

2006
Science Buddies Annual Report

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Table of Contents

Executive Summary	3
Organization.....	3
Purpose.....	3
Description of Programs	3
Highlights of 2006	4
Results of 2006 Programs	5
Overall Website Traffic	5
The Topic Selection Wizard	6
The History of the Topic Selection Wizard	7
Topic Selection Wizard Assessment & Future Plans	7
Project Ideas.....	7
Overview of the Topic Selection Wizard Content Development Project.....	7
Project Guide	8
Ask an Expert (AAE).....	8
AAE Assessment and Future Goals.....	10
Online Mentoring Program (OMP).....	11
Ask an Expert Mentoring Program (AAEMP)	11
Ask an Expert Mentoring Program Recruiting and Training.....	11
Ask an Expert Mentoring Program Assessment and Future Plans	12
Classroom Scientists Program (CSP).....	13
Selected Participant Feedback (All Programs)	14
Student Awards & Recognition	14
Science Buddies Awards to Mentors	14
State and National Science Competition Participants & Winners	15
Ask an Expert Mentoring Program Participating Schools & Employers	16
Investigator Schools.....	16
Mentor Schools	16
Expert Employers.....	17
Calendar Year 2006 Financial Summary	18
Fundraising Summary.....	19
Contact Information	19

Executive Summary

Organization

The Kenneth Lafferty Hess Family Charitable Foundation is a 501(c)(3) public charity (founded in 1995). In 2001, the Foundation began its sole operating program: Science Buddies. Science Buddies is located in the San Francisco Bay Area, but serves students from all over the United States and English speakers in many other nations.

Purpose

Science Buddies focuses on helping a diverse audience of K-12 students do better science research projects. We provide some of the most useful and high-quality educational material available on the Internet for students who are doing science fair projects. All of our programs aim to save students time while simultaneously improving the quality of their scientific investigations. Our mission is to help children from all walks of life develop a love of science and an understanding of the scientific method.

Description of Programs

The common theme running among all Science Buddies programs is the goal of identifying specific student needs (e.g. "I need help selecting a topic for my project") and creating solutions (not just reading material) that actively engage students and scientific professionals. Our programs focus on:

- Involving science and technology professionals to interact directly and indirectly with the students, making science real.
- Leading students to projects that are more challenging and have a higher science content than projects they might choose on their own.
- Saving students time and frustration: students WANT to use our tools because they save them time and make science research more fun.

We offer three main types of resources for students and teachers: how-to information that explains the scientific method and the process of creating a science research project; field-specific information that introduces students to various fields of science and provides ideas for research projects; and, Web-based mentoring programs. Details follow:

1) The **Science Fair Project Guide** is a comprehensive online guide to doing science research and science fair projects. It includes step-by-step guidance, actual sample assignments, photos of science fair projects, tips for success, and self-grading guides for students. The Teacher Resources section includes a planning guide and printable copies of the how-to information.

2) The **Topic Selection Wizard** (TSW) is an immensely popular interactive tool that helps students to explore different topic areas for their science fair project. The TSW has two main components: the Interest Survey and the Interest Areas. First, the tool leads students through a series of plain English questions to help them determine science fields of true interest to them. Then the tool analyzes student responses to provide a custom-tailored selection of **Interest Areas** to visit. Currently, we maintain 25 different Interest Areas. Each Interest Area covers a major field of science or engineering and offers both background information (e.g. vocabulary, important concepts, equations and safety information) and a large selection of project idea **Starter Kits**. Starter Kits, referred to simply as **Project Ideas** on our website, are developed either in house by Science Buddies' staff scientists or by science professionals who collaborate with Science Buddies. Each kit includes a description of the subject

matter, bibliographic references, locations of Internet-based public domain tools and/or real-time scientific data, and suggestions for experiments.

3) **Ask an Expert** (AAE) is an online forum staffed by volunteer scientists and talented science students who help students anywhere, on a drop-in basis, with their project questions. AAE is a great way for a student to get help when they don't have a parent, teacher or other adult with the knowledge, time or desire to help them. When students have such help, they have more fun doing their science fair project, undertake more challenging experiments, learn more and generally develop a more positive interest in science. AAE also offers a searchable database of past questions and answers so that other students may benefit from past discussions. Science Buddies also conducts the **Ask an Expert Mentoring Program** in which we match 2-3 volunteer mentors with a specific classroom of students and they work together over the science fair season in a private mentoring forum.

Highlights of 2006

The 2006 program year was a year of growth and new focuses for Science Buddies. We had continued success with our Ask an Expert forums and we successfully conducted our Ask an Expert Mentoring Program for its first season. Our staff scientists completed work on the two year Project Idea development plan and we saw continued increase in visitors to the website.

- For the fourth year in a row, we continued to experience dramatic gains in website traffic with over 50% more visitors to our website than the prior year. We served four million unique visitors on our website during 2006 and more than 600,000 students became registered users of our Topic Selection Wizard tool. Our Teacher Resources page was accessed 73,214 times.
- We successfully raised the financial support we needed to conduct all of our key programs as well as to develop new content and new infrastructure (just over \$499,000).
- Our two staff scientists improved and expanded 50 existing Project Ideas. They also authored an impressive 191 new Project Ideas, increasing our online library's total to 316 Project Ideas. We successfully engaged professional scientists and engineers as guest authors for some of our Project Ideas, such as Adam Schepis of Symantec, who authored [Artificial Intelligence: Teaching the Computer to Play Tic-Tac-Toe](#) which, like some of our other popular Project Ideas, has been accessed over 10,000 times since being published in June of 2006.
- During the 2005-2006 school year, we successfully completed the third season of our Ask an Expert forums in which 73 volunteers from the professional community answered over 1,000 student questions. We also conducted a pilot test of a promising new classroom mentoring format that has now replaced our original Online Mentoring Program.
- In the fall of 2006, we re-designed our Web-based mentoring environment with new features appropriate for our recent switch from a one-on-one mentoring format to a group mentoring format. The new Ask an Expert Mentoring Program matches a team of about 5 mentors (typically 3 science and engineering professionals and 2 top high school students) with a group of 20 students from one classroom. The new format is still being refined, but so far it requires fewer resources to manage, encourages more peer interaction, and better accommodates a varied level of participant engagement than the older one-on-one mentoring format. The program provides personalized guidance for about 400 students and at the same time provides an excellent way to carefully track and analyze how students use the various tools and resources on our website. This provides an important feedback loop to help us improve our offerings.
- Our lean organization continued to operate very efficiently and at a much lower cost per student served than other prominent mentoring and education organizations.

In the following sections, we provide a detailed look into our 2006 season. We have included insight into our goals, successes, challenges and future plans. While our programs were successful we continued to find areas to improve and worked diligently to make those improvements or implement

upgrade plans that reflect the changing nature of our visitors. As we continue to learn more about our customers we have made an effort to provide them with the resources they need and want, and will continue to develop materials that help improve their science skills and foster their interest in science and engineering. We are thrilled to move into the 2007 season with great plans for development and continued growth.

Results of 2006 Programs¹

Overall Website Traffic

Traffic to the Science Buddies website continued to grow strongly during the 2006 program year, with significant increases in all key parameters. Our traffic is primarily generated through regular Internet advertising (with ads placed at search engines) however we also rely heavily on word of mouth and press coverage. Science Buddies was mentioned in articles appearing in major newspapers and websites including The Washington Post, The Miami Herald, and Scholastic's Science World Magazine. Highlights of our website traffic this program year include:

- A three fold increase in the number of visitors registered on our Topic Selection Wizard survey jumping from 215,353 during 04-05 to 684,307 in 2006.
- An increase in the number of visitors to the Teacher Resource section bringing the total pageviews to 73,213.
- An all time high for the total number of visitors to the website reaching 4,076,114, more than four times the numbers reported during the 2004-2005 season.

Figure 2. Science Buddies Website Traffic Summary²

Website Traffic	'04-'05	2006
	Program Year	Calendar Year
Total Visitors to Website	853,093	4,076,114
Total Page Views	6,525,371	28,163,383
Pages Viewed per Visitor	7.6	6.91
Bytes Transferred (GB)	143.3	1034.2
Avg Session Length (Min:Sec)	6:22	06:51
Visitors Registering for the Topic Selection Wizard	215,353	684,307
Pageviews of Teacher Resource Material	18,380	73,213
International Traffic (approx. percentage of total)	6.20%	15%

Figures 3 and 4 show demographics for our website. The figures below are calculated based on the registered users of our Topic Selection Wizard survey (note that registration on our website is optional; 25-30% of our total visitors register). If we apply these percentages to the 4 million visitors to our site, it shows tremendously diverse usage with thousands of minority students using our resources. For the second year in a row we have seen an increase in K-5 visitors, who now make up just over 20% of the total visitors to the website.

¹ Science Buddies Annual Report has been changed this year to reflect calendar 2006. Some of our mentoring programs are run on an academic schedule and will be discussed based on their 2005-2006 program schedule and results. All other areas of the report reflect statistics and results for calendar 2006 only.

² Traffic summary information for 2006 reflects the change to calendar year reporting and is not an exact match to the months reported during the 04-05 season.

Figure 3. Science Buddies Website Demographics

Grade Level	%Total	Ethnic Group	%Total
K - 5	21.4%	African-American	11.5%
6	14.5%	Alaska Native	0.5%
7	20.2%	Asian	5.1%
8	20.6%	Asian Indian	2.9%
9	8.5%	Caucasian	32.5%
10	5.8%	Latino-American	9.4%
11	3.3%	Native American	2.1%
12	2.9%	Other	15.0%
Adults	2.9%	Pacific Islander	1.3%
Total	100%	Decline to State	19.8%
		Total	100%

Figure 4. Registrants for the Topic Selection Wizard by State or Region (in alphabetical order by state)

State	Registered Users	% of Total	Index of Usage Per Capita (100 = Avg)	Population
Alaska	2,286	0.42%	186	670,053
Alabama	4,707	0.86%	56	4,599,030
Arkansas	5,867	1.07%	114	2,810,872
Arizona	10,838	1.97%	96	6,166,318
California	65,361	11.89%	98	36,457,549
Colorado	6,818	1.24%	78	4,753,377
Connecticut	4,414	0.80%	69	3,504,809
District of Columbia	3,320	0.60%	312	581,530
Delaware	924	0.17%	59	853,476
Florida	61,767	11.24%	187	18,089,888
Georgia	19,353	3.52%	113	9,363,941
Hawaii	2,986	0.54%	127	1,285,498
Iowa	2,365	0.43%	43	2,982,085
Idaho	1,023	0.19%	38	1,466,465
Illinois	27,307	4.97%	116	12,831,970
Indiana	12,499	2.27%	108	6,313,520
Kansas	3,363	0.61%	67	2,764,075
Kentucky	7,255	1.32%	94	4,206,074
Louisiana	8,292	1.51%	106	4,287,768
Massachusetts	13,119	2.39%	111	6,437,193
Maryland	16,083	2.93%	157	5,615,727
Maine	1,269	0.23%	52	1,321,574
Michigan	13,221	2.41%	72	10,095,643
Minnesota	7,565	1.38%	80	5,167,101
Missouri	7,176	1.31%	67	5,842,713
Mississippi	5,761	1.05%	108	2,910,540
Montana	1,210	0.22%	70	944,632
North Carolina	16,029	2.92%	99	8,856,505
North Dakota	1,060	0.19%	91	635,867
Nebraska	2,152	0.39%	67	1,768,331
New Hampshire	1,080	0.20%	45	1,314,895
New Jersey	11,710	2.13%	73	8,724,560
New Mexico	5,901	1.07%	165	1,954,599
Nevada	2,824	0.51%	62	2,495,529
New York	33,711	6.13%	95	19,306,183
Ohio	18,344	3.34%	87	11,478,006
Oklahoma	4,754	0.86%	73	3,579,212
Oregon	4,877	0.89%	72	3,700,758
Pennsylvania	18,519	3.37%	81	12,440,621
Puerto Rico	948	0.17%	13	3,927,776
Rhode Island	2,098	0.38%	107	1,067,610
South Carolina	9,784	1.78%	124	4,321,249
South Dakota	1,168	0.21%	82	781,919
Tennessee	9,753	1.77%	88	6,038,803
Texas	42,934	7.81%	100	23,507,783
Utah	6,202	1.13%	133	2,550,063
Virginia	19,041	3.46%	136	7,642,884
Vermont	1,202	0.22%	105	623,908
Washington	11,698	2.13%	100	6,395,798
Wisconsin	4,711	0.86%	46	5,556,506
West Virginia	2,277	0.41%	68	1,818,470
Wyoming	687	0.12%	73	515,004

The Topic Selection Wizard

The Topic Selection Wizard addresses the first and often the largest problem facing a young scientific investigator: What project should I do? The Wizard is the first in a series of tools that will make it easier for students to do meaningful science projects.

During the past year, the number of students registering for the Topic Selection Wizard increased more than three times to over 684,307 including individuals from every state in the U.S.

The History of the Topic Selection Wizard

In 2001, our founder, Ken Hess, became interested in helping kids participate in the wonderful learning experience of science fairs. Right away, he discovered that many students find selecting a topic to be the most frustrating aspect of doing a science research project. He designed and programmed the Topic Selection Wizard to help students with this vexing problem. At first, use of this tool was limited to participants in an online science mentoring program which we conduct. But during the 2003-2004 school year, we decided to make the Topic Selection Wizard available to the general public. We thought, "Here is this tool that our participating teachers and students love—why limit it to only those students we can accommodate in our Online Mentoring Program?" We were thrilled and delighted to see that with only minimal Internet advertising, thousands of students were coming to our website from all over the U.S. and using the Topic Selection Wizard. Within a few months, the Topic Selection Wizard tool became more popular than the mentoring program itself—in fact, vastly more popular. It launched us onto a national scale and led us to develop new, ancillary programs, taking us in an exciting new direction and putting us in a position to help hundreds of thousands of students from all walks of life improve their science literacy. We came to realize that we could reach 10 times as many students with the Topic Selection Wizard as we could through our mentoring program (and we could do so more cost-effectively).

During the 2004-2005 program year, with major funding from American Honda Foundation, we embarked upon a project to develop new content and Project Ideas for the Topic Selection Wizard. The new version first launched to the public in September 2004 (and additional improvements were completed and released throughout the fall). Upgrades included increasing the capacity of the tool to handle additional users, increasing the number of “fields of science” available to students from 6 to approximately 25, and the creation of new Project Ideas (bringing the total to 142) which allowed students to narrow down an interest in a topic area to a specific question.

Topic Selection Wizard Assessment & Future Plans

With the help of upgrades made during the 04-05 season we continued to evaluate the visitors to our website in order to better understand our customer and how they use the website and more specifically the Topic Selection Wizard tool. Our main focus for 2006 was content development in order to offer a broader range of resources and Project Ideas to students and teachers (details of content developed are provided in the next section). As we move into 2007 we plan to refine the underlying recommender engine of our Topic Selection Wizard so that it will be even more precise and accurate in predicting exactly which Project Ideas from our library will most interest any given student.

Project Ideas

Overview of the Topic Selection Wizard Content Development Project

Development of new content for the Topic Selection Wizard continued to be the main focus for 2006. Science Buddies staff scientists, along with help from volunteers, worked diligently to write, edit and publish new Project Ideas for the website. In addition to the creation of new Project Ideas, staff scientists improved existing Interest Areas and created new Interest Areas for popular topics. Improvements include:

- The creation and/or improvement of 241 Project Ideas bringing the total to over 300, nearly 100 of which specifically target the growing K-5 demographic. (New content includes submissions from science professionals and students, as well as those prepared by the Science Buddies staff.)

- Development of new Interest Areas for fields such as sports science and weather and atmosphere.
- Improvements to existing Interest Areas and the creation of guides on popular topics like “How to Measure Voltage and Current” and “How to Solder”.

The increased number of available Project Ideas in each Interest Area has allowed Science Buddies to serve a greater number of students and teachers, providing them with more variety and topics of true interest to them. As we move into 2007 we will continue to grow and expand on our existing library of Project Ideas.

Project Guide

The Science Buddies Project Guide (formerly How-to Guide) is a step-by-step guide to the scientific method. Each step of the scientific method is outlined in detail and includes self grading guides that students can use to check their own work before submitting it to their teacher.

In past seasons the Project Guide was a series of documents that provided a brief overview of the scientific method and procedures relating to it. As part of the Content Development Plan mentioned in the previous section, Science Buddies upgraded the content of the Project Guide to better reflect the needs of the visitors to the website. Staff scientists reviewed and expanded the content of each page in the Project Guide including the addition of a Key Info section for each page. The Key Info section provides a summary of the topics being discussed and is written in language that is appropriate for the K-5 audience being introduced to the scientific method for the first time. In addition, a Tool, Techniques and Reference Information section was added to the Project Guide homepage to give students additional information on popular topics and procedures used in experimentation.

Plans for 2007 include additional development of existing materials and the addition of new subject guides to meet the growing demand for expanded content and resources.

Ask an Expert (AAE)

“Ask an Expert” is an online bulletin board staffed by volunteer scientists, engineers, and talented science students who offer their help with anyone and everyone's science fair project questions. In contrast to our dedicated mentoring programs, which offer help to a limited number of students during certain months of the year, AAE offers drop-in help to any student looking for answers and help with their work throughout the year. At the same time, Ask an Expert presents a volunteer opportunity that offers even more convenience and takes less time than our Ask an Expert Mentoring Program. During the 2005-2006 academic year, we had 101 volunteers staffing the Ask an Expert Forum, each taking a weekly time slot as their "shift." We divided AAE into five sub-forums where students can post their questions: Physical Science, Math and Computer Science, Life, Earth, and Social Sciences, Running a Science Fair, and Preparing for the Science Fair, which addressed questions about judging, how to set up a display board, preparing a presentation, preparing for interview questions, etc. We continued to see very positive results and clearly witnessed a huge demand from students who seek answers to their “walk up” questions, with volunteers responding to over 1000 questions. In addition to the students posting questions directly to the forums, there are thousands of students benefiting from the past conversations. A large percentage of our site traffic comes from students searching for answers on specific topics in science. There is a search feature available on the Ask an Expert forum that allows visitors to search past message threads for topics of interest to them or to locate answers to questions that might have already been asked by other student visitors.

Below are example posts made on the AAE forums along with a sample of the responses offered by the volunteer Experts. Students post a variety of questions reflecting the range in complexity and diversity of the project ideas themselves.

Figure 5. Sample Post from the Life, Earth and Social Sciences Forum

Author	Message
<p>Mr.Ocax Occupation: student Project Question: Protein evolution Project Due Date: Octobert Project Status: I am just starting</p>	<p>Posted: Fri Jun 02, 2006 7:47 pm Post subject: Protein Function?</p> <hr/> <p>Hi.</p> <p>I am wondering if there is any type of program or list that will show you the function of a particular polypeptide sequence. For example, leu, val, ala=control nerve impulses(that's not right, but I'm wondering if anything works that way). Or, if I'm completely out of my mind, please tell me! Thanks!!</p> <p>Mr.Ocax</p>
<p>andrewgentles Former Expert Occupation: Researcher, systems biology of cancer Project Status: Not applicable</p>	<p>Posted: Sat Jun 03, 2006 1:56 pm Post subject:</p> <hr/> <p>Hi, there are several programs/databases that can help you to discover what functions particular protein sequences have, as related sequences often have similar functions. Try searching for "prosite" or "pfam" on google - that should take you to some sites which have a lot of information about these things.</p>
<p>Lise Byrd Former Expert Occupation: Student Project Question: The effect of global warming on the sunburst sea anemone Project Due Date: n/a Project Status: Not applicable</p>	<p>Posted: Sat Jun 03, 2006 6:20 pm Post subject:</p> <hr/> <p>Here's a site that has links to lots of different databases: http://www.123genomics.com/files/databases.html The protein databases are about a third of the way down the page. The site also has a page dedicated to protein analysis databases, located at http://www.123genomics.com/files/analysis.html</p> <p>You can also try http://www.paralign.org/index.php</p> <p>You may have to dig a bit to find what you're looking for, but hopefully this will give you a direction to start.</p> <p>Good luck! Sonia</p>
<p>Mr.Ocax Occupation: student Project Question: Protein evolution Project Due Date: Octobert Project Status: I am just starting</p>	<p>Posted: Sat Jun 03, 2006 7:00 pm Post subject:</p> <hr/> <p>Thanks! I don't mind digging through lots of info, as long as I find what I'm looking for! Thank you again</p> <p>Mr.Ocax</p>

Figure 6. Sample Post from the Preparing for a Science Fair Forum

Author	Message
<p>kevindakilla</p> <p>Occupation: Student</p> <p>Project Question: engineering</p> <p>Project Due Date: February 7, 2006</p> <p>Project Status: I am just starting</p>	<p>Posted: Wed Feb 01, 2006 7:24 pm Post subject: Lab books and triptych, Yeesh!! </p> <hr/> <p>I dont really understand how to make a lab book, because I am designing an innovation. I would also like to know of any ways to make my triptych more attractive. Thanks!! I really appreciate it 😊</p>
<p>geoffbruton Expert</p> <p>Occupation: Forensic Scientist / Firearms Examiner</p> <p>Project Question: Not applicable</p> <p>Project Due Date: Not applicable</p> <p>Project Status: Not applicable</p>	<p>Posted: Thu Feb 02, 2006 10:23 am Post subject: </p> <hr/> <p>Hi Kevin,</p> <p>In it's simplest form, a lab book is a kind of journal used by scientists. Essentially, it will contain all of your data created throughout your experiment, in the form of your objective, method, results and conclusions. This allows you to look back over your evolving project and, when necessary, go back and double-check your findings and determine why you did what you did. The book is usually bound in some fashion - so that you can't tear pages out! It is important for scientists to be able to look back at things that seemed to go wrong, too. In fact, many of sciences greatest discoveries were made when things did not quite go as planned.</p> <p>With regards to your triptych, your lab book can include the many different designs you considered and why you ultimately went with your final design. Your lab book is meant to include failures as well as successes, and should conform to the Scientific Method (look that up if you haven't already). As for making your triptych more attractive, we may need some more information as to what it is meant to show. As with many things, the simplest and most clear design is often the best. The more complicated something appears, the more likely the viewer will be to 'switch off'.</p> <p>I hope this helps, and if you have any more questions, please do not hesitate to contact us.</p> <p>Good luck! Geoff.</p> <hr/> <p>Geoff Bruton Firearm & Toolmark Section Ventura County Sheriff's Department Forensic Sciences Laboratory</p>

AAE Assessment and Future Goals

One of the benefits of the Ask an Expert program is its simplicity to use and its easy access for students who need drop-in help with their science fair questions. As website traffic has grown, however, we've encountered a few challenges. One of the biggest challenges we faced during 2006 was spam messages being posted as messages in the forums. As the number of visitors increased the number of spammers interested in obtaining access to an easy audience also increased. We were able to nearly eliminate the spam messages by using a combination of approaches. First we diligently cleaned out dormant spam profiles and second, we created a private "spam" forum which has allowed us to quickly move spam messages off the public forums so they are invisible to our visitors (all spam incidents are logged in a file for tracking and are then permanently removed). With the help of top volunteers, who were given moderator status, we have managed to nearly eliminate the spam messages and quickly remove those that do make it through on occasion. Other lesser challenges include students posting inappropriate messages (i.e. using the forum as a "live chat" space) and the sharing of personal contact

information. With the help of our vigilant volunteers we have managed to limit those incidents and provide a safe and secure environment for students to access help.

As our visitor population has grown we have made an effort to increase the number of volunteers monitoring the forums. This increase in volunteers has allowed us to ensure that we are responding to questions in a timely manner, provide students with a variety of Experts, each with unique skills and backgrounds in science and engineering, and obtain additional feedback and perspective on ways we can improve the website and more specifically the Ask an Expert forums.

As we move into 2007 we will continue to upgrade and evaluate the Ask an Expert forum. We hope to divide the forum groups into smaller more specific topics so that students can get the most accurate help regarding their science fair questions. This type of upgrade would also greatly reduce the likelihood of spam messages being posted to the forums and would allow visitors searching the forums for past topics to more easily find what they are looking for.

Online Mentoring Program (OMP)

Although the Online Mentoring Program was beneficial in many, many ways to the students and teachers that participated during the four seasons we operated the program, we were not able to find a way to make the program serve thousands of students without a commensurate increase in staff to manage the program. In other words, we were unable to find a formula for classroom selection, volunteer matching, and program management that would allow the program to easily scale up. Meanwhile, we continued to experience dramatic increases in the numbers of students we were serving with our Topic Selection Wizard and its growing library of Project Ideas, our Project Guide, and our Ask an Expert advice forum. It was hard to justify spending so much of our limited resources on a program that served hundreds of students when the same effort could be expended to improve and manage other Science Buddies programs that were serving millions of students. Therefore, during the summer of 2005, we made a decision to indefinitely suspend the operation of our Online Mentoring Program in order to focus our limited resources on the other programs.

Ask an Expert Mentoring Program (AAEMP)

With the suspension of the Online Mentoring Program in the summer of 2005, we began the 2005-2006 school year with a pilot program of a new format for mentoring that we hoped would be less resource-intensive, both in terms of the number of volunteers needed and the staff time needed to manage the program. Called the Ask an Expert Mentoring Program (AAEMP), this program utilized the existing framework of the Ask an Expert bulletin board system to create semi-private discussion forums where classroom groups of about 20-30 students would interact with a small team of 3-5 dedicated mentors.

Rather than matching up an individual student Investigator with his own adult Advisor and high school student Mentor as had been done in the Online Mentoring Program, the AAEMP selected and assigned one small team of mentors (including both adult professionals and high school students) to an entire classroom of students. We successfully engaged 7 classrooms (with a combined total of 89 students) and 48 mentors in the fall of 2005 to participate in this program.

Ask an Expert Mentoring Program Recruiting and Training

Like our Ask an Expert volunteer opportunity the Ask an Expert Mentoring Program relies on volunteers from the community to respond to student questions and guide students as they work on their projects. Science Buddies relies on the help of corporate partners and talented high school students to fill our volunteer needs each season. Recruiting efforts are made at the start of each fall season to seek

out interested science professionals and top high school students who are dedicated to teaching others about the benefits of science education and participating in science fair competitions.

All volunteers complete an online orientation that provides background information about the mentoring programs and also gives them insight into science standards used around the nation so they will know and understand their audience. Once individuals have completed the orientation they are assigned as volunteers (Note: adult volunteers undergo a background check prior to volunteer placement).

Ask an Expert Mentoring Program Assessment and Future Plans

During the 2005-2006 school year, over half of the AAEMP forums experienced a high level of activity. Students posted topics on a regular basis, bringing the total at the end of the year to over 300. With each topic, students created conversation threads that were used and added to throughout the year. By the end of the season students and their mentors had posted over 200 messages in nearly every forum bringing the total for the program to over 1300 messages.

At the end of the school year, we reviewed what worked and what did not work with the new format. We found that:

- The ratio of mentors to students was appropriate. The change from one-to-one mentoring meant greater flexibility for the mentors and gave the students access to a diverse group of individuals with expertise in a variety of science fields. At the same time, the mentoring team was large enough to easily handle all the questions generated by the student group.
- Students and Mentors enjoyed the semi-private forum set up where they could work as a group without outside interference.
- Teachers appreciated the help of volunteers which provided them with a place to send students with questions and allowed them to concentrate on teaching while still ensuring that their students got the help that they needed.
- Students searching for additional resources did not always navigate back to the Science Buddies website. The new bulletin board format was not as inclusive as the original OMP format.
- The AAEMP forums did not have a biography feature to allow volunteers to give background about their expertise and past experience.
- Students were unable to post their projects on the Discussion Board Index which made it difficult for volunteers to review their work

After careful consideration, we decided over the summer of 2006, that the AAEMP format would not work as a good method for scaling up dedicated mentoring to large numbers of students as we had hoped. In the end, while we were able to serve more students with fewer mentors, and while we did gain some efficiencies in management, the program was not significantly less resource-intensive than the Online Mentoring Program that preceded it. However, we began to feel that some benefit might be derived from maintaining a smaller, more structured group mentoring program in future years to serve as a kind of in-house laboratory or focus group that would enable the Science Buddies staff to carefully follow real students and classroom groups as they used Science Buddies tools and resources. We felt that if the classroom mentoring groups could be moved back into the Online Mentoring Program's online mentoring environment, the Command Center, we could capture and evaluate valuable data about how students were using the various Science Buddies programs. However, some modifications would have to be made to the Command Center to reflect the classroom group mentoring model since the original Command Center was designed to serve individual student Investigators and their mentors rather than groups comprising 20 or more students and 3-5 mentors.

Classroom Scientists Program (CSP)

In the summer of 2006 we examined the original Command Center and determined what changes would need to be made to the software to enable it to accommodate the group mentoring model used in the AAEMP. Over the summer, we made the appropriate changes. We set goals for what information we hoped to obtain by studying the classroom mentoring groups' usage of Science Buddies resources and tools. The new format, called the Classroom Scientists Program, consisted of a semi-private forum, called an Online Classroom, which housed a Discussion Board Index (similar to that used in the Ask an Expert advice forum) where students, called Investigators, could post questions for their volunteer Mentors (both adult science professionals and top high school students) and where they could communicate with each other about their projects. In addition to the Discussion Board Index, the Online Classroom also mirrored the Science Buddies website and allowed students direct access to all the same resources available on the public site, such as the scientific method resources and our library of Project Ideas.

We changed the name of the program from Ask an Expert Mentoring Program to Classroom Scientists Program for two reasons: to better differentiate it from our regular Ask an Expert forums and to reflect the classroom-based mentoring model.

After careful evaluation we decided that we wanted to have about 20 groups for a total of around 400 students. We established criteria for selecting classroom groups for participation including: students who had the ability to choose any topic in science for their project, teachers who did not have an existing science fair guide in use, and students who had regular access to the internet at home and/or in a computer lab. We developed a teacher contract in order to ensure that key program rules and guidelines would be followed (for example, it was absolutely critical that student participants begin the program by first using the Topic Selection Wizard). We initially had trouble getting teachers to commit for a variety of reasons. A number of teachers were concerned about the extra planning and commitment to involve themselves and their students for the duration of the program and quite a few were concerned about their students' willingness to participate in an auxiliary program outside the required classroom assignments. Eventually, we were able to sign up 11 teachers for a total student audience of 399, who represented 24 Online Classrooms.

By the end of December 2006, we saw positive feedback from the majority of students and volunteers. We did see a decrease in activity in some Online Classrooms and while we worked diligently to increase activity within the program as a whole, some Online Classrooms were shut down due to inactivity. Some minor adjustments to the format of the Online Classroom were also added early on to make the environment more user-friendly. Among the improvements we added: a search function that allowed participants to search messages for key words or by author, an edit feature for Investigators so they could edit their own messages, and an updated Discussion Board Index that moved new messages and threads with new responses to the top of the Discussion Board for easier message tracking and follow-up.

The start of the Classroom Scientists Program was met with both success and challenges. Using a new format proved to be very successful and was met with great response from volunteers who had been involved in previous mentoring programs. Upgrades to the feature set and increased capabilities made the online environment much easier to use and provided students with a usable workspace where they could easily converse with their Mentors and each other.

Selected Participant Feedback (All Programs)

"Thanks for providing such an excellent site. We have been requesting all students to get on the site to help select a project. The really nice thing that we discovered is that students are being able to focus more on their own on figuring out what they need to do at their own pace versus us having to explain/re-explain and so forth. It cleared up some areas we needed to improve on how to get our students to take this project more seriously/the value of it." **Cindy Fong, Hilo Intermediate School, Hilo, Hawaii**

"I am currently using your website as one of the major sources of information for our middle school science fair. Our students have been doing science fair for 25 years and your site is one of the best I have seen. I am using the suggestions for topics section the most right now with students. All your information is wonderful and I wanted to let you know that we appreciate all the hard work you have done to make science fair a little less daunting for our middle school students. I have put a link to your site from my website for my students. Thank you." **Jennifer Castle Parrish, 8th Grade Physical Science, Brentwood Middle School, Greeley, Colorado**

"My goal is to dramatically increase the number of my students who enter a project in the Science Fair. I strongly believe that your site will be extremely helpful to my students and their parents." **Laura Fullen, Lumberport Middle School, Lumberport, West Virginia**

"I've been on your website all day...:). I love it and so do my students...it is a wealth of information. We especially love the "Topic Selection Wizard." It is a blessing, thanks again." **Stanley Adkins, Science Coordinator, Mt. Bethel Christian Academy**

"I am currently preparing my 8th grade students for Pennsylvania Junior Academy of Science projects. Although their projects are judged as a 7 - 10 minute oral presentation, I use Science Buddies to reinforce all the steps of the scientific method as they conduct their experiment and prepare their speeches and transparencies. Thank you for providing such a useful site!" **Rosemary Justus, Northeast Middle School, Bethlehem, Pennsylvania**

"Hi I'm a 7th grader who used your website for my project. This website was very helpful to me. I made a 100% A." **Mendrek Solite, Student**

"I am deeply honored to have received the Outstanding High School Expert Award from such a wonderful organization. I hope to continue working with Science Buddies for many more years and to help other students as much as I can. Your organization has inspired me tremendously and I'm sure my feelings are shared with countless others." **Sareena Avadhany, High School Mentor, 2005-2006 Volunteer Programs**

Student Awards & Recognition

Science Buddies Awards to Mentors

Science Buddies also gives out two tiers of awards to recognize the exceptional Mentors in our Ask an Expert Programs who have gone above and beyond their call of duty. Each Outstanding High School Expert Award winner received a personalized certificate, an award letter, and a \$300 scholarship. Honorable Mention Award winners each received a personalized certificate and an award letter. All other Mentors who completed the program received a personalized letter detailing their involvement in the 2005-2006 program, including the number of hours spent online, to be counted toward their community service requirement at their schools.

School	Student Name	Award
Arroyo High School (San Lorenzo, CA)	Amy Zhang	Honorable Mention
Carlmont High School (Belmont, CA)	Sonia Singhal	Outstanding High School Expert
Henrietta High School (Henrietta, TX)	Philip Pierce	Honorable Mention
Mission San Jose High (Fremont, CA)	Jessica Hua	Honorable Mention
Mission San Jose High (Fremont, CA)	Tarang Srivastava	Honorable Mention
Monte Vista High (Danville, CA)	Mona Vakilifathi	Honorable Mention
Plainview Old Bethpage JFK High School (Plainview, NY)	Benjamin Pollack	Honorable Mention
Sachem High School (Lake Ronkonkoma, NY)	Hira Muzammal	Honorable Mention
San Jose High Academy (San Jose, CA)	Sareena Avadhany	Outstanding High School Expert
Somerville High School (Somerville, NJ)	Kavya Gorukanti	Outstanding High School Expert

State and National Science Competition Participants & Winners

One of the most rewarding aspects is reporting the success of student volunteers and participants. We are happy to report that a number of student participants had success at local, regional, state and national competitions. Science Buddies had the honor of attending a number of local and regional science fairs and we were delighted by the number of students who had used our resources and/or participated as volunteer mentors on the website and gone on to win awards at those fairs. Below are some of the high school participants (both volunteers and student visitors) who competed in top science competitions across the nation.

Terik Daly

"Investigating the Chemical Signatures of Meteorite Impacts"

Intel International Science & Engineering Fair (ISEF)

- All-expense-paid trip to Indianapolis, IN
- Top Place Winner, award of \$5000 for Intel ISEF Best of Category in Space Science sponsored by Los Alamos National Laboratory
- 1st Place award of \$3000 in Space Science
- Place award of \$500 from the American Statistical Association
- Award of Merit of \$400 from the Society of Exploration Geophysicists
- Honorable Mention award from American Geological Institute

George Chen

"Paladin: A New Fast and Secure Symmetric Block Cipher"

Intel International Science & Engineering Fair (ISEF)

- MILSET award for a Top Team Project, a trip to the European Youth Science Exhibition ESE 2006 in Tarragona Spain
- 1st Place award of \$3,000 for Team Projects presented by Science News

Sonia Singhal

Intel International Science & Engineering Fair (ISEF)

- Participant

Benjamin Pollack

"Sexual Selection in Drosophila: A Behavioral, Morphological, and Geographic Study"

Intel International Science & Engineering Fair (ISEF)

- Merit Team Award of \$100 from Society for Technical Communication
- 4th Place award of \$500 for Team Projects from Science News Siemens Westinghouse Competition in Math, Science & Technology
- Team Scholarship Award for \$50,000

Amy Tai

"HOXD12: Tracking a Protein through Species Evolution"

Molecular Sciences Institute Competition for the "Best Genomics Presentation"

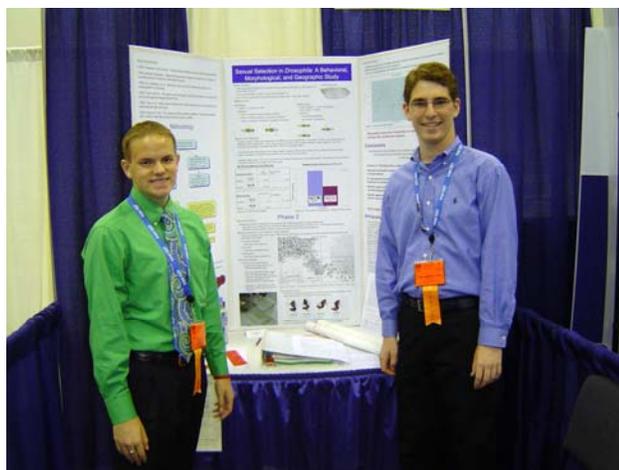
- 1st Place award of \$750 from Molecular Sciences Institute

Harsh Singh

"Avian Influenza (Bird Flu): Analyze H5N1 prototype vaccine strain"

Molecular Sciences Institute Competition for the "Best Genomics Presentation"

- Runner up award of \$250 from Molecular Sciences Institute



Students Terik Daly (left) and Benjamin Pollack present their projects at Intel ISEF 2006.

Ask an Expert Mentoring Program Participating Schools & Employers

Investigator Schools

Participating Schools	County or [State]	Participants
Carquinez Middle School	Contra Costa	9
Dempsey Middle School (OH)	[Ohio]	62
Plainview Old Bethpage JFK High School (NY)	[New York]	18
Totals by County or [State]		
	Contra Costa	9
	[Ohio]	62
	[New York]	18
Total from Underserved Communities		
Students from schools with greater than or equal to 25% of students qualifying for free lunch program (we collect no such information from individual students) ³		9
Total Investigators		89

Mentor Schools

Participating Schools	County or [State]	Participants
Accel Middle College	Santa Clara	1
Amador Valley High	Alameda	1
Arroyo High School	Alameda	1
California Academy of Mathematics and Science	Los Angeles	2
Carlmont High School	San Mateo	1
Carondelet High	Contra Costa	1
Choate Rosemary Hall	[Conneticut]	1
College Preparatory School	Alameda	1
Colonie Central high	[New York]	1
El Cerrito Senior High	Alameda	2
Henrietta High School	[Texas]	1
Live Oak High School	Santa Clara	1
Mills High	San Mateo	4
Mission San Jose High (Fremont)	Alameda	5
Monta Vista High (Cupertino)	Santa Clara	1
Monte Vista High (Danville)	Contra Costa	3
Northgate High School	Contra Costa	1
Notre Dame High	Santa Clara	1
Piedmont High School	Alameda	1
Piedmont Hills High	Santa Clara	1
Plainview Old Bethpage JFK High School	[New York]	10
Rider High School	[Texas]	1
Rutherford B. Hayes High School	[Ohio]	4
Sachem High School	[New York]	1
San Jose High Academy	Santa Clara	1
San Ramon Valley High	Contra Costa	3
Saratoga High	Santa Clara	1
Silver Creek High	Santa Clara	2
Somerville Highschool	[New Jersey]	1
UC San Diego	San Diego	1
Valley Christian Schools	Santa Clara	2

High School Totals by County or [State]	
[Connecticut]	1
[New Jersey]	1
[New York]	12
[Ohio]	4
[Texas]	2
Alameda	11
Contra Costa	8
Los Angeles	2
San Diego	1
San Mateo	5
Santa Clara	11
Total Mentors	58

³ Calculated based on statistics from www.greatschools.net
Science Buddies Annual Report 2006

Expert Employers

Advisor Organization	Participants
Abbott Laboratories	1
Actuate Corporation	1
Affymetrix	1
Avnera Corporation	1
Bio-Rad Laboratories	4
Boston Scientific	2
Clairvoyante Laboratories	2
Druai Education Services	1
ELORET Corp./NASA Ames	1
EMC Corporation	1
Genentech	1
Genetic Information Research Institute	1
Genworth Financial Long Term Care Division	1
Hewlett Packard Co.	1
Hyperion Solutions	1
In Silico Studios	1
Integrated Science Solutions, Inc	1
Lam Research	1
Lockheed Martin	1
Mad Science of Southern Colorado	1
MIRA	1
NASA-Ames Research Center	1
National Institutes of Health	1
National Semiconductor	1
Northeastern Ohio Universities College of Medicine	1

Advisor Organization	Participants
Rocky Mountain Laboratories	1
Sandia National Labs	1
SBC Long Distance	1
Seagate Technology	1
SF Bay Area Rapid Transit	1
SRI International	1
Stanford Linear Accelerator Center	1
Stanford University	4
Sun Microsystems	1
Synaptics, Inc.	1
UC Irvine	1
UC Santa Cruz	3
UCSB	1
Universal Hospital Systems	1
University of California San Francisco	1
US Geological Survey	1
USDA Forest Service	1
UT Austin	1
VCSoOhio	1
Ventura County Sheriff's Department	1
Vertical Communicationss	1
Warren Township High School	1
Other (retired, independent, etc.)	5
Total Advisors	62

Calendar Year 2006 Financial Summary

Science Buddies is a very lean organization. The president, Ken Hess, takes no salary, and all other employees operated from home offices or donated office space during calendar year 2006, keeping overhead expenses at an absolute minimum.

Figure 11. Calendar Year Expenses

Revenues

Source	Amount
Corporate, individual and other grants	\$817,646
Dividends, interest, and other income	4,768
Total Revenues	\$822,414

Expenses

Budgeted item	Amount	Notes
Compensation of CEO, Officers, Directors	\$0	Our CEO volunteers full-time
Other Salaries & Wages, Health Insurance, Workers Comp	\$370,292	3 FT and 3 PT staff members
Employment Taxes	\$28,432	
Legal Fees	\$3,828	
Accounting Fees	\$1,425	
Bank fees	(\$150)	
Other Professional Fees (Incl. Admin)	\$1,305	
Graphic Arts	\$6,050	
Depreciation	\$2,041	
Insurance and misc. taxes	\$800	DOJ, Franchise Tax Board, Scty of State
Rent	\$0	We used donated space
Advertising	\$406,461	Note: about \$400,000 of this amount is the value of in-kind grants of advertising
Other Miscellaneous Expenses	\$8,266	Including travel, printing, phone, postage
Internet	\$21,062	Server costs, security, etc.
Personnel Screening Fees	\$891	We do background checks on volunteers
Participant Awards & Scholarships	\$900	
Total Expenses	\$851,603	

Category Breakdown

Source	Amount
Program expenses	\$779,603
General expenses	\$15,000
Fundraising expenses	\$57,000
Total	\$851,603

Fundraising Summary

During the 2006 program year, Science Buddies continued to enjoy generous support from dozens of corporate sponsors whose donations funded the majority of our operating budget. As in prior years, earning corporate support was the primary focus of our fundraising strategy. Science Buddies received grants or in kind donations from the following organizations in 2006:

Copernicus Level (\$50,000 – \$99,000)

American Honda Foundation
Seagate Technology

Darwin Level (\$30,000 – \$49,999)

The Dreyfus Foundation
The Dow Chemical Company
Northrop Grumman Corporation
Motorola Foundation
Symantec Corporation

Newton Level (\$20,000 – \$29,999)

Juniper Networks

Salk Level (\$15,000 – \$19,999)

AMD

Salk Level (cont'd)

MedImmune
Sun Microsystems

Edison Level (\$10,000 – \$14,999)

EMC Corporation

Galileo Level (\$5,000 – \$9,999)

Applied Biosystems
Beckman Coulter
Conexant
GlaxoSmithKline
Hyperion Solutions
Lockheed Space Systems
Molecular Sciences Organization
National Semiconductor
OSI Pharmaceuticals

Galileo Level (cont'd)

SanDisk
Xilinx

Curie Level (\$1,000 – \$4,999)

Adaptec
Biogen Idec Foundation
Sybase

Contributors (up to \$1,000)

Actuate

Donations in Kind

Autodesk
AOL
Google
SAS Institute

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