the VSF coordinator and the students.

Judging Streamlining

Judging the 2000 VSF was also simplified using Perl scripting. As indicated above, processing the student entry forms generated a number of files including the student project information sheets used by the judges. Links to the student's Web site and/or other files were also contained on the project information page. A link to the student's e-mail address was also posted to provide one-stop judging for each project. These scripts also created on-line project evaluation forms that were automatically totaled. *The GSFC Virtual Science Fair Web Site Judge's Guide* (Appendix F) was created to explain to judges how to use the Web site and what was expected of them.

Web Site Usability Review

In August 1999, Goddard's Usability Engineering Laboratory reviewed the site. The observations from that review were used to make further modifications to the Web site. Suggestions included changing wording, color schemes, and page layout. These changes, which were mostly stylistic and organizational, helped to improve the readability and usability of the site.

VSF Promotion

Since promotion was a significant challenge for the 1999 VSF, advertising for the 2000 Fair began in the summer of 1999. Promotion focused on two groups: students and their teachers (for entries) and Goddard scientists and engineers (for judges).

Students

The VSF was presented at education open houses and showcases (July 9, 1999 and April 17, 2000) and at a DDF poster session held at Goddard on November 23, 1999. A VSF brochure was also prepared (Appendix G) and handed out at Goddard and through the Goddard Education Office to science educators at various regional schools.

In addition to the on-site advertising and the distribution efforts of the Goddard Education Office, the 2000 VSF was also promoted by contacting science teacher organizations. The Maryland Association of Science Teachers (MAST) and the Mid-Atlantic Chapter of the Eisenhower Consortium

were contacted and sent VSF brochures to distribute to their membership.

The final major effort for promoting the VSF was made at local regional science fairs. During the 1999 VSF, it was discovered that the best way to introduce the VSF to students was face-to-face. As a result, VSF coordinators made several trips to local and regional science fairs. The coordinators traveled to Eleanor Roosevelt High School (Greenbelt, MD); the Montgomery Area Science Fair (Gaithersburg, MD); the Prince George's County Science Fair (Largo, MD); the Anne Arundel County Science Fair (Annapolis, MD); the Morgan State University Science-Mathematics-Engineering Fair (Baltimore, MD); and the Delaware Valley Science Fairs (Philadelphia, PA). Students at these fairs who met the grade level and project category criteria received personal invitations to participate in the 2000 VSF.

Judges

Recruiting judges was a much easier process than recruiting students. In addition to the GSFC forums mentioned earlier, *Dateline Goddard* and the *Goddard News* ran advertisements for the VSF. These two venues were sufficient to attract qualified judges for all three categories. Some of these judges had never judged a science fair before. One was located at a remote site and appreciated the unique opportunity a virtual fair gave her to participate in Goddard's educational outreach activities.

Results

The initial request for projects resulted in "Intent to Participate" submissions from seven students (one project was a group submission). Two intents were from the Pittsburgh area, one from Philadelphia, and the remainder from the GSFC vicinity (Montgomery, Prince George's and Howard counties). Of these seven submissions, four were as a result of the VSF coordinators attending local science fairs.

From the seven intents, five projects were actually submitted. The project title, student, and school information for these entries are in Appendix H.

The system for intent and entry form processing worked well with only minor problems. Students who submitted electronic files, as opposed to Web sites, were required to e-mail those files separately, but all other portions of those entry files were processed automatically.

First round judging began on May 1 and was completed on May 22, 2000. Once again, the automated system worked well with only minor problems. Improvements were primarily required in communications with students. Some judges provided a great deal of feedback and questions for the students, while others did not. In the end, however, all students received constructive comments from at least one judge.

Once the initial round of judging was completed and the placements for each category determined, the first place winners of the three categories were entered into the final round of judging. These projects can be viewed at *http://scifair.gsfc.nasa.gov/* by linking to "The Winners". The final round of judging began on May 26 and winners were announced on June 27, 2000.

Certificates and plaques were sent to the VSF participants and winners on August 10. The final certificate designs are shown in Appendix I.

Survey

In order to improve the VSF for 2001, we asked the student participants and Goddard judges to give their feedback through surveys. All the completed surveys are shown in Appendix J. The following sections summarize the results of these surveys.

Student Survey

Two of the five students entered in the VSF responded to the survey request. Most of the questions were scored on a scale of 1 to 5, with 1 being the most negative response and 5 the most positive. The following are the students' survey questions.

1. How and when did you hear about the VSF?
2. Were the rules of the VSF understandable?
3. Were you easily able to decide which category your project fit in?
4. Were the judges' comments helpful?
5. How effective was the use of e-mail for communicating with the judges?
6. Did the electronic format help or hinder the presentation of your project?
7. If you are eligible, would you enter the VSF next year?
8. What would make you more interested in competing in the VSF next year?
9. How would you rank your VSF experience overall?
10. Additional comments on the VSF.

Both of the students who responded ranked all questions in the 3 to 5 point range, with most either 4 or 5. The lowest scores were for questions 3 and 4. Both students also responded to question 8 that more significant prizes, other than just certificates and plaques, would entice them to enter the VSF in the future. Students in the 1999 VSF also voiced this comment.

Judge Survey

Six of the thirteen VSF judges responded to the survey. As with the students, most of the questions were scored on a scale of 1 to 5, with 1 being the most negative response and 5 the most positive. The following are the judges' survey questions.

1. How and when did you hear about the VSF?
2. Were the judging rules of the VSF understandable?
3. How effective was the use of e-mail for communicating with the students?
4. How effective was the use of e-mail for communicating with the VSF organizers?
5. Did the electronic format help or hinder your understanding of the project?
6. Would you judge the VSF next year?
7. Would you be willing to be an e-mail advisor for students working on projects for future VSF's?
8. How would you rank your VSF judging experience overall?
9. Additional Comments.

In general, the judges responded positively to all the questions of the survey with most responses falling between 3 to 5 points. The average scores for the those questions given a numerical point ranking are as follows:

Question	Average
2	**4.2**
3	**2.8**
4	**4.2**
5	**3.2**
8	**3.7**

The judges seemed to have experienced the most problems with communicating via e-mail. It appears that there is a learning curve when judging a science fair electronically. Most of the judges, however, appreciated the trade-off between giving a larger group of students the opportunity to participate in a NASA science fair and the slightly limited ability to give students more focused, one-on-one interaction.

Virtual Science Fair 2001 and Beyond

Once again, preparations for the 2001 VSF began almost immediately at the conclusion of the 2000 VSF. These efforts initially focused on upgrading the Web site and correcting some of the minor problems that developed in the 2000 VSF.

Web Site Upgrades

A second summer student helped upgrade the VSF Web site. She made corrections to reduce the chance of duplicate student entries and judges' score sheets. The upgrades included streamlining the intent and entry forms and adding more tools for viewing student and project information, as well as tools for editing and adding student entries and judges. These upgrades should make Web site administration and VSF coordination simpler.

Recommendations

The 1999 VSF showed that the concept of the NASA Virtual Science Fair is feasible. The 2000 VSF showed that automation and all-electronic project submission and judging is also practical. Therefore, it is reasonable to say that the mechanics of the Virtual Science Fair are understood by all participants and that the current system is functional. As in 1999, the main concern for any future VSF is the level of student participation.

High School

It is difficult to say whether or not publicity for participation in the VSF reached the students. Certainly, if the VSF becomes an official program in the GSFC Education Office, that office's communication resources may improve awareness of the VSF in the science educator community. Links to Goddard education Web pages may also help in this area.

Judging from student comments, an incentive to participate is the major shortcoming of the 1999 and 2000 Fairs. Certificates and plaques — although nice — are not sufficient to encourage students to spend extra effort getting a project ready for the VSF. Although this was clear in 1999, restrictions on the use of DDF funds made it impossible to purchase additional incentives. Finding the right incentives and means of promotion should be the major tasks for future Fairs. The prizes could range from electronics to merchandise with the NASA logo. It may also be worthwhile to have a VSF day at the Goddard Space Flight Center where VSF winners are treated to a tour of Goddard, a luncheon, and special presentations. If these prizes are well defined and attractive to students, it will produce much more interest in the VSF.

One final suggestion for the high school level VSF is to extend the grade range from the current 11th and 12th grade to 9th through 12th grades. This would open the Fair to more students and would potentially create a cadre of students who compete in the Fair each year of their high school career. If we make the VSF a part of the science fair landscape for students, it will become less of a novelty and more a standard stop in the science fair competition season.

Middle School Pilot Program

During visits to area science fairs in Maryland, it was clear that some middle schools have stronger science fair programs than their associated high schools. At the Anne Arundel County Science Fair, for instance, middle school students greatly outnumbered high school students. The same was observed in Frederick County and at the Morgan State Fair. This indicates the potential for either a redirection of the VSF or, better yet, the addition of a middle school fair.

Discussions with middle school teachers during education showcases and workshops at Goddard showed that there was such an interest. It is recommended that one or two interested middle schools be invited to help create this pilot program and produce a Virtual Science Fair that meets the needs of both Goddard and the schools. This would help in establishing the concept of the Virtual Science Fair. Middle school students, who are the first generation of students to grow up with the Internet, may also be the most receptive to the idea of an "all-electronic" science fair.

Conclusions

The NASA Goddard Space Flight Center Virtual Science Fair is functional. While improvements can and should be made, the 1999 and 2000 Fairs have shown the potential and practicality of this project. For the program to be a complete success, however, it will require greater student participation. The key to this may be to supply students (and perhaps judges) with greater incentives to participate. For high school students, this may mean more attractive prizes.

Broadening the base of students allowed to enter may also help to establish the VSF. This means expanding high school participation to include 9th to 12th graders. Consideration should also be given to a pilot program for middle school students. Not only may these students be more receptive

to an Internet science fair, but also middle school science teachers may be more willing to explore the VSF concept and encourage students to participate.

Science fairs have always been an excellent tool for NASA to encourage student involvement in science and engineering, as well as a method for public outreach. The Virtual Science Fair may be the next step for NASA to take in advancing this important tradition of student inspiration and education.

Appendix A:

Director's Discretionary Fund Proposal for the Virtual Science Fair

Proposal Title: NASA Goddard Space Flight Center Virtual Science Fair

Principal Investigator: Jeff Bolognese – Code 542
Co-I: Harvey Walden – Code 588
Co-I: Elaine Lewis – Code 130.3

Background:

Historically, NASA has provided, though its centers, special awards of merit to 9-12th grade student scientists. These awards were given at regional science fairs for outstanding projects related to NASA's science and technology enterprises. NASA has inspired students into careers of science and engineering by giving them the recognition of a leading research organization as well as allowing them to interact with scientists and engineers in their areas of interest. There has been a substantial increase in the number of science fair support requests in GSFC's service area, which includes the 12 states north of Washington, DC through Maine. These requests are not always served due to the distances involved and limited resources. The purpose of this proposal is to provide, for 9-12th grade students within Goddard's area of education outreach responsibility, a Virtual Science Fair.

Objectives:

- The Virtual Science Fair will capitalize on the unique nature of GSFC research and technological development while utilizing Goddard's 3 major Enterprises as categories for projects: Earth Science, Space Science, and Space Technology.

- The process will provide students with easy access to scientists and engineers whose areas of expertise match the students' interests.

- Students will be inspired to pursue careers in science and technology through interaction with NASA and its employees.

- The Virtual Science Fair will be available to all school districts in the Goddard Space Flight Service Area, with an emphasis placed on underserved urban areas.

- Minority scientists and engineers will be recruited to encourage culturally diverse student participation.

- Relationships between GSFC and local community colleges will be strengthened by using community college students to assist in Web site development.

The objectives will be accomplished through a *final product* consisting of a Web site that contains information on the Virtual Science Fair, judging categories and criteria, submission requirements and format, links to other GSFC sites, and GSFC contacts. At the conclusion of the science fair, winners will also be posted on the site.

Research and Development:

- Evaluate existing virtual science fair Web sites for possible Web design ideas. A few other sites exist, and learning from their successes and failures should help reduce our Web design time.

- Develop student research topics specific to GSFC. A narrow description of project topics should be in place for this pilot program.

- Refine judging criteria, and project submission formats. The final project submission format should allow maximum student participation, but should not curtail creative use of Internet unique technologies that may enhance the project presentation (e.g.: animations, audio, etc.)

- Begin Web site development as soon as possible with completion by March 31, 1999. Partnering with students from local community colleges with Web authoring curricula could provide much of this support and expand our educational outreach. Local high school teachers will be invited to evaluate the site for ease of use and understanding.

- The site should be ready for submissions by April 1, 1999, in time for the beginning of the science fair season. Announcement of the fair will be made to regional fairs, schools and through science teacher organizations throughout the GSFC region. In order to reduce the risk of over commitment of resources, this pilot program will be open only to 12th grade students in the GSFC region.

- Solicit teams of judges for each of the 3 Enterprise categories to review student projects. Teams will be in place and briefed on the review process in time for student submissions in April. Initial judging should be completed by May 15, 1999. At that point, the pool of projects will be reduced to 4 or 5 finalists in each category. Final judging, via student teleconferences, will occur by June 1. Winners will be announced, posted on the Web site, and have awards sent to them.

- Based on results and comments from the first GSFC Virtual Science Fair, upgrades will be made to the Web pages over the summer of 1999. This time can also be used to evaluate how best to expand the pilot program to better serve the educational community and its students.

- Two students from local community colleges, who are involved in Web authoring curricula, and recommended by community college faculty, will work on the Web site. The students will make necessary upgrades to the Web pages over the summer. These changes can be used to expand our educational outreach to grades 9-12, in the Goddard service region.

Context:

The concept of a Virtual Science Fair is directly related to Goal 3 of the GSFC Strategic Plan. A virtual science fair provides coverage of all the Goddard educational outreach region at a minimal cost, and still allows secondary students to interact with NASA scientists and engineers. The science fair will emphasize GSFC missions and expertise. Through the Web site, students, educators and parents, will become aware of the unique nature of Goddard's research and technological developments. Students will create a project that is based on their interest, and benefit from the expertise of GSFC scientists and engineers. Students will expand upon the knowledge that they have acquired through their academic studies by applying it to real world science and technology problems. This heightened awareness of science and technology, and the impact it has on their lives, will also increase interest in pursuing careers in these areas.

Budget:

PC for Web service	$4K
Web administrator	$6K
Awards	$1K
Summer Intern	$4K
Graphics Support	$2K
	$17K

PI/CoI Time:

Jeff Bolognese	0.1 MY
Harvey Walden	0.1 MY
Elaine Lewis	0.1 MY

Appendix B: Virtual Science Fair Judging Criteria

Virtual Science Fair Judging Criteria

The following is a listing of the judging criteria and point values used in evaluating VSF projects:

I. SCIENTIFIC THOUGHT / ENGINEERING GOALS – 35 points

1. Does the student understand the project's ties to Goddard research and development?
2. Is the scientific method clearly and accurately applied (problem, hypothesis, procedure, use of controls, data collection and analysis, conclusions)?
3. Is the solution workable and practical?
4. Is the experiment repeatable, particularly under appropriate conditions of use?
5. Does the student cite scientific/technical literature, where appropriate?

II. CREATIVITY AND ORIGINALITY – 25 points

1. Does the investigation help answer a question in an original way?
2. Did the concept and method of solution originate with the student?
3. Did the student demonstrate innovation in the approach to solving the problem?

III. THOROUGHNESS – 15 points

1. Are the project's conclusions adequately supported by the data/observations presented?
2. Was the project completed within the scope of the original intent?
3. Does the student demonstrate awareness of other approaches or theories relevant to the project?

IV. SKILL – 15 points

1. Does the student demonstrate the required laboratory, computational, observational, and design skills to obtain supporting data?
2. Is the role of each participant (team member, mentor, etc.) in the project clearly defined?

V. CLARITY – 10 points

1. Does the student use the medium of presentation effectively?
2. Does the student clearly explain the project's purposes, procedures, and conclusions?
3. Is the project presented in a clear, concise, and well-organized fashion?

Appendix C: 1999 Virtual Science Fair Entries

Entries for the 1999 Virtual Science Fair

The following table lists the names, projects and schools for those students who entered the 1999 VSF.

Name	Project Title	Category	School
Marcela Smid	Algorithms and Analysis Tools for Soil Carbon Content Modeling Based on Thematic Mapper Satellite Data*	Earth Science	Eleanor Roosevelt High School, Greenbelt, MD
Sarah F. Zelechoski	Imaging Quasi-Stellar Objects Using Geodetic VLBI**	Space Science	Westlake High School, Waldorf, MD
Marc Carney	Variations in Synthesis of Buckminsterfullerenes	Space Technology	Westlake High School, Waldorf, MD
Adam Siegel	Mathematical Moon	Space Science	Walt Whitman High School, Bethesda, MD

* First Place Project

** Second Place Project

Appendix D: The NASA GSFC Virtual Science Fair Web Page User Guide

The NASA GSFC Virtual Science Fair Web Page User Guide

By Carl Michael Szabo
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Welcome to the wonderful world of the NASA GSFC Virtual Science Fair (VSF) at *http://scifair.gsfc.nasa.gov*. This document describes the VSF Web pages including general architecture and use. The Web pages have been designed so that a user can understand them in the absence of knowledge of either the Perl scripts or the HTML Web programming language used to build the pages. This user guide is meant to assist the Web site administrator in understanding, using and modifying the VSF Web site.

This user guide contains instructions on how to add judges and new full access users, change recipients of e-mails, update the Web pages, and control certain aspects of the Web page appearance and information.

I. Understanding the Web Page

The first observed link on the Scifair Web page, as seen through a Web browser, is the logo on the bottom of the page. From there, the user is taken to the index page. The frame on the right side contains links to all parts of the Web site and is used for navigation by both students and judges.

Most sections of the Web site are devoted to the student participants and include information on the logistics of the VSF, project categories, rules, and entry forms. The other section is used by VSF judges to evaluate student projects and communicate with the contestants.

Most of the data generation and updating of the Web site is completed through Perl scripts. These are computer programs that are used to process entry and judging information as well as to allow the Web site administrator to modify VSF data. The Perl scripts process most of the data through the use of Web forms. Following are examples of how two of the most basic Web site forms work.

II. Forms

When the "submit" button is activated on a form, a large number of actions occur. In order to understand these actions, we will see what happens when the intent form is submitted.

A. Intent Form

The intent form submits the applicant's name, address, phone number, school address, etc. and informs the webmaster that the student is interested in joining or finding out information about the Web site. The form checks to see if the student has sent an intent form previously by checking the name and e-mail address. If there is a duplicate intent form, the form does not allow the user to re-submit his intent form. If there is a student with the same name but a different e-mail address, the form adds a "2" to the end of the user's name.

This information has several destinations, namely, the webmaster's e-mail and six different files. To change the destination e-mail address, simply open each mail Perl script, *mail1.pl*, *mail1a.pl*, *mail2.pl*, and *mail2a.pl* with wordpad. Then locate the line of code that says, *$to="yourname@server.com",* and fill in your e-mail address between the quotes. Make sure you change this in all four of the different Perl scripts; otherwise, you will receive only some of the mail.

The next location for the student information is a series of Web pages. For each student, a Web page is created with all of his information. This Web page is located in

d:\www\hostdata\intnet\which ever category they select\their name without any spaces

A Web page with the student's name can be found with all of his information. A second Web page without the student's address or phone number is sent to a second directory at

d:\www\userdata\intent\which ever category they select\their name without any spaces

Here the abbreviated version is kept for access by the judges of the competition.

All entries by the students are maintained in a master list located within each folder. There is a *master.txt* containing the names of all students who have entered, which does not delete duplicates. Within the same folder is a *master.html* that contains links to each of the students within the same category.

It is recommended that none of the folders or routes to those folders be changed**.**

B. Entry Form

The entry form is much like the intent form with a few small modifications. It sends the applicant's information to the webmaster in e-mail format and creates two different personalized Web pages and master directories, but the directory of these files is changed. The location of these Web pages and master directory is

d:\www\hostdata\entry\which ever category they select\their name without any spaces

for the webmaster or anyone with full access privileges to all the applicant's information, and

d:\www\userdata\entry\which ever category they select\their name without any spaces

for the applicant's information without address or phone numbers.

When a person has entered the contest, he will receive a confirmation e-mail with the option of directing him to the Scifair list server and a second e-mail will be sent to the master server.

Unlike the intent form, the entry form, when completed and submitted, creates a judge's entry form to be completed by assigned judges. This is discussed below.

III. Judge's Area

The judge's area is quite possibly the most complicated, yet, at the same time, the most user-friendly part of the Scifair Web site. Here a judge can enter an area of the Web site from which he can access information about a student, his school, his project, and then score that project. He can also view previously submitted scores, add judges, delete entry and intent forms, and select finalists.

A. Creating Judges

To create a judge, a user needs to be a judge with full access privileges. Under the menu "Chief Judge Tools", the option "Add Judge" must be selected. The user is taken to a page with a form. The name, password, and e-mail field all must be filled in. If the judge's e-mail address is unknown, the user can type "unknown" in the e-mail field.

The next decision to be made by the webmaster is the degree of access to give the judges. There are several different options: final, full, entry, and intent access. Full access is access to the full files on an applicant, as well as access to completed score sheets. Entry and intent access are access to the limited applicant information and the option of completing a score sheet for that applicant, but not access to completed score sheets. Final access includes the ability to select, judge and view the final contestants.

To choose the type of access for a judge, select the type from the pull-down menu. To view a list of judges, a judge who has full or final access can select "View Judges" from the tools menu.

B. Accessing Judges

Once judges have been registered in the main database, a judge can access his personal account on the Scifair Web server. On the Scifair Web site, there is a button entitled, "Judge's Area". When pressed, the user will be prompted to enter a name and password. The judge should enter his name and password normally. When the judge submits this information, if everything is correct, he will be presented with a list of files that he can access.

Once the judge has entered a category, he must click on the browser "refresh" button, since new contest entries may have been made since that page was last accessed. Here the judge can complete his task as assigned by the webmaster.

C. Judges' Tools

To access the "Judges' Tools", a judge must have universal full access privileges. The tools will appear as a menu on the bottom of the judge's area. The options for this menu are: *add a judge*, *edit a judge*, *list judges*, *delete an entry*, *select final contestants*, and *view final contestants.*

1. *Add a judge*: The process of adding a judge has been described above.
2. *Edit a Judge*: When this option is selected, the first page that opens is a list of judges. A judge is selected and this judge's information is located in the file *judgeinfo.txt*. This information is automatically entered into the form fields on the next page. If the user wants to change the data, he can enter new information into the fields provided. When new information is submitted, the files *judgeinfo.txt* and *judgelist.txt* are both updated.

3. *List Judges*: This option accesses a Perl script that reads information from the file *judgeinfo.txt* and prints it out as a table.
4. *Delete an Entry*: When this option is selected, a Perl script creates a menu of all current entries. When a name is selected and submitted, another script deletes all references to this entry from the master file for the entries and the master file for the specific category. It does not, however, delete the actual entry file. This must be done manually.
5. *Select Final Contestants*: This option creates a list of all current entries as a form. The judge will then select the entries that will go on to the final round. When this form is submitted, the master file in *security/judgesarea/final* will be created. Also, the entry forms of each of the finalists will be copied to this directory and new score sheets will be created.
6. *View Final Contestants*: This option opens up the file *security/judgesarea/final/master.htm*, which contains a list of the finalists.

IV. Student Information

Whenever a student enters information, he assumes that it will be kept confidential. This Web site ensures that it will. Information about the student's home phone number and address will not be given to anyone who does not need them to complete his task.

When a student enters his information, several actions occur: he has two personal Web pages created with his information, an e-mail with his information is sent to the webmaster, and a confirmation e-mail is sent back to the student.

The student information is put into a table and made into two Web pages. The first Web page contains all the student's information: name, address, phone number, e-mail address, school and, if relevant, mentor information. The second Web page contains only the student's name, e-mail address, school, and mentor information. The first of these two Web pages is created for the webmaster and judges with full access privileges, and the second is for the normal intent and entry-level judges.

Quick reference of locations with student information**:**

d:\www\hostdata\intent\earthscience	full intent form in Earth science
d:\www\hostdata\intent\spacescience	full intent form in space science
d:\www\hostdata\intnet\spacetechnology	full intent form in space technology
d:\www\hostdata\entry\earthscience	full entry form in Earth science
d:\www\hostdata\entry\spacescience	full entry form in space science
d:\www\hostdata\entry\spacetechnology	full entry form in space technology
d:\www\userdata\intent\earthscience	limited intent form in Earth science
d:\www\userdata\intent\spacescience	limited intent form in space science
d:\www\userdata\intnet\spacetechnology	limited intent form in space technology
d:\www\userdata\entry\earthscience	limited entry form in Earth science
d:\www\userdata\entry\spacescience	limited entry form in space science
d:\www\userdata\entry\spacetechnology	limited entry form in space technology

V. Score Sheet

The score sheet is where the judges evaluate a student's Web site and project. In order to access this form, a judge clicks the link at the bottom of the applicant's entry form.

A score sheet is created for each student upon entry into the competition. The forms can be found at

d:\www\security\judgesarea\scoresheets\which ever category\their name without a space

When the link on an entry form is accessed, the score sheet for that student is presented to the judge. The student's name, project category, and project name are already filled in. On this page, the judge must score the project using the judging criteria. The number of points allowed per category is listed next to the blank. When all the point values and the judge's name are entered, the Web site will allow the form to be submitted.

The completed forms are mailed to the webmaster with all of the subsidiary scores, as well as the total score. A second copy of the form is sent to a file that includes all of the applicant's previous scores. This file is located at

d:\www\security\judgesarea\scoresheets\completedsheets\ scoresheets\which ever category\name without a space

These completed forms can be accessed by the judges with full access privileges who will be able to see the score sheets for every applicant in their category.

With final access privileges, a judge can submit score sheets for students in the category of finalists and view completed score sheets for the finalists.

These score sheets are the last part of this Web site. They allow the judges to do their duty and facilitate the task of evaluation for the webmaster.

VI. Editing and Updating the Web Site

This will help explain how to make changes and corrections to the Web pages. In order to change a Web page, first open your preferred Web editing tool (e.g., Microsoft FrontPage). Once inside this program, open the Web page file you would like to alter by selecting it from the www folder in the "d" drive. Here you can simply click, type, and make the desired changes to the document. Click on "save" and your changes are completed. Now you must open the other version of this document and make the same changes to it. Once these changes are completed, they will be instantly implemented into the Scifair Web page.

Every so often, the "last updated date" on the Web page will need to be changed to a more recent date. To do this, simply follow the steps listed above.

When all of this is done correctly, it will keep this Web site up-to-date and informative.

VII. Lyris Message Server

The Lyris message server is a way for the webmaster to post information and send mass e-mails to all the VSF student participants and judges. Since it is self-sufficient, it is very simple to maintain this part of the Web site. All a webmaster must do is log himself in as a webmaster to *http://scifair.gsfc.nasa.gov/cgi-bin/lyris.pl* and then run this self-explanatory program. From here, the webmaster can also add contestants who have not applied to entry into the Lyris message server. All the webmaster must do is enter the student's e-mail address as a new member of the message server without a password. This will enable the applicant to see the server list and the webmaster to e-mail the applicant up-to-date information.

VIII. Conclusion

The Virtual Science Fair is a mechanism by which students throughout the Goddard educational outreach area can receive feedback and encouragement relating to their science projects from NASA scientists and engineers. The VSF Web site has been designed to automate and simplify as much of the entry and judging process as possible.

Appendix E: Index of Perl Scripts

Index of Perl Scripts

Imp-arc.pl	import list standard archives into Lyris
Inplproc.pl	import list of e-mail addresses into a Lyris list, reads the *ListProc ".subscribers"* format
Imp-user.pl	import list of e-mail addresses into a Lyris list, reads the *ListProc ".subscribers"* format
Judgecodetest1.pl	test of *judgecode*
Judgecode2a.pl	old copy of *judgecode.pl*
Addjudge.pl	adds a judge: adds entries to the files *judgelist.txt* and *judgeinfo.txt*
Judgecode.pl	takes information from the form in *judgearea.htm* and accesses *judgelist.txt* to verify the judge's name and password, prints out different menus depending on the judge's access level
Judgecode_old.pl	old copy of *judgecode.pl*
Judgecode1.pl	old copy of *judgecode.pl*
Judgecode1a.pl	old copy of *judgecode.pl*
Judgecode2.pl	old copy of *judgecode.pl*
Judgecodea.pl	old copy of *judgecode.pl*
Judgecodetest.pl	test copy of *judgecode.pl*
Delentry.pl	prints out a form with a list of the existing entries
Delentry2.pl	gets name of entrant to be deleted from the form created by *delentry.pl*, deletes that name and the information connected with it from the master list of entries and the master list from the category the entry is in
Delintent.pl	prints out a form with a list of the existing intent forms
Delintent2.pl	gets name of entrant to be deleted from the form created by *delentry.pl*, deletes that name and the information connected with it from the master list from the category the entry is in
Editjudge.pl	prints out a form with a list of the existing judges
Editjudge2.pl	prints out a form with the existing information for the selected judge and fields for changing the information
Editjudge3.pl	changes the judge's information to the new information entered in the form created by *editjudge2.pl*, changes information in the files *judgeinfo.txt* and *listjudge.txt*
Entrydirect.pl	directs the judge to a page depending on the value selected in the entry field on the main judge's page
Intentdirect.pl	directs the judge to a page depending on the value selected in the intent field on the main judge's page
Listjudge.pl	prints a list of the judges along with e-mail addresses and access levels
Lyris.pl	Web interface to Lyris
Lyrislib.pl	Perl5 interface to Lyris
Lyrispg.pl	Web interface to Lyris
Mail1.pl	old version of *mail2b2.pl*
Mail1a.pl	old version of *mail2b2.pl*
Mail1b.pl	takes information from intent form, sends e-mail and creates intent information sheet
Mail1c.pl	old version of *mail2b2.pl*
Mail2.pl	old version of *mail2b2.pl*

Mail2a.pl	old version of *mail2b2.pl*
Mail2b.pl	old version of *mail2b2.pl*
Mail2b2.pl	takes information from entry form; sends two e-mails, creates entry information form, creates listings in master directories
Scoredirect.pl	directs the judge to a page depending on the value selected in the score field on the main judge's page
Scoresheet.pl	takes information from completed score sheet and prints it to the student's completed score sheet file
Scoresheet2.pl	takes information from completed score sheet and prints it to the student's completed score sheet file
Select.pl	prints out a form with entrants
Simple.pl	test script
Simple_bin_file.pl	test read of binary file
Simple_mail.pl	test mail
Survey1.pl	reads in information from student survey, sends two e-mails
Survey2.pl	reads in information from judge survey, sends two e-mails
Temp.pl	blank file
Tempnew.pl	old version of *mail2b2.pl*
Temporig.pl	old version of *mail2b2.pl*
Testmail.pl	old version of *mail2b2.pl*
Tooldirect.pl	directs the judge to a page depending on the value selected in the judge's tools field on the main judge's page
Viewfinal.pl	reads information from *select.pl*; prints names to *finalists.txt*, prints information to *master.htm*

Appendix F: Virtual Science Fair Web Site Judge's Guide

The GSFC Virtual Science Fair Web Site Judge's Guide

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This document has been created for all judges who will use the GSFC Virtual Science Fair (VSF) Web site. Our goal is to make your job as easy as possible, so we have designed the Web site with a great deal of automation. This guide will inform you about the different aspects of the Scifair Web site and the judging process. The guide describes the different levels of access privileges, and the mechanics of using the Web site to judge the VSF.

I. Gaining Access

Gaining access to the judge's area of the Scifair Web site is very simple. You will receive a user name and a password. Simply go to the Scifair Web site, *http://scifair.gsfc.nasa.gov*, and click the "Judge's Area" button on the left part of the screen. By clicking this button, you will be directed to the Judge's Area Web page. You will then be prompted to enter your name and password. After clicking "submit," you will enter your own personalized Web area. Depending on your level of access privileges, your Web page will reflect the areas that you can view.

Now that you know how to access your personal account, we will discuss the different levels of access that a judge may possess.

Note: Once you enter your name and password and are admitted into your own area, hit "refresh". It is imperative that you refresh any page without a black background. Your Web browser will not refresh this Web page, so any new entries will not be registered on this Web page.

II. Access Levels

Depending on your judging role, you will be assigned a specific level of access which will restrict the amount of information available to you. This should reduce the risk of confusion and information overload for VSF judges. Following is a list of the different levels of access privileges describing the purpose and amount of information available.

A. Universal Full Access

Full access allows a free range of all the different categories, and you can access all the intent, entry, and evaluation forms. From here, you will be able to view any part of a student's project including his initial form of intent. Also you will be able to see all the information about the student, including his address and telephone number. Only a limited number of people will have full access to this confidential student information.

This access level also allows the ability to add and edit judges and to delete intent and entry forms.

When you first log in, you will see four different menus: *Student Intent Forms*, *Student Entry Forms*, *Completed Score Sheets*, and *Chief Judge's Tools*.

Student Intent Forms

- To view the intent forms for all categories, select the option "All Students." This will take you to a list of students who have submitted intent forms for all the categories. To access the intent form for a student, click on that student's name. To e-mail that student, click on his e-mail address.
- To view the intent forms for a specific category, select that category from the menu. This will take you to a list of students who have submitted intent forms for that category. To access the intent form for a student, click on that student's name. To e-mail that student, click on his e-mail address.

Student Entry Forms

- To view the entry forms for all categories, select the option "All Students." This will take you to a list of students who have submitted entry forms for all the categories. Each entry will have the student's name, e-mail address, project title, and category entered.
- To view the entry forms for a specific category, select that category from the menu. This will take you to a list of students who have submitted entry forms for that category. To access the entry form for a student, click on that student's name. To e-mail that student, click on his e-mail address.

Completed Score Sheets

To view the completed score sheets for a category, select that category. The next Web page shown is a list of names. To view the completed score sheets for a student, click on his name.

Chief Judge's Tools

- *Add a judge:* This option brings up a form with four fields. Fill out each of these fields with the correct data and click "submit." The new judge will be ready to log in.
- *Edit a Judge:* The first page is a menu of all the judges. To edit a judge, select his name from the menu. The next page will show the current information for the selected judge. To change this information, enter the updated data into the provided fields and click "submit."
- *List Judges:* This option lists each judge's name, e-mail address, and access level.
- *Delete an Entry:* When this option is selected, a menu of all the current entries is created. When a name is selected and submitted, all references to this entry are deleted from the master file for the entries and the master file for the specific category. The actual entry file, however, is not deleted. This must be done manually.
- *Select Final Contestants:* This option creates a list of all current entries. To select an entry as a finalist, simply check the box next to the entrant's name. You can select as many finalists as you want. When you are finished selecting, press the "submit" button.
- *View Final Contestants:* This option allows you to view all the finalists. From here, you can click each project title to go to that student's entry page.

B. Limited Full Access

Many category leaders will have limited full access. This level of access gives free range of all papers in one category. It will enable you to complete the task of being the group leader of a specific topic without difficulty. From here, you can gain the full data on any student, including telephone number and address, as well as all information they have submitted about their project to date. Since all changes and submissions are instantaneous, the category leader will be able to keep up-to-date on the student's progress by simply accessing this Web page. He will also be able to the see the scores given to a student by any judge. From here, the category leader can access the information needed to regulate the contest in a specific category, and provide the results of the judge's evaluations.

When you log in, there will be two menus: *Student Entry Forms* and *Completed Score Sheets*.

Student Entry Forms

- To view the entry forms for all categories, select the option "All Students." This will take you to a list of students who have submitted entry forms for all categories. Each entry will have the student's name, e-mail address, project title, and category entered.
- To view the entry forms for your category, select that category from the menu. This will take you to a list of students who have submitted entry forms for that category. To access the entry form for a student, click on that student's name. To e-mail the student, click on his e-mail address.

Completed Score Sheets

The option of "All Completed Score Sheets" (in your category) brings you to a page with names. To see the completed score sheets for a specific student, click on his name.

C. Final Access

This level of access is for final round judges. With final access, you have the ability to select, judge, and view the final contestants. Your job will be to select the contestants who will go on to the final round, and then to judge those contestants.

When you enter the judge's area, you will see a menu called "Judge Tools." There are two options:

- *Select Final Contestants:* This option creates a list of all current entries. To select an entry as a finalist, simply check the box next to the entrant's name. You can select as many finalists as you want. When you are finished selecting, press the "submit" button.
- *View Final Contestants:* This option allows you to view all the finalists. You can click each project title to go to that student's entry page.

D. Universal Intent Access

This level of access gives you access to the entire list of students who have completed intent forms in all three categories. You will receive all the information about a student, except for his address and telephone number. The intent form captures basic information about the student and his project. The

student provides more detailed information as he completes the project and enters it in the Fair.

When you first enter the judging area you will see a menu of intent forms with four options:

- To view the intent forms for all categories, select the option "All Students." This will take you to a list of students who have submitted intent forms for all categories. To access the intent form for a student, click on that student's name. To e-mail the student, click on his e-mail address.
- To view the intent forms for a specific category, select that category from the menu. This will take you to a list of students who have submitted intent forms for that category. To access the intent form for a student, click on that student's name. To e-mail the student, click on his e-mail address.

E. Full Intent Access

This level of access will give you access to the entire list of students who have completed intent forms in a specific category. You will receive all information about a student, except for his address and telephone number. The intent form captures basic information on each student and his project. The student provides more detailed information as he completes the project and enters it in the Fair. Intent access will be at most limited to one category.

When you enter the judge's area you will have two choices:

- Master directory of all students who intend to enter the Fair (in your category): This will take you to a list of students who have submitted intent forms for your category. To access the intent form for a student, click on that student's name. To e-mail the student, click on his e-mail address.
- Master directory of all students currently in the Fair: This will take you to a list of students who have submitted entry forms in all categories.

F. Limited Intent Access

This is one of the most limited levels of access privileges. You will have access only to one student and only in the intent category. This option will most likely be used if the contestant pool becomes massive and greater than one or two judges can handle. Your job will most likely entail judging this one student.

When you enter the judge's area you will have two choices:

- Student's notification of intent information: This will take you to that student's intent form.
- Master directory of all students currently in the Fair: This will take you to a list of students who have submitted entry forms in all categories.

G. Universal Entry Access

This is much like the level of Universal Intent Access. Both possess the same attributes directed differently, with this one directed to the entry category. You can view all entry forms submitted by all students in all three categories. You cannot view the phone numbers or addresses of students in the entry category. From here, you can view all the student entry forms and complete a judging form. The judging forms will be sent to the webmaster but you cannot see scores from other judges nor can other judges see your scores.

When you first enter the judging area you will see a menu of entry forms with four options:

- To view the entry forms for all categories, select the option "All Students." This will take you to a list of students who have submitted entry forms for all categories. To e-mail a student, click on his e-mail address.
- To view the entry forms for a specific category, select that category from the menu. This will take you to a list of students who have submitted entry forms for that category. To access the entry form for a student, click on that student's project title.

H. Full Entry Access

This is much like the level of Full Intent Access. You can view all the entry forms submitted by all students in the entry category. You will not be able to view the phone numbers or addresses of students in the entry category. Your access will be limited to the entry category alone. From here, you can view all the student entry forms and complete a judging form. The judging forms will be sent to the webmaster but you cannot0 see scores from other judges nor can other judges see your scores.

When you enter the judge's area you will have three choices:

- All students: This will take you to a list of all students who have submitted entry forms. To e-mail a student, click on his e-mail address.
- Your category: This will take you to a list of students who have entered in your specific category. To view a student's entry form, click on his project title.
- Finalists: This will take you to a list of students who have been chosen as finalists. To view a student's entry form, click on his project title.

I. Limited Entry Access

This level is similar to the Limited Intent Access. You will only have access to information from one student. You will be able to look at information about this student, except for address and telephone number, and complete a judging form on the quality of his Web page. You will not be able to see how other judges have scored this contestant, nor will they be able to see your scores.

When you enter the judge's area you will have two choices:

- Student's full project information: This will take you to that student's entry form.
- Master directory of all students currently in the Fair: This will take you to a list of students who have submitted entry forms for all categories. To e-mail a student, click on his e-mail address.

III. The Judging Process

A. *Chronology*

The sequence of the judging process is as follows:

1. Judges assigned categories and given log in names and passwords.
2. First round judging begins.
3. Judges review projects and communicate with students.
4. Judging ends and projects are scored.
5. Category winners are selected based on project scores.
6. Projects are selected for final round of judging based on project scores and judges' recommendations.
7. Final round of judging begins.
8. Projects are scored (students may be interviewed during this process).
9. Overall VSF winners are selected and announced.

B. *Using the Web Site*

Once judges are selected and assigned to specific project categories, they will be given a log in name and password. These allow access to the restricted judging area. Judges should test the name and password combination once received to make sure they can access their assigned projects.

Judging will begin as soon as completed student entry forms and projects are submitted. This may be before the entry deadline in order to give the judges a head start on project judging.

After logging in to the "Judges' Area" of the Web site, you will be directed to a Web page with links to all the projects you have been assigned to judge. You may also have links to the student intent forms and judges' information, depending on your level of access. Selecting a "Student Entry Form" category will display a list of students and projects in that category. Selecting a project title from that list will take you to the entry information page for that particular project.

The project entry information will have the project abstract, links to the student project and contact information for the student (usually an e-mail address). Projects will either be in the form of Web sites or electronic documents. As projects are reviewed, judges may ask questions of the student or request clarification or additional information via e-mail. Use the e-mail link on the entry page for this communication, as this link is configured to automatically send a copy of the message to the other judges for your category. Your interaction with the students is vital to fully assessing the project and the student's understanding of that project.

Once you have reviewed a project, the next step is to score it. At the bottom of a project entry form you will find a link to the project "Score Sheet". Connecting to this link will generate a project score sheet with the student's name, project, and category. The score sheet indicates the scoring categories and criteria. The judging criteria can also be found in the main area of the VSF Web site. Students will not see these score sheets.

Judges are required to fill in their name and score all categories before submitting the score sheet. Submitting the score sheet will automatically total the values on the sheet and add your scores to the project scoring record.

Once submitted the score sheet cannot be updated! If you have made an error or wish to make changes or re-score a project, you must contact the Web site administrator.

Once a judge has completed evaluating all his assigned projects, his job is essentially completed. The chief judge may ask for suggestions or nominations for projects to be submitted for the final round of judging. Depending on the number of projects submitted to the VSF, the top one or two projects in each category will automatically be entered for the grand prize judging.

Those judges selected as grand prize judges will then evaluate the finalists. The judging process is identical to the first round judging, although students may be contacted via telephone in addition to e-mail if a more detailed interview is necessary. The grand prize judges vote on the finalist projects using the same scoring criteria. A separate menu will be available in the judges' area for this round of judging.

C. Additional Judges' Responsibilities

Aside from the mechanics of reviewing and scoring all assigned projects, judges should also make an effort to communicate the strengths and weaknesses of projects to the students. Since students will not see their score sheets, you should convey the gist of your scoring to the students separately. Comments should be constructive and point out areas of improvement and possible future directions for the project. In addition, be sure to comment on aspects of the project that you thought were particularly good.

Always remember that our goal is to encourage students to explore science and engineering. As a professional and a representative from NASA, your opinions and suggestions will mean a great deal to the students.

IV. Conclusion

The VSF is an ever-evolving effort and your involvement is the key to making it a success. Our goal is to reach a broad range of students and inspire them to pursue their interests in science and engineering. This guide was designed to explain the VSF judging process and aid judges in using the VSF Web site. If you have any additional questions, please contact the VSF coordinator.

Thank you for your interest in the scientists and engineers of tomorrow.

Appendix G: Virtual Science Fair Brochure

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Appendix H: 2000 Virtual Science Fair Entries

Entries for the 2000 Virtual Science Fair

The following table lists the names, projects and schools for those students who entered the 2000 VSF.

Name	Project Title	Category	School
Jessica Webbon	The Auger Emission Spectrum of Iron*	Space Science	Eleanor Roosevelt High School, Greenbelt, MD
Matthew Harrison	A Study of Plate Modes Using Laser Interferometry**	Space Technology	Germantown Academy, Fort Washington, PA
Alon Shalev	An Empirically Generated Latitude Dependent Ocean Temperature Model***	Earth Science	Northwest High School, Germantown, MD
Xiaolin Li	Analysis of the Near Earth Asteroid Rendezvous X-ray Remote Sensing Data	Space Science	Eleanor Roosevelt High School, Greenbelt, MD
Christina Bonebreak	Celestial Motions, Systems of Time, and Coordinate Systems: Understanding Star Selection	Space Technology	River Hill High School, Clarksville, MD

* First Place Project
** Second Place Project
*** Third Place Project

Appendix I: Virtual Science Fair Award Designs

NASA GODDARD SPACE FLIGHT CENTER
Presents this Award to
Jessica Wellon
for
First Place
At the 2000 Goddard Space Flight
Center Virtual Science Fair
June 23, 2000
Date
NASA
Director,
Goddard Space flight Center

NASA GODDARD SPACE FLIGHT CENTER
Presents this Award to
Alon Shalev
for
First Place
in
Earth Science
At the 2000 Goddard Space Flight Center Virtual Science Fair
June 23, 2000
Date
NASA
Director,
Goddard Space flight Center

NASA GODDARD SPACE FLIGHT CENTER
Presents this Award to
Jessica Wellon
for
First Place
in
Space Science
At the 2000 Goddard Space Flight Center Virtual Science Fair
June 23, 2000
Date
Director,
Goddard Space flight Center

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Print from original hardcopy.

Appendix J: 2000 Virtual Science Fair Survey Responses

Responses to 2000 Virtual Science Fair Judge Survey

Following are the responses from the survey of judges for the 2000 GSFC Virtual Science Fair. Questions with a numeric score were based on a scale from 1 to 5 with "1" corresponding to strong disagreement or "no," and "5" corresponding to strong agreement or "yes". Six of the thirteen judges responded.

Q: How and when did you hear about the VSF?
A: Weekly Goddard newsletter.

Q: Were the judging rules of the VSF understandable?
A: 5

Q: How effective was the use of e-mail for communicating with the students?
A: 3

Q: How effective was the use of e-mail for communicating with the VSF organizers?
A: 5

Q: Did the electronic format help or hinder your understanding of the project?
A: 3

Q: Would you judge the VSF next year?
A: Yes

Q: Would you be willing to be an e-mail advisor for students working on projects for future VSF's?
A: Yes

Q: How would you rank your VSF judging experience overall?
A: 4

Q: Additional comments on the VSF:
A: As a judge in a category with only one entrant, I had some difficulty in that I couldn't compare the quality of the work to other students' work. I would have liked to look at entries in other categories (as a judge would while wandering through a live fair). In retrospect, my scores would not have been different but at the time of judging, this seemed an impediment to doing the best job possible.

My "yes" answers to questions 6 & 7 create a potential conflict of interest but what the heck. I mean to imply that both are worthwhile endeavors. Virtual mentoring has the potential to open the fair to students (and schools) with relatively limited science opportunities.

Q: How and when did you hear about the VSF?
A: I guess from the time that it was first proposed as an alternative to trying to have a formal NASA presence at the many regional and state science fairs.

Q: Were the judging rules of the VSF understandable?
A: 4

Q: How effective was the use of e-mail for communicating with the students?
A: 3

Q: How effective was the use of e-mail for communicating with the VSF organizers?
A: 5

Q: Did the electronic format help or hinder your understanding of the project?
A: 3

Q: Would you judge the VSF next year?
A: Yes

Q: Would you be willing to be an e-mail advisor for students working on projects for future VSF's?
A: Maybe

Q: How would you rank your VSF judging experience overall?
A: 4

Q: Additional comments on the VSF:
A: I'm not sure if more consistency among the projects might be helpful or not. Now there are many different formats for the electronic presentation and it is a little harder to compare them to each other. It would be easier if they were all PowerPoint presentations, but that would also be limiting in creativity and some of them may not be adept at PowerPoint. More consistency would make judging a little easier, however.

Q: How and when did you hear about the VSF?
A: Goddard News, I think.

Q: Were the judging rules of the VSF understandable?
A: 3

Q: How effective was the use of e-mail for communicating with the students?
A: 2

Q: How effective was the use of e-mail for communicating with the VSF organizers?
A: 1

Q: Did the electronic format help or hinder your understanding of the project?
A: 4

Q: Would you judge the VSF next year?
A: Maybe

Q: Would you be willing to be an e-mail advisor for students working on projects for future VSF's?
A: No

Q: How would you rank your VSF judging experience overall?
A: 2

Q: Additional comments on the VSF:
A: I tried to communicate problems to the VSF e-mail address and got back unhelpful responses from a computer. It was clear no human wanted to bother reading too much.

Because the directions were unclear, I sent my judges' comments on one project to the author of another project that I had already judged. She sent them back. Next, I sent them to one of your uncaring computers which possibly threw them away. I still don't know if the second student ever received my comments.

Q: How and when did you hear about the VSF?
A: GSFC News via e-mail a few months prior to the VSF.

Q: Were the judging rules of the VSF understandable?
A: 3

Q: How effective was the use of e-mail for communicating with the students?
A: 3

Q: How effective was the use of e-mail for communicating with the VSF organizers?
A: 5

Q: Did the electronic format help or hinder your understanding of the project?
A: 3

Q: Would you judge the VSF next year?
A: Yes

Q: Would you be willing to be an e-mail advisor for students working on projects for future VSF's?
A: Maybe

Q: How would you rank your VSF judging experience overall?
A: 5

Q: Additional comments on the VSF:
A: Had fun being a judge of the VSF, very well run/organized considering it was all completed online.

Q: How and when did you hear about the VSF?
A: Through the weekly e-mailed GSFC announcements.

Q: Were the judging rules of the VSF understandable?
A: 5

Q: How effective was the use of e-mail for communicating with the students?
A: 3

Q: How effective was the use of e-mail for communicating with the VSF organizers?
A: 4

Q: Did the electronic format help or hinder your understanding of the project?
A: 3

Q: Would you judge the VSF next year?
A: Yes

Q: Would you be willing to be an e-mail advisor for students working on projects for future VSF's?
A: Maybe

Q: How would you rank your VSF judging experience overall?
A: 4

Q: Additional comments on the VSF:
A: Although judging via Internet is not as one-on-one as talking to the student in person, I appreciate the opportunity the format provides to both the students and myself. I have a feeling some of the students enter their projects in more traditional science fairs, as well. This may give them the opportunity to tweak their projects. I had fun and look forward to participating again next year.

Q: How and when did you hear about the VSF?
A: In March or April 2000, responded to a GSFC news bulletin asking for volunteer judges.

Q: Were the judging rules of the VSF understandable?
A: 5

Q: How effective was the use of e-mail for communicating with the students?
A: 3

Q: How effective was the use of e-mail for communicating with the VSF organizers?
A: 5

Q: Did the electronic format help or hinder your understanding of the project?
A: 3

Q: Would you judge the VSF next year?
A: Maybe

Q: Would you be willing to be an e-mail advisor for students working on projects for future VSF's?
A: Maybe

Q: How would you rank your VSF judging experience overall?
A: 3

Q: Additional comments on the VSF:
A: The VSF experience was generally good - provided you accept the "virtual" nature of the whole thing.

But an "electronic science fair" can only do so much. I am beginning to think that I would be more comfortable judging projects that I can actually see. We can also get a better feel for the depth of understanding of the candidates if we interview them personally.

Responses to 2000 Virtual Science Fair Student Survey

Following are the responses from the survey of students who entered the 2000 GSFC Virtual Science Fair. Questions with a numeric score were based on a scale from 1 to 5 with "1" corresponding to strong disagreement or "no," and "5" corresponding to strong agreement or "yes". Two of the five students entered responded.

Q: How and when did you hear about the VSF?
A: At the Prince George's County Area Science Fair, a NASA scientist approached me, asked me if I knew about the fair, and gave me a brochure.

Q: Were the rules of the VSF understandable?
A: 5

Q: Were you easily able to decide which category your project fit in?
A: 4

Q: Were the judges' comments helpful?
A: 5

Q: How effective was the use of e-mail for communicating with the judges?
A: 5

Q: Did the electronic format help or hinder the presentation of your project?
A: 5

Q: If you are eligible, would you enter the VSF next year?
A: None

Q: What would make you more interested in competing in the VSF next year?
A: Monetary prizes or anything more substantial than a plaque, even just a luncheon.

Q: How would you rank your VSF experience overall?
A: 5

Q: Additional comments on the VSF:
A: Thanks!!

Q: How and when did you hear about the VSF?
A: From Jeff at DelVal — the regional science fair in the Philadelphia area

Q: Were the rules of the VSF understandable?
A: 4

Q: Were you easily able to decide which category your project fit in?
A: 3

Q: Were the judges' comments helpful?
A: 3

Q: How effective was the use of e-mail for communicating with the judges?
A: 5

Q: Did the electronic format help or hinder the presentation of your project?
A: 5

Q: If you are eligible, would you enter the VSF next year?
A: Yes

Q: What would make you more interested in competing in the VSF next year?
A: I would like to know what the prizes are, if any; and maybe get an idea of what other people have done. That is, all the projects be available online.

Q: How would you rank your VSF experience overall?
A: 4

Q: Additional comments on the VSF:
A: I only received comments from one of the judges; it would have been nice to get suggestions, etc., from all the judges.

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This report describes the development of the NASA Goddard Space Flight Center Virtual Science Fair, including its history and outgrowth from the traditional regional science fairs supported by NASA. The results of the 1999 Virtual Science Fair pilot program, the mechanics of running the 2000 Virtual Science Fair and its results, and comments and suggestions for future Virtual Science Fairs are provided. The appendices to the report include the original proposal for this project, the judging criteria, the user's guide and the judge's guide to the Virtual Science Fair Web site, the Fair publicity brochure and the Fair award designs, judges' and students' responses to survey questions about the Virtual Science Fair, and lists of student entries to both the 1999 and 2000 Fairs.

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