

C E N T E R
F O R
**Children &
Technology**

**Access Excellence
Program Evaluation**

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Appendices

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Executive Summary

The goal of Genentech's Access Excellence program is to provide high school biology teachers with on-line access to scientists, other science teachers, and high-quality scientific resources, particularly those related to biotechnology and genetics. By providing biology teachers with a community of colleagues and experts, and a rich and up-to-date library of resources, Genentech intends to alleviate the sense of isolation which biology teachers nationwide have reported is the most critical challenge they face as professionals.

The Access Excellence program has, during each of the past three years, recruited and trained one hundred exceptional biology teachers who act as the core participants in the Access Excellence program. These three cohorts, known as Access Excellence Fellows, received extensive training, free portable computers, and subsidies for their access to telecommunications networks. In return, these Fellows have contributed curricula, led discussions, designed and led collaborative on-line projects, and acted as hosts to other teachers visiting the Access Excellence Forum on the World Wide Web. With its emphasis on providing a diverse range of biology-related resources, and its willingness to allow the Fellows to play a significant role in determining the course and content of Forum activity, the Access Excellence program is a leading example of the potential of on-line forums to support flexible and effective informal professional development opportunities for teachers.

The evaluation of the Access Excellence program combined quantitative and qualitative techniques, including surveys, interviews, and observations of on-line activity. Over the course of the 1995-1996 school year, the evaluation team was able to develop an increasingly refined picture of how the Fellows were using the Forum; how they understood the goals and effectiveness of the Access Excellence program; the impact the Forum was having on the Fellows; and the potential of the Access Excellence program to expand to include a larger number of high school biology teachers as participants.

Key findings of this evaluation study include the following:

- The Access Excellence program was successful in alleviating the Fellows' feelings of isolation from their peers and colleagues.
- Access Excellence Fellows were highly enthusiastic about their experiences with the program, giving it high ratings for effectiveness and ranking it favorably in relation to other teacher development programs they were aware of, both corporate-sponsored and non-profit- or government-sponsored.
- The Fellows feel a high degree of ownership of the program.
- Fellows placed the most value on, and reported that they learned the most from, the community of teaching colleagues they came in contact with through Access Excellence.

Recommendations growing out of this evaluation focus on two subjects: supporting Fellows as recruiters of new participants, and adapting the structure and focus of the Forum to serve the needs of a broader population of biology teachers.

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Introduction

“Access Excellence has allowed me access to a variety of resources that make teaching more exciting both for myself and my students. The communication with teachers that are talented in many ways inspires me to continue to try to be the best teacher that I can possibly be.....the best part about it is that I don’t have to do it alone in isolation.”

— *An Access Excellence Fellow*

The Access Excellence program was initiated in 1994 by Genentech, Inc., to provide high school biology teachers with access to scientists, other science teachers, and high-quality scientific resources, particularly those related to biotechnology and genetics. The goal of the Access Excellence program is to respond to the needs of biology teachers by easing their sense of isolation, offering them access to rich and up-to-date information, and providing connections to professional scientists and other expert teachers.

Central to the development of the Access Excellence program was the creation of a Fellowship for outstanding biology teachers, and the development of an on-line Forum where Fellows and other biology teachers could work with one another and with scientists to increase their expertise in biology teaching. One hundred Fellows have been recruited during each of the first three years of the program. The on-line Forum began its development as an America OnLine site, with a supplemental presence on the World Wide Web, and in the spring of 1996 was transferred in its entirety to the World Wide Web.

During the 1995-1996 school year, the Education Development Center’s Center for Children & Technology undertook an evaluation of the Access Excellence program, concentrating on two main themes: investigating the quality and character of Fellows’ experiences with the program, and exploring the potential of the on-line Forum to effectively reach and involve a broader cohort of high school biology teachers in addition to the Fellows. A range of techniques, including surveys, both of Fellows and of other teachers involved with the Forum; phone interviews with Fellows; interviews with a range of teachers at conferences and at the Fellows’ summit in June of 1996; and tracking of on-line conversations and activities were all used to inform the evaluation analysis.

This report provides a synthesis of findings and an overview of recommendations for the further development of the program. Findings from this evaluation should help to inform the further development of the Access Excellence program. In a broader context, this evaluation study will contribute to the further understanding of how to carry out successful on-line professional development programs for educators.

Methods

See Table 1 for a summary of research methods used in this evaluation.

Surveys. Four surveys were conducted between January and May, 1996. Two in-depth surveys were done to probe Fellows' experiences in the Access Excellence program; one short survey followed up on Fellows' action plans; and one survey followed up with non-Fellows who had visited the Forum.

The first Fellows' survey investigated the following issues: the fellows' teaching experience; their level of familiarity with educational technology, including telecommunications; their goals for teaching, learning and assessment in their classrooms; their degree of opportunity to shape curriculum and teaching conditions within their own schools; and their current practices and focuses in their use of the Access Excellence forum. One hundred forty-three teacher surveys were analyzed.

The survey addressing Fellows' action plans collected information in three areas: outreach, collaboration, and participation in the forum. The survey was distributed to all Fellows, but was targeted at 1995 Fellows who had agreed to action plans at the 1995 summit, and those 1994 Fellows who had chosen to participate in the action plan process. Seventy-six Fellows responded to the survey: 29 1994 Fellows and 48 1995 Fellows.

The survey of forum visitors who were not Fellows was sent to 380 individuals. These names were collected from several sources, including postings to bulletin boards in the forum and individuals who had asked to receive the periodic tableaux. Eighty-nine individuals responded to the survey. The survey asked people to identify their occupation (teacher, student, scientist, etc.); how often they visited the site; whether they had sought out the site or found it by chance; how they had heard about the site; and what aspects of the forum they found most interesting.

The final survey of the Access Excellence Fellows focused on four key issues: Fellows' experience of the fellowship; their experience with the Forum; their opinions about the future of the Access Excellence program; and their sense of the program's overall effectiveness. Seventy-eight Access Excellence Fellows returned this survey.

Detailed reports on findings from each individual survey can be found in the appendices of this report.

Interviews. Formal interviews with twelve individual Fellows were conducted by phone during the spring of 1996. A group interview with six Fellows was conducted at the National Science Teacher's Association meeting in March

of 1996. A range of informal interviews were conducted with individuals and groups of Fellows at the NSTA meeting and at the 1996 Fellows' Summit.

The phone interviews were specifically designed to learn more about the experiences of some of the most and least active Fellows. Fellows were asked about their use of and participation in the Access Excellence program; the program's impact on their teaching and professional status; their original expectations of the program, and their current opinions of it; logistical obstacles to participation; and their plans for further participation in the future. Similar themes were pursued more broadly in the group interview and in informal interviews with a broader range of Fellows.

Tracking of on-line activity. Throughout the 1995-96 school year researchers followed the progression of day-to-day activity on the forum. Areas that emphasized discussion, including the Seminars, Teachers' Lounge, and collaborative projects, received particularly close attention. Observations of activity were guided by questions including: which subjects spark conversation among teachers, and which do not?; what aspects of new scientific ideas do teachers respond to and ask questions about?; how are resources and ideas shared and spread across the community?; when do teachers seek help from scientists and how do they respond to scientists' explanations and suggestions?; and, what evidence do teachers provide of how these resources are having an impact on their teaching?

Table 1: Summary of Research Methods

Instrument	Topics addressed	Number of Subjects (where applicable)	Appendix¶ (where applicable)
First Fellows survey	teacher background, teaching goals, current uses of the Forum	143	A, B
Fellows Action Plan survey	outreach, collaboration, participation	76	C, D
Final Fellows survey	experience of the Fellowship; experience with the Forum; future of the program; program effectiveness	78	E, F
Survey of visitors to the Forum ¶ (non-Fellows)	how they found out about the Forum, use of the Forum	89	G, H
Formal phone interviews informal face-to-face interviews	program impact on teaching; expectations of the program; hurdles to participation; plans for future participation	12	
Focus group	program impact on teaching; expectations of the program; hurdles to participation; plans for future participation	6	
Informal interviews	program impact on teaching; expectations of the program; hurdles to participation; plans for future participation		
Tracking of online activity	dynamics of discussion; teacher engagement with content; sharing of resources and ideas; teacher/scientist interactions; impact of participation on teaching	¶	

Findings

This evaluation was designed to investigate and document two key themes: the quality and character of Fellows' experiences with the program, and the potential of the on-line Forum to effectively reach and involve a broader audience of high school biology teachers in the present and in future years. The following summary of findings is organized around these themes.

Theme I: Fellows' experiences with the program

1. The Access Excellence program was, overall, a very positive experience for the Fellows.

Throughout this evaluation, Fellows provided copious and enthusiastic evidence that they felt that the program had lessened their sense of professional isolation and motivated them to change and improve their teaching.

Access Excellence lessened teachers' sense of isolation. The Fellows' enthusiasm for Access Excellence is perhaps best indicated by their response in the spring survey to a question concerning the program's effectiveness in combating teachers' feelings of isolation (the central goal of the Access Excellence program). Every respondent indicated that they did, in fact, feel that the program had achieved its goal, and had helped them to alleviate their feelings of professional isolation. Rating the effectiveness of Access Excellence in meeting their needs as biology teachers on a scale of 1 to 10, respondents gave the program a mean rating of 8.9, with only six of 78 ratings falling below 8. Ninety-nine per cent of respondents to that survey also agreed that Genentech should continue to sponsor the Access Excellence program.

“The program has allowed me to meet teachers from across the United States, and form friendships and collaborations that would not have happened if it wasn't for Access Excellence. It was really nice to see friendly faces at the National Science Teachers Association meeting in St. Louis! It made you feel like you belonged.”

— *An Access Excellence Fellow*

Fellows also rated Access Excellence highly in comparison with other corporate-, government-, and non-profit-funded educational programs. In comparison to other corporate-sponsored educational programs, 97% of Fellows rated Access Excellence “much better than most” (two Fellows rated it “better than most”). In comparison with government- or non-profit-funded programs, 86% of Fellows rated Access Excellence “much better than most,” with another 8% rating it “better than most.”

Access Excellence motivated Fellows to change and improve their teaching. Fellows reported that the Forum provided them with access to colleagues, experts, and informational resources that helped them to solve the day-to-day challenges of teaching, and that also motivated them to try new curricula, new activities, new forms of assessment, or new teaching methods in their classrooms.

“I have been able to find resources to present difficult concepts to my students that I could use with assurance because they had already been tested by colleagues. This year I was in a school that was new to me and it was important that I make a positive and active first impression on my students. I found an activity on one of the message boards that had students observing a “candle” burn; at the end of the period, I blew the flame out and ate the candle (made of apple). The kids went out in awe and the next day we had great discussions about actual observation versus assumption (75% described seeing wax drip from this “candle”!) and real data versus inference. I could not have made a better beginning!!”

— *An Access Excellence Fellow*

When discussing the impact of Access Excellence on their teaching, Fellows were most likely to report (both in interviews and in responses to open-ended questions in surveys) that they had made many specific and concrete changes in what and how they taught in their biology classrooms. Rather than identifying global shifts in their beliefs or practices as teachers, the Fellows felt that the program had given them many specific new ideas that they were able to implement immediately and that had a significant impact on their own morale and on their ability to teach effectively.

A smaller number of Fellows did attribute more global shifts in the dynamics of their classroom, in their teaching strategies, or in the nature of their curriculum, to their involvement in Access Excellence. These shifts included a greater emphasis on student research that was closely related to current and relevant scientific questions and issues, and moving away from lecturing and toward project work. These comments on more holistic changes in the classroom were less common than Fellows mentioning specific activities or labs that they felt had added to their students’ enthusiasm for or understanding of a particular scientific concept. For an example of how teachers described these changes in their practice, see Table 2, which presents a summary of Fellows’ responses to an open-ended question about how their involvement in Access Excellence effected their students, and Table 3, which presents Fellows’ rankings of different statements about the impact of Access Excellence on their students.

“I have established a personal relationship with some of the best teachers in the country. The students in my district are benefiting because of some of the new ideas I have been able to bring to them and their teachers. We are changing the way education is done in our district.”

— *An Access Excellence Fellow*

Table 2

**How my involvement in Access Excellence has benefited my students
(N=78, multiple responses possible)**

34	My students have increased access to resources - both information available on the Web and other people (scientists, other fellows).
29	My students have gotten involved in collaborative projects (contact with other students, sharing information, getting excited about research).
28	I am using new labs, new activities, new lesson plans.
12	I'm bringing more up-to-date information and ideas into the classroom.
12	My students have increased access to and knowledge about computers and the Internet.
10	I'm doing more real science with my students, asking and investigating up-to-date questions.
6	My students have increased access to scientists and experts.
5	I am changing my classroom style - more student-centered, less lecturing, more projects.
1	I have increased credibility with my students because of my knowledge and access to resources.

Table 3

Statements that reflect Fellows' "overall view" of the Forum in relation to their students.

(N=78)

of times included as 1 of 3 "most accurate" statements

69	It has helped me bring new ideas into my classroom
58	My students have access to many more resources than before.
53	My classes have become more dynamic, driven by projects and collaborative work.

continued

Table 3 — *continued*
**Statements that reflect Fellows’ “overall view” of the Forum in
 relation to their students.**
(N=78)

of times included as 1 of 3 “most accurate” statements

33	My students are more motivated to explore science as an exciting field of inquiry.
26	I have participated in regional and/or national lab experiments.
11	My students are more interested in careers in science.
6	My students are doing better on standardized tests.

2. Fellows placed the most value on, and reported that they learned the most from, the community of teaching colleagues they came in contact with through Access Excellence.

Importance of teacher to teacher communication. While Fellows felt that the forum offered many valuable resources, and that access to scientists was important to them, both of these aspects of the program were only important to them in the *context* of an active and collaborative community of colleagues.

“I have benefited most by interacting with fellow Access Excellence teachers. I am able to integrate this interaction in most aspects of my teaching. I have contacted teachers when I needed help with a lab or a concept. I have helped teachers by uploading ideas, labs and projects. I have looked for fellow Access Excellence’ers at conventions and interacted there. Even when I needed to get in touch with scientists in the field, it was usually with the help of other Access Excellence teachers. I feel that the community that evolved from the Access Excellence experience is the most helpful I have had in my 23 years of teaching biology.”

— *An Access Excellence Fellow*

Across a number of different survey questions, Fellows reported that they experience the Access Excellence forum as, first and foremost, *a place for teachers to talk with other teachers*. For example, in relation to the Fellowship, 92% of Fellows indicated that increased exposure to colleagues was a more important aspect of involvement in Access Excellence for them than increased exposure to scientists. In open-ended questions in which teachers described what they most enjoyed about using the Forum, Fellows wrote emphatically about the importance of learning from and supporting other teachers.

“AE provided a teacher resource bank so that when I taught AP Biology last year for the first time, I was able to ask my questions about labs and get a number of different methods to teach the labs and related material. When I had content or procedural difficulties, those more experienced with AP patiently helped me through my problems. They gave me other better ways to teach the same material with a shoestring budget. I could not have made it as successfully through this year without the support the other AE teachers gave me.”

— *An Access Excellence Fellow*

In relation to their own professional growth and development, Fellows also indicated that the most beneficial aspect of the Fellowship is the opportunity it provides for interaction with colleagues (see Table 4). In interviews, discussions, and responses to open-ended questions, Fellows sometimes talked about other teachers as practical resources who can be tapped for answers to specific questions, ideas for materials, or ideas for new labs or activities in the classroom. At other times, Fellows explained said that they are motivated to connect with other teachers because they want to discuss more general topics about the challenges of teaching, or about issues that have an impact on their professional lives, such as controversial school policies and changing assessment practices.

Table 4
Greatest benefits of Access Excellence for my professional growth
(N=78)

Mean (1-7 scale; 1 is most beneficial)

- 2.8 Interaction with other teachers on-line through the AE forum
- 3.2 Access to scientific information and resources
- 3.2 The free laptop computer
- 3.6 The Summit experience
- 4.1 Personal interaction with AE Fellows and/or staff (other than on-line)
- 5.2 Interacting with scientists on-line through the AE forum
- 5.5 Representing the AE program at local, regional, or national meetings.

When asked in a survey to describe their motivations for logging onto the Forum, Fellows most frequently described three central motivations, all focused on to teacher-to-teacher relationships. First, they most frequently

described wanting to seek out or share information or advice about curriculum and pedagogy. These responses reflected a perception of the forum as a space for teachers to share their knowledge and ideas.

Second, Fellows frequently reported logging on to use areas such as Activities-to-Go or the Activities Exchange to develop lesson plans, labs, or general ideas for classroom activity. Third, they almost as frequently described logging on to make connections with other teachers, to give and receive moral support, encouragement and discussion. This is closely related to the most popular response (seeking or providing information), but suggests a less content-focused orientation, and emphasizes the interpersonal enjoyment the teachers find in “talking” with one another in the Forum. As one teacher wrote, “I also log on to communicate with others, to seek reinforcement and encouragement on bad days, and inspiration on good days.” See Table 5 for a summary of responses.

Table 5
Fellows’ motivations for logging into the Forum
(N=143, multiple responses possible)

69	To seek out specific topics relating to my curriculum, educational interests, or pedagogy – seeking or giving information and/or advice (teacher to teacher).
61	To use Activities-To-Go and/or the Activities Exchange; to develop lesson plans , labs, or general ideas for classroom activity by drawing on teacher-developed resources.
57	To use the Teacher’s Lounge and message boards, as they provide general teacher connection (this also includes e-mail).
31	To browse general resources and information of interest; to “find out what’s up”
25	To collect current information (Media Watch, articles, updates).
14	To participate in Science Seminars (reading and/or posting)
13	To participate in teacher project collaborations .
11	To answer student questions
9	To find interesting tidbits/ factoids to enliven my classroom .
6	To communicate with scientists .
6	To find information to share with colleagues who don’t/can’t log on .

When Fellows were asked to describe the aspects of the Forum they found most useful, their answers were consistent with responses about motivations for logging on, reported above. Two responses dominated for this question: they use parts of the forum that allow participants to make connections with

other teachers (e-mail, discussion boards, etc.), and parts of the forum where activities, lesson plans and classroom ideas are provided.

Respondents' written comments about their use of the Forum are particularly interesting, because they point to the emphasis Fellows are putting on the benefits of increased access to other teachers for their *day to day teaching lives*. Fellows repeatedly reported that they got the most satisfaction out of having concrete, immediate questions answered by other teachers who were knowledgeable both about content and about the realities and complexities of in-class implementation of that content. For example, when asked to describe a new teaching idea they had implemented from the Forum, Fellows most often reported on their use of the activities and labs posted in the Activities Exchange by other teachers.

Fellows' focus on Activities Exchange and Teachers' Lounge. Teachers' ratings of their frequency of use of the different sections of the forum, and of the usefulness of different forum areas, are consistent with their responses to questions about their motivations for using the Forum. Responses to these questions focus on the two areas where teacher-generated ideas and resources are most highly concentrated — the Activities Exchange and the Teachers' Lounge.

When Fellows were asked to rank the six main areas of the Forum in order of frequency of use, the Activities Exchange (a set of resources entirely generated by teachers) received the highest mean rating (3.72 on a scale of 0 to 5) among Fellows, as well as having a modal (most common) rating of 5 (see Table 6). Fellows also rated the Activities Exchange as the "most useful area of the Forum," rating it significantly higher than any other area (see Table 7). This section of the forum was also most often cited in responses to open-ended questions as a significant influence on Fellows' teaching.

Table 6
Fellows' relative frequency of use of Forum areas
(5=most frequently used, 0=least frequently used; N=76)

Section	Mean	Mode
Activities Exchange	3.72	5
Teacher's Lounge	3.09	5
Let's Collaborate	2.84	3
What's News	2.68	2
About Biotech	1.96	1
Resource Center	1.77	0

The Teacher's Lounge also received a modal rating of 5 (for frequency of use), but had a somewhat lower mean rating at 3.09, suggesting that while many teachers use the Lounge a great deal, there is a segment of the group that is not likely to use it much at all.

Table 7
Most useful area of the Forum
(N=78)

Mean (1-6 scale; 1 is most useful)

1.9	Activities Exchange
3.3	Let's Collaborate
3.6	Teachers' Lounge
3.6	Resource Center
3.9	What's News
4.0	About Biotech

3. The Fellows, an experienced and expert group of teachers, were appreciative of Genentech's recognition of them as valued professionals.

Importance of the Fellows as a pool of teacher-leaders. Genentech was very successful in its efforts to recruit a group of Fellows who would represent the best of biology teaching from across the country. The Fellows do vary in how experienced they are, in their areas of expertise, and in the type of schools and students they work with. However, taken together, they are a very experienced and highly educated group of teachers who are very likely to hold leadership positions in their schools or in professional organizations.

Forty-eight percent of the fellows have taught for more than twenty years – this is almost double the national proportion of 25%. The fellows also are far more likely to have attained Master's (76%, vs. 42% nationally) or Doctoral (8%, vs. 0.8% nationally) degrees than is typical of teachers nationwide. Many are also experienced users of educational technology — 62% reported using computers in their teaching for five or more years. They are less experienced, though, in using telecommunications in their classrooms; 62% reported that they had used telecommunications for professional development purposes for two years or less. Not surprisingly, for the majority of the Fellows, Access Excellence was their first exposure to an on-line professional development program, suggesting that for many Fellows this was a new arena in which to share their expertise.

The Access Excellence Fellows are also *innovators* in their schools. Most Fellows are experienced at collaboration; most report that they collaborate regularly with other teachers, either in their departments or through Access Excellence, to develop curricula that are largely of their own making. They do not experience state and local mandates about curricular structure or textbooks as constraining (Fellows reported they had little influence on their curricula). They are very likely to be decision-makers in their schools, structuring science programs and allocating resources.

“It has allowed me to share my best ideas from a 27 year career in biology education with other teachers and their students. I feel that I am truly being allowed to pass on my intellectual torch...”

— *An Access Excellence Fellow*

The Fellows are highly enthusiastic about emphasizing original inquiry and problem-solving as key components of students’ learning. In response to a survey question, Fellows report that their top goals for their biology classes are “interacting with students in ways that will focus and support their inquiry” and demonstrating “inquiry, curiosity, openness, and skepticism” in their own scientific inquiry (each of these goals received mean scores of 5.6, and were most commonly rated 6 - a top priority; N=138).

Impact of program on teachers’ professional lives. The Fellows indicated that an important part of their experience of Access Excellence was Genentech’s recognition of their expertise and value as professionals in their field. Fellows consistently praised the quality and organization of the Summit; the dedication of the Access Excellence staff at Genentech; and Genentech’s investment in laptop computers and on-line access for all Fellows as concrete signs that the Fellowship was intended as a substantive investment, as opposed to a nominal or superficial award.

In many cases, a teachers’ status as Access Excellence Fellow had, in turn, increased his or her ability to effect change on the local level. Many Fellows reported that the recognition granted them by Genentech had a concrete effect on their status within their school building or district, and helped them to become leaders within their schools in relation to broad issues such as curricular reform and school networking.

“Access Excellence has helped my community understand that teachers, biology teachers, and someone in their own community is valuable to society. Because of Access Excellence, I have become to be regarded as somewhat of an important person in the community, so much so that I have been invited to be the keynote speaker at our county’s Chamber

of Commerce annual banquet. I have also been asked to be a mentor for the state in telecommunications. Neither of these honors would have ever been conferred except for Access Excellence...This year has made the difference in my entire future as a teacher.”

— *An Access Excellence Fellow*

“One of our goals [at my school last year] was to be connected to the Internet, but no one knew quite where to start. I really didn’t either, but through Access Excellence I was able to ask questions of Fellows who were already connected at their schools. I gained the confidence (knowing I had support) to “take the bull by the horns,” do the necessary research—and then beg for money. Being an Access Excellence Fellow gave me some “credibility”.

Net result: Last week we had an ISDN line connected to our school (first in our county!) and we will have 43 computers with Internet connectivity by the end of May, ready to begin the new school year. I can honestly say we would not be there if it were not for Access Excellence.”

— *An Access Excellence Fellow*

4. Adequate opportunities for training in the use of telecommunications technology and adequate access to the Forum were crucial to Fellows’ ability to participate in Access Excellence.

Training in the use of telecommunications software was perceived by Fellows as both necessary (for effective participation in the program) and beneficial (as an area of general professional development). The majority of Fellows felt that they learned a great deal from their training at the Summit, and more through experience during the school year. Some Fellows did report frustrations or difficulties with the process of gaining access to and navigating the on-line Forum. For example, for less technologically-experienced Fellows, there were often minor but difficult-to-solve technical problems such as determining whether a graphic being downloaded was compatible with the software the Fellow had; figuring out how to print from the Forum; and adjusting preferences between home systems and school systems. While the Access Excellence staff was very available to Fellows for help with these kinds of issues, they are the kinds of challenges that can compound teachers’ frustrations and that make adequate training all the more important for participants.

Even those Fellows who were most comfortable with telecommunications technology were aware of the *importance* of training to successful

participation in a program such as Access Excellence. Even those Fellows who felt that they did not personally need further training frequently suggested that training was key to effectively involving more teachers in the Forum. “Training” was second only to “access” in Fellows’ recommendations of what supports other teachers would need in order to become active members of the Forum (see Table 8).

Table 8
Fellows’ recommendations of ways to support new
Access Excellence participants
(N=78, multiple responses possible)
of times included as necessary (max=N=78)

73	Better access to computers and to the Internet, from home and/or school
63	Training in using these technologies
62	Well-designed, well-organized structuring of on-line information
60	Adequate time in the school day to effectively explore resources and integrate them into the curriculum
52	Search tools that enable me to easily find specific information
38	Print materials or workshops on how to integrate Forum materials into teaching
22	Award programs

Finally, Fellows often reported that they felt that they were quickly outgrowing their own level of technical training. This was particularly true of 1994-95 Fellows who had not been trained in the use of the World Wide Web. These Fellows would like to receive some training in using the Web.

“Access Excellence gave me the training, ability, and interest to become technologically proficient and to get involved with bringing technology, computers, and telecommunications into my classroom. I have made a network of FRIENDS all across the country to whom I can turn for advice, information, and support.”

— *An Access Excellence Fellow*

Program potential for reaching and involving a broader audience in the future. How successful the Access Excellence program will be at expanding its base of participants will largely depend on two factors: the accessibility of the Forum to new participants and the willingness of existing participants (the Fellows) to act as recruiters for the program. This evaluation suggests that

Access Excellence is well positioned in both of these areas and consequently has a strong opportunity to expand the number of teachers involved.

5. Making a complete and permanent move from America OnLine to the World Wide Web was a prescient decision.

Resolution of some technical hurdles for users. The decision to move the Access Excellence Forum to the World Wide Web was timely and solved many of the minor but persistent problems that had been frustrating some Forum participants. The design of the Forum became clearer, and links became more easily maneuverable. Uploading and downloading materials became a simpler process. Discussion lists became easier to track and use. Some duplication of information or cross-posting of lists continued, but overall the design of the Forum was simplified and much more aesthetically attractive. The improvement was reflected in Fellows' comments in the response to survey questions. When Fellows were asked in the Fall of 1995 how they would change or modify the resources available in the Forum to make them more useful, 27% suggested that improvements be made to the overall structure and organization of the Forum to make it easier to use. In the Spring, 1996 survey, after the move to the World Wide Web, these comments had almost entirely disappeared.

Easier access for a broader audience. While commercial services played a key transitional role in the development of on-line educational resources, the importance of these services is rapidly fading as teachers become more knowledgeable users of on-line resources, and as the quality and reliability of teachers' access to the Internet continues to improve. Locating the Access Excellence forum on the World Wide Web rather than on America OnLine broadens the audience for the forum; increases teachers' options for gaining access to the Forum through low- or no-cost connections; increases Genentech's control over the aesthetic and structural character of the site; and demonstrates that Access Excellence continues to be an exemplary and forward-thinking model of on-line professional development for teachers.

6. Access Excellence Fellows demonstrate an unusually high level of personal investment in this program.

Fellows as recruiters of new participants. Throughout the life of the Access Excellence program, the Genentech project team has emphasized the Fellows' central role as shapers and, in large part, creators of the Access Excellence forum. The Fellows have been given significant support in the form of training and hardware, and have, in turn, been asked to take significant responsibility for expanding the Forum and keeping it active, and for publicizing the Access Excellence program to colleagues in their own communities. Fellows have willingly accepted this responsibility and demonstrated, both in response to

evaluation questions and through their enthusiastic participation in the program, that they do feel a great deal of ownership for the Access Excellence program as a whole.

This sense of ownership is suggested by the significant effort Fellows are making to promote the Access Excellence program and to recruit new participants. In the short update survey, 71 respondents reported that they had made a total of 171 presentations about Access Excellence just during the 1995-1996 school year. Additionally, in the spring survey, when asked to indicate what kinds of activities they would be willing to take part in during future school years, 85% of respondents indicated that they would recruit new participants by promoting Access Excellence in their own and neighboring school districts, and 79% indicated that they would be willing to work as trainers or recruiters at state and national professional meetings.

The Fellows often articulated, in interviews and surveys, a clear belief that the Access Excellence can grow and have a major impact on the practices and morale of many other science teachers. Their willingness to make the effort necessary to recruit, train, and support new participants in the project is unusual for a professional development program, as is their thoughtfulness about the limits and realities facing them as they try to carry out this kind of work.

“I am my district’s high school science mentor. I have been able to share opportunities, activities, newsbreaks, and the latest in science research with all the science teachers in my school district. I have received nothing but praise for the value of this information. In addition, one of my district’s biology teachers has applied and been accepted to this year’s team of fellows. I’m glad I was able to encourage her in this success.”

— *An Access Excellence Fellow*

Fellows’ needs for support for outreach work. Fellows who are actively involved in Access Excellence take their agreement to recruit other teachers to use the Forum very seriously, as reflected by the large percentage of Fellows who report they have made presentations about the program during the 1995-96 school year. Many Fellows have given a range of presentations – for example, a Fellow may have started by introducing some teachers in her own school to the forum, then moved on to presenting at a regional biology teachers’ meeting, and then to presenting at state or national conferences as well. Fellows’ commitment to recruiting actively for the program is reinforced by Fellows’ concrete suggestions for the kinds of support they will need in order to continue to do this work in the future. Fellows commented that more support materials would help them make presentations more effectively.

Respondents were particularly interested in the idea of a CD-ROM that they could use to make presentations when Web access was not possible. Fellows also made many suggestions of new ways to reach teachers not yet aware of Access Excellence: these included making phone contact with teachers who aren't yet on-line; advertising in or writing articles for state level teacher organizations and departments of education; presenting a workshop/demonstration at the Woodrow Wilson Leadership Institutes; and visiting graduate school classes on science teaching.

“I have had a great time being a fellow, it has opened up many avenues to work with other teachers, to be a part of a dialog on-line, and to get some more professional viability in terms of being connected with such a great program...It has also given me the opportunity to try and get more people involved in teaching real science by pointing out the many excellent resources on the web and America OnLine.”

— *An Access Excellence Fellow*

The commitment of these Fellows is a valuable resource, but it will require continued investment over time if the Fellows are to be expected to continue to play leadership roles within the program. Teachers have limited resources of their own to expend on travel, hardware, or further training, all of which will be necessary for them to remain up-to-date and knowledgeable leaders, and to bring them in contact with new teachers who might become involved in the program.

Recommendations

1. As the base of participants in the Forum grows, the nature of the content being shared there will need to be expanded in some ways, and to become more focused in others.

Not all high school biology teachers will find that biotechnology or genetics are appropriate or possible topics to cover in their curricula. Genentech will need to provide some indication to new visitors of how and whether it covers the broader scope of biology content that teachers might come to the Forum to investigate. Much of the current content of the Forum can be adapted to suit a range of topics, not all directly related to biotechnology or to genetics. Teachers visiting the site will need help sorting through this content, and thinking about how it might be adapted to their own curriculum needs.

“I now go on-line every time I start a new unit. I get up to date information and a little more depth as well as a refresher course in the subject. I recently read the updates on AIDS, downloaded the AIDS activity from Activities-To-Go.

Downloaded the latest news from What's News. Also used the interview of Don Francis as an example of someone who is working on HIV. The same process was used with Ebola and with the on-line report summary from Heidi Haugen. A similar process was used in genetics. Used a Lorenzo's Oil report as well as downloading the information from the Myelin Project. All in all, it has infused new life into some rather old and stale lessons. Kids love the idea that they are learning what is going on NOW."

As the Forum settles into providing a long-term service to a broader audience of teachers, it may be necessary to investigate adding some more structured and constrained areas to the Forum. To date, Access Excellence has primarily relied upon delivery and developing content at the Forum in a diffuse and multifaceted way — allowing many conversations and projects to take place in many different parts of the Forum. Beyond the Forum's overarching commitment to biotechnology, there has been little emphasis on thematic threads across the areas of the Forum, and little perceived need to limit the Forum's focus to a finite number of curricular topics or content areas within biotechnology. This has maximized the Forum's flexibility, and given the Fellows the opportunity to take off in many directions and explore those areas of content and pedagogy that they are more interested in.

In order for Access Excellence to be a key on-line resource for biology education and teacher development, it will need to deliver content in ways that are useful to biology teachers with widely ranging interests and levels of experience. Many of the areas of content and pedagogy emphasized by NSTA, which the Access Excellence Fellows are already integrating and using, may be unfamiliar to less experienced and less highly educated teachers. Some of these teachers may best be invited into participation in the Forum through more structured presentations of science content, whether through materials created and provided by Access Excellence or through pointers to other resources.

More structured Forum areas will allow teachers with concrete needs and limited time and access to feel that their time at the Forum is useful and constructive, and that will bring them back to visit again. For example, Access Excellence could develop a list of key topics related to high school biology curricula and the NSTA National Science Standards. A set of links could then be created for each of these topics, giving priority to resources within the Forum that would be relevant to the topic, but also pointing out a range of relevant on-line resources, as well as key organizations, textbooks, laboratory resources, etc. that would be relevant. Such a structured and easy-to-apply resource would provide a new avenue into participation in the Forum

for teachers with very specific needs and questions or with limited time to explore the rich and complex resources of the rest of the Forum area.

Another way to increase the utility of the site while putting a minimal burden on development staff would be to stress the need for all active teachers participating in the Forum to contribute to archives - to post links, names of books, names of laboratory equipment, in areas that could be devoted to collecting such recommendations and organizing them in relation to specific topics. For example, teachers who come to the Access Excellence forum who are aware of other important on-line resources related to genetics would be encouraged to post the link to the genetics site in a clearly marked "Genetics resource archive" area.

Teachers do find useful content in all areas of the Forum. While more focused and structured presentation of content may become important, particularly for inviting in new participants, it will also be important to preserve those areas of the Forum that teachers value precisely because new content knowledge is embedded in more practical discussions of day-to-day teaching and classroom issues.

Both the surveys and our tracking of on-line activity throughout the year indicated that the Fellows felt that they were learning new content through *all* aspects of the Forum, not only from the areas specifically designed to present or teach new science content. Some areas of the Forum, such as the discussion boards and the Activities-to-Go, are less explicitly focused on exposing teachers to new content and were more concerned with giving teachers an opportunity to share resources, activities, curricula and teaching ideas with one another. However, these areas are also important to the overall delivery of content through the Access Excellence Forum.

The best examples of the intermingling of content and practice that occurred during teacher-to-teacher conversation happened on the discussion boards, where teachers frequently embedded new information or pointers to further information within their discussion of broader topics. Teachers who knew more about a particular subject area shared their knowledge informally through these avenues, allowing other teachers to follow up by tracking down suggested resources, or by contacting that knowledgeable teacher privately for further discussion. Similar sharing of content knowledge occurred through the Activities-to-Go, which often focused on relatively complex topics that not every teacher would necessarily be comfortable with. Teachers who posted more advanced activities reported in interviews and surveys that they were often contacted privately by other teachers seeking guidance and pointers toward further information on topics they had not yet mastered. These kinds of informal pathways will need to be preserved as the Forum grows, so that

teachers can continue to follow serendipitous routes to new content knowledge as well as following more structured paths.

2. Other teachers can be expected to share the Fellows' primary interest in learning about new content in the context of concrete, classroom-based discussions among teachers about teaching and learning.

Complex content will be most successfully presented if it includes examples of other teachers' methods for approaching the content, such as lesson plans, methods of presentation, possible student projects and possible assessment techniques for responding to students' work in the area. This kind of teacher-generated material can be presented in concert with other forms of content that are common at the forum, such as seminars, journalistic reports and interviews, and academic articles, but it is a key component that teachers need in order to feel invited into the process of learning about new content.

Once a teacher explores the Access Excellence Forum, they will find that content, pedagogy and community are tightly interwoven throughout the Forum. However, they are likely to first visit the Forum because of some specific need or interest related to a particular content area. Providing a way for these new visitors to feel successful in their visit to the site maximizes the possibility that they will visit again, and gradually discover that the Forum provides more than specific answers to specific questions — that rather, it is a community of teachers and scientists that can help them to learn about new content, think about their teaching, develop new projects and activities, work with new colleagues, and expand their horizons as teachers.

As the site continues to develop, Genentech will need to determine how much, if any, support to provide for the biology teacher who might come to the site seeking more general biology information. One of the complexities of Genentech's mission with the Access Excellence forum is balancing their specific expertise and interest in biotechnology with an interest in reaching and serving all high school biology teachers. While biotechnology is a growing field within high school biology curricula, more sophisticated and experienced biology teachers (such as the Access Excellence Fellows) are more likely to be ready to engage with biotechnology content than are the rank and file of high school biology teachers.

However Genentech chooses to balance their emphasis on biotechnology content with a broader range of biology content, the following points will be key to successful support, no matter what content teachers are seeking:

- making it easy for teachers to search the content that does live on the Forum to find the available content on topics they're interested in; and

- providing well-designed links out to other sources of content for other areas of biology content.

From its inception, the Access Excellence Forum has provided some mechanism for both of these needs. However, as the forum grows, as its audience grows, and as the number and range of biology-related sites on the Web grows, effort will have to be made to keep these search strategies and links up-to-date and easy to use. It may become increasingly important to integrate links out to other resources into biotechnology-related content living on the site. For example, a teacher reading material posted at the forum about the genetic structure of specific diseases may need to find more information about the basic pathology of that disease, and would benefit greatly from links out to other resources from that specific page (rather than having to navigate over to the Resource Center to conduct a separate search).

3. Ultimately, the Access Excellence Forum can only invite the participation of teachers who have access to the World Wide Web and who have received adequate training to know how to navigate through the site effectively.

A broader pool of teachers can be reached as materials are shared and new information is passed from one teacher to another who may not have ever visited the site. But access and training will remain permanent hurdles to Access Excellence's ultimate goal of soliciting the participation of every high school biology teacher in the country.

Key obstacle: Getting more teachers on-line. The level and quality of in-school connectivity is growing rapidly. Opportunities for quality Internet training and adequate release time for participation in on-line professional development programs like Access Excellence, however, continues to be rare and is growing at a much slower rate than is simple access. Contributing to the national effort to inform teachers about the resources and communities available on-line, and to training them in the skills they need to make use of those resources and communities, would be an influential and meaningful step for Genentech to take.

Fellows are aware of the challenges facing other teachers who may want to get involved in the Access Excellence Forum. Currently, 70% of schools have some kind of Internet access. Even in these schools, teachers often need to get on-line in a media center or other area outside of their own classroom, and their time for exploration of on-line resources like the Forum is likely to be severely constrained by their teaching schedules. Teachers in schools without Internet access will need to rely, for the time being, on home access or access via other institutions to make use of resources like Access Excellence.

Key obstacle: Lack of time. Lack of time is the most significant barrier to participation in the forum. Fellows rated lack of time to explore, to download, to experiment with or adapt new materials, and to keep up with on-line relationships, as the most significant obstacle to more in-depth participation in the forum. This is consistent with findings from a broad range of teacher enhancement and educational technology projects. Lack of time is a chronic obstacle facing any project that seeks to enhance teachers' options for developing their own professional skills and/or their classroom practices and curricula.

Key obstacle: Lack of funding for outreach. The Access Excellence Fellows feel a high degree of ownership of the Access Excellence program. They are enthusiastic about the possibility of involving a larger community of science teachers, and want to contribute to outreach and recruitment efforts. The Access Excellence Fellows are very aware that their colleagues need both training and access if they are to become active participants in communities like the Access Excellence Forum. This kind of outreach is expensive, but it is, in the long run, crucial to reaching the next level of teacher participation in the Forum, and it would contribute not only to the vitality of the Access Excellence program but to the immediate needs of the high school teaching community in general.

In their responses about how Genentech can support them in such outreach efforts, Fellows pointed clearly to the financial constraints that can impede their work. Although the most common suggestion for support was full funding for attending national conferences, participants also suggested that partial funding would be important for them. Many Fellows explained the near-impossibility of receiving any funding or release time from their district to attend conferences, but also expressed their strong desire to both help with outreach at conferences, and to maintain the face-to-face relationships that they feel are an important part of the vitality of the Access Excellence community. Some Fellows also pointed out that it will be difficult for them to replace their laptops and modem connections as they age, making it difficult for them to give demonstrations.

Key opportunity: Fellows as trainers at conferences. Several findings suggest that it is particularly important for Access Excellence to continue to offer training opportunities for other teachers at conferences and for the Fellows to be involved in those training sessions. *Access Excellence* fellows themselves report that other than learning on their own, they are most likely to have learned how to use telecommunications technologies at conferences or in workshops. Fellows also reported that they did feel confident that teachers with a basic understanding of computers and telecommunications could be trained in the use of the Forum in a three-hour workshop. Finally, Fellows

also report that they feel strongly that teachers are most likely to become interested in a program like Access Excellence if they hear good things about it from another teacher. Taken together these points suggest that Fellow-led training sessions at conferences are an important and effective way to reach new teachers, to help them get on-line access, and to introduce them to the forum.

Key opportunity: Fellows as trainers in their communities. Respondents indicated that they were particularly willing to do focused, and most often face-to-face kinds of outreach to invite other teachers into the Access Excellence community. In response to questions about outreach to other teachers, respondents consistently emphasized the importance of initial face-to-face contact. Doing local recruitment, working at conferences, and routinely answering questions from old and new participants on-line were the most popular forms of outreach for Fellows to be interested in conducting. However, Fellows also expressed concern about the financial burden of these activities, their time limitations, and their limited access to and confidence in using the technology necessary for any large demonstration.

In light of these realities, Fellows suggested that Genentech's primary responsibility for supporting new participants is to help to remove roadblocks to teachers' easy and reliable access to the Forum. According to these respondents, helping to provide better access to computers and to the Internet, providing training in using the Forum, and maintaining a well-designed, well-organized Forum were the most important factors in making the Forum viable for new participants.