

# WHAT EDUCATORS WANT FROM THE WORLD WIDE WEB:

## THE VALUE OF AN INTERNET PRESENCE FOR SCIENCE EDUCATION PROGRAMS

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by

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### ABSTRACT

*"What do YOU want from the World Wide Web?"* This question was asked to a random sample of graduates from a local university science education program, offering the opportunity to directly participate in educational reform and actively influence the development of educational resources and support mechanisms appropriate for a graduate-level science education program website. The survey data support the national projections concerning the World Wide Web, indicating that it is here; we need it; we are using it; it can help; and science educators are willing to participate in its application. In other words, an Internet presence has a tremendous potential value for science education programs. Recommendations are of interest to content providers, program developers and administrative planners.

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### INTRODUCTION

The World Wide Web provides an unprecedented opportunity to enhance science education - not only with an enormous amount of current information and vivid experience, but also with an accessible communication mechanism to support classroom teachers and enrich their professional development. Science education programs are rising to the challenge of preparing educators to meet the evolving expectations of students, teachers, parents, and the general public. This study explores the potential benefits of using an Internet website to enhance a graduate program in science education – *from the perspective of science teachers*.

Technology significantly influences both the topics and tools of science education. In addition to the traditional textbook and standard curriculum (lesson plans, course materials), teachers can enhance lessons with a variety of educational resources including visual media (videos, CD-ROMs), specialized manipulatives (games, toys), interactive software programs (computer-assisted instruction), and most recently, the Internet [an open interconnection of networks that enables connected computers to communicate directly (Encarta, 1996)].

The World Wide Web, which allows users to create and use point-and-click hypermedia presentations linked across the Internet to form a vast repository of information that can be browsed easily (Encarta, 1996), is revolutionizing science education – blasting us through classroom walls on a real-time mission to Mars, bringing the excitement of undersea exploration to our desktops, and inviting all to experience a myriad of opportunities for personal growth and professional development. At the click of a button, time and space become irrelevant and we are limited only by our imagination.

The implications for science education programs are enormous and complex. State officials are hurriedly promoting the realization of global connectivity and computer literacy. Educational researchers are busily evaluating the impact of technology on theory and practice. University systems are boldly implementing new features and functions for distance learning. Foundation grants are graciously encouraging the delivery of creative content and practical tools. But, *what do science teachers want, and need, from the World Wide Web?*

In the early part of 1998, a 26-item questionnaire was mailed to a random sample of graduates of a local university Master of Arts in Teaching (MAT) in Science Education program. The purpose was two-fold: to determine the extent of connectivity of graduates currently teaching science and to define the prospective user expectations for the

program website. Results were compared to national statistics to assess the applicability of general trends to the specific evaluation and development of a local site.

The quantity and quality of educational websites continues to grow as we learn how to effectively apply technology. Numerous sites dedicated to science education are providing superior content and instructional activities. Educational research sites are providing timely, relevant information for educators and administrators. There are sites dedicated to legal aspects and educational reform issues. Surprisingly, if the recruiting propaganda, application forms and graduation requirements are removed, university sites dedicated to education are less prominent.

Now that the newness of the Internet has worn off a bit, analysts project that most World Wide Web users will "probably spend more time at a small number of sites that meet their requirements with respect to quality and content... Not only will users have a relationship with a small number of key websites, the websites will also have to start treating their users as individuals..." (Nielsen, 1996, ¶ 3-4). This trend in web usage suggests the potential value of an Internet presence for science education programs. "While the Internet and World Wide Web have clearly become a major force in disseminating information, the web has also become an efficient and cost-effective means for gathering information as well" (Becker, 1996, ¶ 1).

## REVIEW OF LITERATURE

***It's here.*** The sixth of seven priorities of the U.S. Department of Education set forth by President Clinton in his fifth State of the Union address (February 4, 1997) is that "Every classroom will be connected to the Internet by the year 2000 and all students will be technologically literate" (U.S. Department of Education, 1997, part 8). In the fall of 1996, 65% of U.S. public schools had access to the Internet; 74% of schools that did not had plans to obtain access by the end of 1997; and by the year 2000, 95% of our public schools expected to have Internet capabilities. Ninety percent of schools with Internet access had e-mail [electronic mail, allows a message to be sent from one computer to one or more other computers (Encarta, 1996)] and 89% had access to the World Wide Web. In schools with World Wide Web access, 94% made it available to teachers. Applications of advanced telecommunications included information access (74%), record keeping (67%), communication with parents (22%) and distance learning (22%) (National Education Association, 1997). Education is building its own HOV lane on the "information superhighway".

***We need it.*** Today's teachers are smart (65.2% hold one or more advanced degrees), experienced (52.4% have been educators for at least 15 years), skilled (82.6% teach in their major field) and dedicated (\$408 average annual out-of-pocket spending for class materials) (National Education Association, 1997). Yet, America still lags far behind other countries in science education and is falling short of its goals for achieving scientific literacy (Lavoie, 1997). Lesson #4 of a TIME Magazine (Wulf, 1997) feature article entitled "What Makes a Good School" states that "Nearly 2 million new teachers will be entering classrooms over the next decade. The system that prepares them for the job needs to improve" (p. 68). In a recent survey, K-12 teachers cited poor salary/working conditions and a lack of assistance, guidance and support as the top factors that contribute to the problem of poor quality in teaching (American Federation of Teachers, 1997).

***Let's use it!*** In short, technology is both the problem and the solution. The ways we learn have changed; to remain effective, the ways we teach must also change. The teacher survey cited in the preceding paragraph also reported that 77% favored peer evaluation and assistance programs for new teachers and 66% favored such for tenured teachers with poor evaluations (American Federation of Teachers, 1997). A nationwide forum of public school teachers that focused on the quality of professionals entering and remaining in teaching recommended, among other things, that we redesign teacher education programs, implement teacher-designed professional development programs and create teacher networks (National Teachers Policy Institute, 1997). According to the National Science Education Standards, "Teachers need the opportunity to become part of the larger world of professional teachers of science through participating in networks, attending conferences, and other means" (Thirunarayanan, 1996, conclusion). The World Wide Web offers a unique opportunity for graduate programs in science education to help meet the wants *and needs* of science teachers.

***It can help.*** It stands to reason that "since science content increases and changes, a teacher's understanding in science must keep pace" (Cannon, 1997, ¶ 2). Surveys indicate that in-service high school teachers "need enhanced content and pedagogical training to stay current within their teaching fields" and "want enhancements that will allow them to directly apply new learning in their classrooms" (Lavoie, 1997, ¶ 2). The World Wide Web can effectively provide resources for virtual learning environments, a wide variety of flexible professional development programs and interactive collaboration that supports and encourages today's science teachers.

Teachers are no longer limited to the resources within their physical reach. Integration of technology into educational reform has enabled a "global learning community". Collaboration among classroom teachers, science education professors and graduate students has already helped individual elementary school teachers change their science teaching practices (Briscoe, 1997). Preliminary investigations suggest that technology can help close the gap between teacher education programs and practicing classroom teachers by providing (i) specific, practical ideas and advice, (ii) a sympathetic and appreciative forum for discussion of ideas and experiences, (iii) general support for a progressive, active group of teachers exploring innovative methods, and (iv) continuity between pre-service and in-service community and professional development (Hammer, 1996).

Technology in teaching supports a more student-centered approach and offers significant benefits, including an increased emphasis on individualized instruction; more time engaged in advising students; an increased interest in teaching and experimenting with emerging technology; multiple technology utilization; increased productivity, planning and collaboration; revision of curriculum and instructional strategies; greater participation in restructuring efforts; business partnerships with schools to support technology; involvement of education with community agencies; and increased communication with parents (Cradler, 1994).

***Participation is the key.*** The role of teachers is being re-defined with an emphasis on becoming a learning facilitator, rather than assuming the traditional role of information supplier (Justice & Espinoza, 1996). Most educators would agree with another study's tenet that "teachers construct their own schema from their experiences in order to comprehend, plan for, and respond to the dynamics of their classroom" (Adams, 1997, abstract). During the 1993-1994 school year, the National Science Teachers Network successfully delivered course content to secondary-level science teachers using electronic media. One conclusion of the study revealed that "teachers seemed to learn more from themselves than from the instructor", further supporting the value of a virtual (implying "without place") learning community (Lavoie, 1997, conclusion).

Post-graduate education programs are unusual in that the students are also teachers. Just like their classroom students, each educator has a unique background and individual expectations. The World Wide Web can enhance the graduate experience with adult-learning strategies, such as observing, mentoring, coaching and reflecting, by providing "opportunities for participants to practice the methods demonstrated" and "help them apply their new knowledge in the classroom" (Fleming, 1996, ¶ 3).

This is not to imply that technology can or will replace teachers. Distance learning programs are becoming more common at the university level and the concept of a "virtual K-12 school" does raise some interesting considerations (Van Horn, 1997). For instance, pairs of geographically separated faculty members would be chosen on their collegiality, technology comfort level, willingness to teach any type of student, and effectiveness in one-on-one and small-group conversation. The "schoolhouse" would be comprised of well-configured workstations with videoconferencing capabilities. The server system would equate to the school's curriculum. The students would naturally become excellent writers. On-line teacher planning would be critical and directed toward the principles of cooperative learning, appropriateness and inquiry. The teachers would be "power users" of technology with tremendously magnified productivity. As far-fetched as it seems, an Alabama educator was scheduled to participate at a national education debate in January of 1998 titled "The Imminent Death of the Classroom" (McCarley, 1997).

At the time of this printing, no teacher education programs were known to offer training for this "virtual career path". However, teacher education programs are pro-actively initiating efforts with respect to the congressional charge, issued to the U.S. Office of Technological Assessment, to prepare teachers to use technology before entering the classroom. Their response stated that "most teachers graduate from teacher preparation institutions with limited knowledge of the ways technology can be used in their professional practice" and that "most technology instruction in colleges of education involves teaching about technology as a separate subject, not teaching with technology by integrating it into other course work to provide a model for instructional use" (Wetzel & Chisholm, 1996, ¶ 2).

## METHODS

To determine the impact and influence of a graduate-level science education program website, data were gathered using direct mail solicitation to support a random sample involving a wide range of contacts. Although mail surveys typically have a low response rate (Jaeger, 1988), this method was selected to provide an equal opportunity for a wider range of subjects to participate. The goal was to gather relevant, quantifiable data that would be difficult to obtain by direct observation or personal interview. An on-line survey mechanism was initially considered; however, this was not implemented because of the inherent bias toward "connected" users. Ease of response was a key consideration to reduce the limitation of data to pro-active respondents. The data is deliberately skewed toward in-service teachers as they make up the primary audience for the application of interest.

The total population consisted of 278 graduates of the MAT in Science Education program at an accredited university near Dallas, Texas that has been offered consistently for over 20 years. (Refer to "Appendix A. University Profile" for a general description of the population and academic environment.) The target population of subjects who currently hold science teaching positions was limited to a more accessible population consisting of those who graduated during or after 1987, spanning ten (10) years. This stratified the total population into relatively equal groups based on graduation year. The natural distribution of suitable subjects within the files dispels any threat of convenience sampling bias. Contact information was gathered by randomly selecting every 9<sup>th</sup> graduate that met the graduation year criteria from alphabetically arranged files maintained by the program office. Alternate subjects were also recorded using the same method in the event of a poor response to the initial direct mail campaign.

An original instrument was developed to address specific issues relevant to the new topic of the Internet with respect to science education. Testing and review by comparable educators who both do and do not use the World Wide Web in the teaching of science validated the survey content. The 26-item questionnaire parallels the order of discussion in the "Review of Literature" and allows for direct comparison between the sample usage and national statistics. Based on a nominal scale, a one-dimensional chi square test (Gay, 1996) was performed to compare the study results with the expected proportions of key items reported in the literature. Related questions triangulate the sample data, supporting the study conclusions and yielding insight into topics for further study and recommendations for similar program activities.

The inquiry packet mailed to subjects included a cover letter, survey instrument, return envelope and pin-on button. Refer to "Appendix B. Sample Instrument" for details. Subjects were requested to respond within two (2) weeks, as specified on the instrument.

## RESULTS & ANALYSIS

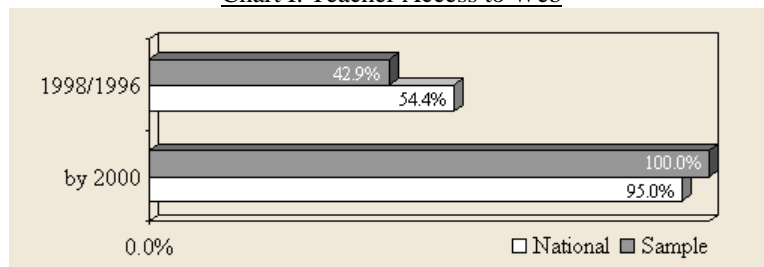
Of the 22 packets mailed, 7 were received as of this printing. The four male and three female participants represent four nearby public school districts and one distant university. Graduation years include one in 1998, three in 1997, one in 1995, one in 1989 and one in 1987. Three packets were returned because of incorrect addresses; 12 questionnaires were not received for unknown reasons. It is likely that several recipients chose not to return the study as they do not currently hold a teaching position. (Future versions should include a response item for non-educators.) Survey responses were manually tallied and are presented in "Appendix C. Instrument Compilation".

Although the response was the minimum required for a representative sample, the results are nonetheless valuable considering the obstacles of sampling such a mobile population. Based on most recent university program associations, the actual response group reasonably represents the upper half of the target population. Similarly subdividing the target population of 139 graduates within the last 10 years, the estimated sample of graduates within the last five years is approximately 70. As such, the results (10% of final target population) constitute an acceptable (large enough to generalize to similar settings) response for this type of research. The even distribution of males and females nullifies potential gender bias toward new teaching styles and technology integration.

The sample data reflect the national conclusions and current understanding about the World Wide Web in science education, strongly supporting the potential value of an Internet presence for science education programs.

***It really is here!*** According to a recent survey on Internet usage (Greenman, 1998), Dallas ranks 13<sup>th</sup> among the 50 largest cities in the United States, with "fewer Internet companies than its Texas counterparts but more data passing through" (p. 77). The positive survey results support this ranking, as well as the national statistics.

Chart I. Teacher Access to Web

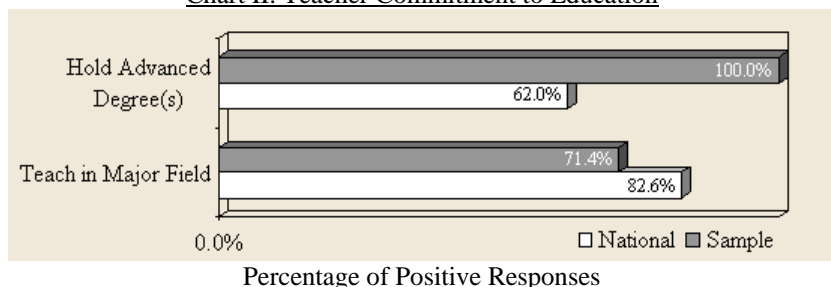


Percentage of Schools with Access to the Web (Now and Planned)

There was no significant difference between the actual sample data and the reported national statistics with respect to teacher access to the Web. All subjects had access to the Web either professionally (classroom, school/public library, school/district office) or personally (71% at home). Nearly half of the sample group had access to the Web from within their classroom; all of the sample group expected to have classroom access by the year 2000. In one district the students already had individual computers! To supplement traditional textbook and videotape tools, nearly half of the sample also use interactive software and Internet resources in their lessons. Sampled educators primarily used computers for general teaching functions, such as data access, record keeping, and to a lesser extent, for other communication and distance learning activities.

***We really do need it!*** Described in the 1996-1998 graduate catalog, "The Master of Arts in Teaching degree in Science Education stresses training in the art of teaching and advanced knowledge in the science selected for major specialization. Designed for individuals with significant ability in a discipline and a serious commitment to teaching, the program offers an opportunity for professional development of experienced teachers" (p. 184). The sample group reflects this standard and supports the published description of today's educators.

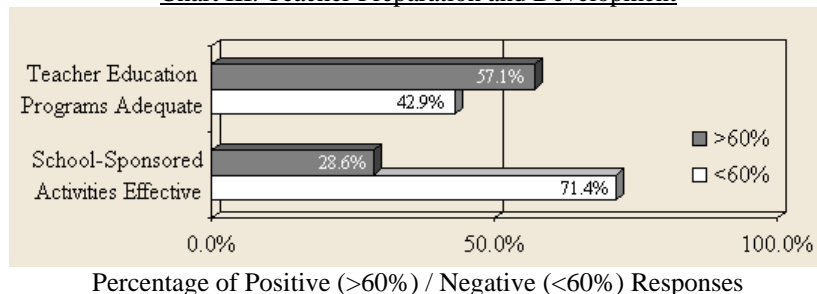
Chart II. Teacher Commitment to Education



There was no significant difference between the actual sample data and the reported national statistics with respect to teacher commitment to education. By definition, all subjects held a MAT in Science Education. Additionally, a supervisor certificate, Master of Science degree and Doctor of Philosophy degree had been earned by members of the sample group. Seventy-one percent of the sample taught or supervised in their major field; all taught in their major and/or related fields. All but one had been teaching for over 6 years and most reported spending more than \$100 of their own money for teaching purposes each year. On a positive note, all but one of the subjects were confident that their administration supported their teaching efforts.

***We really should use it!*** The Web is uniquely positioned to play a major role in the nationwide reform of science education. Current knowledge about teaching lists the following elements as necessary to build productive classroom communities: "an extensive base of knowledge about science, about their students, and about teaching; the ability to facilitate learning in a community of 'student scientists'; adequate teaching materials and other tools; administrative support and encouragement; and time to prepare, to respond to students, and to reflect on their teaching" (Knuth, 1991, ¶ 17).

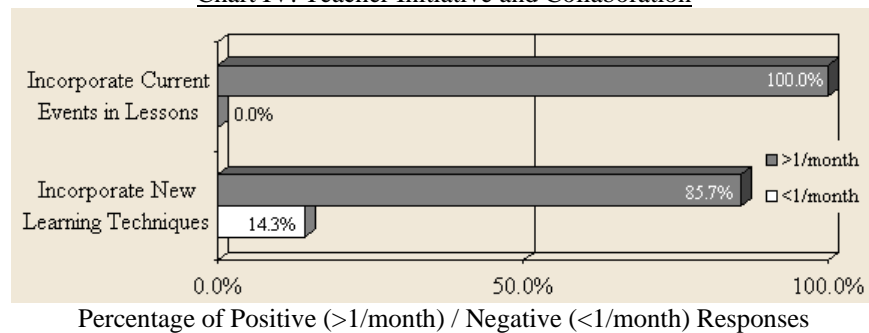
Chart III. Teacher Preparation and Development



With respect to teacher preparation and development, opinions on the adequacy of teacher education programs were evenly split between positive and negative responses; however, school-sponsored events were not considered effective for the most part. While some subjects were evaluated with department, peer and student reviews, most were rated with traditional administrator observations. There was a wide range (<3 to >10) in the average number of professional development programs attended by subjects each year. Subject interaction with educators outside their department was typically engaged at district/regional meetings and educational conferences. Two participated in teacher networks, another cited lunch time as a source of interaction, and one reported no interaction with teachers outside his/her department.

***It really can help!*** History that supports the interest, popularity and ubiquity of the World Wide Web in education is literally in the making. As one of many examples, "The JASON Project joins many groups with one common goal in mind: getting today's students and teachers excited about science and technology. Private industry, scientific researchers, and educational organizations around the world have cooperated since 1989 to show young people some of the earth's most amazing places" (EDS and the JASON Foundation, 1998, "Participation" page, ¶ 1).

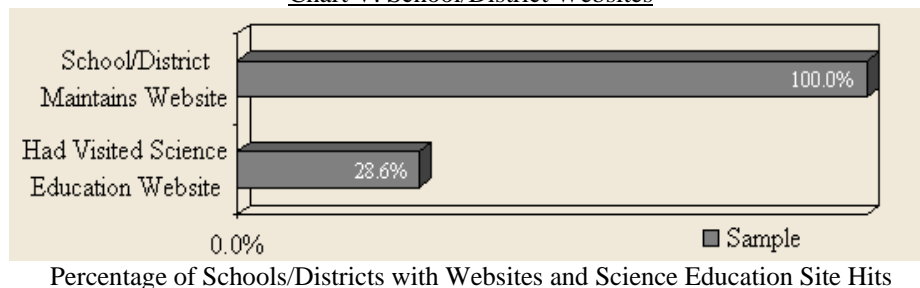
**Chart IV. Teacher Initiative and Collaboration**



With respect to teacher initiative and collaboration, at least once a month all subjects incorporated current events and over 85% incorporated new learning techniques in their lessons. Most had participated in district/regional and college/university collaborative projects; two had worked with local businesses and one reported no such interaction. The majority cited support for innovative methods and an experience/discussion forum as critical elements of a "global learning community". By incorporating technology in teaching, all subjects felt that revision of curriculum and instructional strategies was supported and most indicated that increased emphasis on individualized instruction and increased interest in teaching and new technology were specific benefits to teachers. More time engaged in advising students; multiple technology utilization; increased productivity, planning and collaboration; and business partnerships with schools to support technology were additional benefits of incorporating technology in teaching.

***We really are participating!*** Commenting on preservice training for teachers, a recent Office of Technological Assessment report describes "a number of experiments by schools of education using technology that provide a rather rich picture of the potential technology has as both a means for fulfilling traditional missions in more effective ways and as an agent for fostering college of education reforms" (Glennan, 1996, Chapter 4). Enrollment in innovative distance education and technology-oriented courses offered by the university science education program certainly supports teacher interest and involvement.

**Chart V. School/District Websites**



With respect to relevant website maintenance and exposure, all of the schools/districts represented by the sample group maintained a website, but few subjects had "hit" (accessed or visited) the science education program website. Internet access by the sample group was evenly distributed. On the high end, 29% "surfed the web" on a daily basis; 29% ranked in between with weekly access; on the low end, 29% accessed the World Wide Web three to five times a month; and one subject reported less than two instances per month. Reasons for access included general information, topic research, and personal use. New technology had been applied in the sampled classrooms through in-class labs, individual reference, presentation materials, handout development and project research.

## CONCLUSIONS & SUGGESTIONS FOR FURTHER STUDY

The World Wide Web has been established in science education. The new challenge to science educators is to take advantage of this versatile medium for gathering and distributing timely information. Local, state and federal officials have set the aim of current science education reform high. University-level science education programs can help realize critical goals by implementing relevant website strategies that support, inform and encourage today's science educators. The possibilities are intriguing. The value of an Internet presence for science education programs is virtually overwhelming.

Based on the survey-specific responses, the following comments may be extended for consideration by content providers, program developers and school administrators interested in science education-related web sites.

- Compare/monitor historical reference data by logging HitBOX stats (Refer to "Appendix D. Web Site Statistics" for details.)
- Promote newly designed website to science departments in local school districts and similar target groups to increase exposure and use
- Place articles in alumni magazine/student newspaper to exploit the positive marketing potential of the program's development/growth
- Initiate an electronic "guestbook" to specifically define audience and solicit user feedback to provide content consistent with user expectations
- Regularly update site by inviting creative, peer-developed content on a variety of educational topics and study areas
- Expand site with "success stories" detailing how science educators are using the web and technology in teaching
- Initiate an interactive "sci\_ed network" with a chatroom (electronic forum for open discussion), e-mail notification of updates/events, recommended links to sources of quality information, and other support services

The results of this study support continued maintenance and expansion of the university's science education program web site. By assuming a leadership position and engaging a proactive role to improve science education, the program will benefit from an expanded perspective and continuous infusion of innovative contributions. On a larger scale, the results also support increased training efforts and improved accessibility options for more effective use of a powerful tool that will, regardless of indifference, quickly change the face of science education - for better or for worse.

The fact that science educators *are* willing to participate in the development of the web as a resource and that they *do* have a need for peer networking and outside support more than justifies the value of an Internet presence and the limitless possibilities for application of the World Wide Web in science education programs.

## **APPENDIX A. UNIVERSITY PROFILE**

The following profile (from <http://www.utdallas.edu/utdgeneral/utdtour.html>) describes the general academic environment of the graduate program studied in this report.

### **University of Texas at Dallas Profile**

The University of Texas at Dallas is a young institution with a great and challenging future. It was created in 1969 on the foundation of the Graduate Research Center of the Southwest. Expanded in 1989 from upper-level and graduate studies only, it now includes freshman and sophomore students, offering a new opportunity for Texas high school seniors to study in a rigorous and fulfilling academic environment. It currently enrolls approximately 9022 students.

UT-Dallas has two parallel missions: a new mandate to achieve preeminence in undergraduate math, science and engineering education in the North Texas region, as well as continuing its traditional role of providing ongoing, professional education to local adult students. With admission standards for freshman set by the state legislature as among the highest in the UT-System, The University of Texas at Dallas continues to stress a highly rigorous, demanding curricula for all of its students, ensuring the quality of our graduates to be second to none. The typical UT-Dallas student is married, has a family and works full time. More than 40-percent are graduate students, and three-quarters of all UT-Dallas students take at least one evening class.

High quality academics are an integral part of the institution's heritage. UT-Dallas has distinguished itself as the focal point of excellent academic research in the region. Beginning with space sciences, geosciences, and biological sciences at UT-Dallas' predecessor institution, the Southwest Center for Advanced Studies, the University has extended its strong research program into the arts and humanities, engineering and computer science, general studies, human development, management, natural sciences and mathematics and social sciences. Research expenditures per faculty member maintains the university's rank among the top three institutions in Texas.

The recently established Erik Jonsson School of Engineering and Computer Science fulfills the goals of our founders, Cecil Green, Erik Jonsson, and Eugene McDermott, in providing a first class, high-tech engineering education for local students, offering a Texas alternative to out-of-state institutions. With the school's new building--featuring a state-of-the-art clean room--the University can provide cutting-edge education and research in three key fields of tomorrow's technology: computer science, microelectronics and telecommunication.

Also recently established is The Cecil and Ida Green Center for the Study of Science and Society. Providing both a repository for Mr. Green's collections, and a faculty commons, the purpose of the Center is to convene debate among nationally renowned scholars regarding the effect of science and technology on society.

With program offerings from freshman to doctoral, and the school's attractiveness to part-time, ongoing adult students (all degree programs may be taken at night), UT-Dallas features an incredibly diverse student body, numbering many international students from Europe, Central and South America, Asia and Africa. Such diversity requires novel approaches by the University to support the student's needs. For example, our students value evening care, rather than day care, for dependent children. Instead of traditional dormitories, the University features an apartment complex devoted to UT-Dallas students, located adjacent to the academic complex.

Dr. Franklyn Jenifer, became president of UT-Dallas in the fall of 1994, coincident with the University's 25th Anniversary.



## APPENDIX B. SAMPLE INSTRUMENT

A sample of the cover letter and instrument follow. The materials, including a pin-on button (below) and self-addressed stamped envelope were mailed in a hand-addressed, matching colorful envelope to encourage participation.

### Sample letter



<date>

Dear <name>:

Thanks for opening this letter. I hope you'll take a few minutes to read it and respond as soon as possible. This is *not* a plea for money or volunteer work; it's simply an opportunity for you to improve "the system" - *really!*

The World Wide Web provides an unprecedented opportunity to enhance science education - not only with an enormous amount of current information and vivid experience, but also with an accessible communication mechanism to support classroom teachers and enrich their professional development. Science education programs are rising to the challenge of preparing educators to meet the evolving expectations of students, teachers, parents, and the general public.

You have been selected to participate in a research study to investigate the potential benefits of using an Internet website to enhance a graduate program in science education – *from the perspective of science teachers*. Even if you don't "surf the web" or even teach right now, your comments are valuable. We want to know your interests and ideas. We have tried to keep the questions short and to the point and have provided space for any comments and suggestions. This information is strictly confidential and you will not be contacted with respect to this study after we receive your response. Please return your questionnaire in the envelope provided by <response date> at the latest. The results will be formally reported to the department of Natural Sciences & Mathematics and made available to participants, faculty, and students via the UTD Science Education website at [http://www.utdallas.edu/dept/sci\\_ed](http://www.utdallas.edu/dept/sci_ed).

Your participation is critical to the success of this project. ***What do YOU want from the World Wide Web?***

By completing this survey, you will directly participate in educational reform and actively influence the development of educational resources and support mechanisms available through the UTD Sci\_Ed website.

***Please take a few minutes to ...help US ...help YOU ...help THEM    Learn something new - everyday!***

Thanks in advance,

Rebekah K. Nix, *M.A.T. Candidate, UTD*

**Sample survey**

*Instructions...*

Please answer all questions with respect to your *current* or most recent teaching position.

Check *all* responses that apply. Indicate *other* responses as needed in the space provided or attach another sheet.

**Please return completed form in the enclosed envelope by**

**<response date>.**



1. What types of educational resources do you use, as appropriate, in your lessons?

textbook      videotape      interactive software      internet resources      \_\_\_\_\_

2. How "connected" to the World Wide Web (WWW) is your classroom?

>15 terminals      15-6 terminals      5-1 terminals      will be by 2000      \_\_\_\_\_

3. What percentage of your students are "computer literate" (i.e., basic skills, could access information via WWW)?

>80%      80-61%      60-41%      40-21%      <20%      \_\_\_\_\_

4. Where do you, professionally and/or personally, have access to the World Wide Web?

in classroom      school library      school office      at my home      \_\_\_\_\_

5. For what other teaching functions do you use your school's computer/network?

data access      record keeping      communication with parents/peers      distance learning      \_\_\_\_\_

6. What, if any, advanced degrees/certificates do you hold? Please list all, including subject(s).

None      \_\_\_\_\_

7. How many years - cumulative, not necessarily consecutive - have you been teaching?

>15      15-11      10-6      5-3      <3      \_\_\_\_\_

8. In what fields are you teaching/supervising now?

major only      major & related      related only      extra-curricular      \_\_\_\_\_

9. How much out-of-pocket money do you spend for teaching purposes annually?

>\$300      \$300-226      \$225-151      \$150-75      <\$75      \_\_\_\_\_

10. How confident are you that administration supports your teaching efforts (i.e. provides assistance, guidance)?

>80%      80-61%      60-41%      40-21%      <20%      \_\_\_\_\_

11. How adequately are today's teacher education programs preparing new teachers for the field?

>80%      80-61%      60-41%      40-21%      <20%      \_\_\_\_\_

12. What types of reviews/observations are used to evaluate your teaching practices?

administrator      department      peer      student      outside      \_\_\_\_\_

13. How many professional development programs do you attend, on average, each year?

>10      10-7      6-3      <3      none      \_\_\_\_\_

14. In what types of interaction with teachers outside of your department do you typically engage?

district meetings      regional meetings      teacher networks      educational conferences      \_\_\_\_\_

15. How effective/productive do you feel school-sponsored activities are for your professional needs?

>80%      80-61%      60-41%      40-21%      <20%      \_\_\_\_\_

16. How often do you incorporate current events in your lessons?

≥ 2/day      daily      2-3/week      2-3/month      <1/month      \_\_\_\_\_

17. How often do you incorporate new/supplemental learning topics/techniques in your classroom?

≥ 2/day      daily      2-3/week      2-3/month      <1/month      \_\_\_\_\_

18. In what types of interactive collaboration projects have you participated?

district/regional      college/university      market/industry      local business      none      \_\_\_\_\_

19. Which of the following elements of a "global learning community" do you think are critical to success?

specific ideas, practical advice      experience/discussion forum      support for innovative methods      development continuity      \_\_\_\_\_

20. What benefits to teachers do you feel can be/are supported by incorporating technology in teaching?

- |   |  |
|---|--|
| increased emphasis on individualized instruction  | revision of curriculum & instructional strategies      |
| more time engaged in advising students            | greater participation in restructuring efforts         |
| increased interest in teaching and new technology | business partnerships w/ schools to support technology |
| multiple technology utilization                   | involvement of education with community agencies       |
| increased productivity, planning & collaboration  | increased communication with parents                   |

\_\_\_\_\_

21. How many computer/new technology training workshops/seminars have you attended?

- >10      10-7      6-3      <3      none      \_\_\_\_\_

22. How have you applied new technology in your classroom?

- presentation materials    handout development    research projects    in-class labs    individual reference    \_\_\_\_\_

23. How often do you "surf the web"?    do not have access

- daily      5-3/week      2-1/week      5-3/month      ≤ 2/month      \_\_\_\_\_

24. Why do you typically access the WWW?    do not have access

- current events    research subject    product info/order    general information    personal use    \_\_\_\_\_

25. Does your school/district maintain a website?    yes    no

26. Have you visited the UT-D website ([http://www.utdallas.edu/dept/sci\\_ed](http://www.utdallas.edu/dept/sci_ed))?    yes    no

Please comment on what you liked best/would like to see on the UT-D Science Education website:

**Confidential demographic information - for statistical purposes only.**

<name, address, city, state, zip> (MAT <year graduated >)

What is/was your teaching position? Year(s): \_\_\_\_\_ District: \_\_\_\_\_

Level/Subject(s): \_\_\_\_\_

***Thank You for helping Us learn something new!***

Your time, effort, comments and suggestions are valued and appreciated.

## APPENDIX C. INSTRUMENT COMPILATION

The following instrument summarizes the survey results. The percentage of responses is indicated below the respective options. Write-in responses are listed in the appropriate spaces.

### SURVEY RESULTS SUMMARY

1. What types of educational resources do you use, as appropriate, in your lessons?

textbook=6 videotape=6 interactive software=3 internet resources=3 +1=FOSS/SEPUP

2. How "connected" to the World Wide Web (WWW) is your classroom?

>15 terminals=1\* 15-6 terminals=0 5-1 terminals=2 will be by 2000=4 \*students have individual computers

3. What percentage of your students are "computer literate" (i.e., basic skills, could access information via WWW)?

>80%=1 80-61%=2 60-41%=0 40-21%=2 <20%=2

4. Where do you, professionally and/or personally, have access to the World Wide Web?

in classroom=2 school library=3 school office=1 at my home=5 +1=public library +1=district office

5. For what other teaching functions do you use your school's computer/network?

data access=3 record keeping=3 communication with parents/peers=2 distance learning=1 +1=none +1=test bank

6. What, if any, advanced degrees/certificates do you hold? Please list all, including subject(s).

None=0 +7=MAT Science Education +1=Supervisor Certification +1=MS Plastics +1=PhD

7. How many years - cumulative, not necessarily consecutive - have you been teaching?

>15=1 15-11=2 10-6=3 5-3=1 <3=0

8. In what fields are you teaching/supervising now?

major only=5 major & related=2 related only=0 extra-curricular=2

9. How much out-of-pocket money do you spend for teaching purposes annually?

>\$300=3 \$300-226=1 \$225-151=1 \$150-75=0 <\$75=2

10. How confident are you that administration supports your teaching efforts (i.e. provides assistance, guidance)?

>80%=4      80-61%=1      60-41%=1      40-21%=0      <20%=1

11. How adequately are today's teacher education programs preparing new teachers for the field?

>80%=1      80-61%=3      60-41%=1      40-21%=2      <20%=0

12. What types of reviews/observations are used to evaluate your teaching practices?

administrator=4    department=2    peer=2      student=1      outside=0

13. How many professional development programs do you attend, on average, each year?

>10=2      10-7=1      6-3=1      <3=2      none=0      +1=just state-mandated number

14. In what types of interaction with teachers outside of your department do you typically engage?

district                  regional                  teacher                  educational                  +1=none +1=lunch time  
meetings=4                  meetings=3                  networks=2                  conferences=4

15. How effective/productive do you feel school-sponsored activities are for your professional needs?

>80%=0      80-61%=2      60-41%=1      40-21%=1      <20%=3

16. How often do you incorporate current events in your lessons?

≥ 2/day=0      daily=1      2-3/week=3      2-3/month=2      <1/month=0      +1=every physics topic relevant

17. How often do you incorporate new/supplemental learning topics/techniques in your classroom?

≥ 2/day=0      daily=1      2-3/week=3      2-3/month=2      <1/month=1

18. In what types of interactive collaboration projects have you participated?

district/                  college/                  market/                  local                  None=1                  \*Texas Instruments  
regional=3                  university=3                  industry=0                  business=2\*                  Robotics Competition

19. Which of the following elements of a "global learning community" do you think are critical to success?

specific ideas,                  experience/dis-                  support for inno-                  development  
practical                  cussion forum=4                  vative methods=5                  continuity=1  
advice=2

20. What benefits to teachers do you feel can be/are supported by incorporating technology in teaching?

3=increased emphasis on individualized instruction      7=revision of curriculum & instructional strategies  
2=more time engaged in advising students              1=greater participation in restructuring efforts  
4=increased interest in teaching and new technology      2=business partnerships with schools to support technology  
2=multiple technology utilization                              0=involvement of education with community agencies  
1=increased productivity, planning & collaboration              1=increased communication with parents  
+1=student motivation    +1=extra-curricular topics

21. How many computer/new technology training workshops/seminars have you attended?

>10=0              10-7=1              6-3=1              <3=3              none=2

22. How have you applied new technology in your classroom?

presentation materials=3      handout development=2      research projects=1      in-class labs=4      individual reference=3

23. How often do you "surf the web"? do not have access=0

daily=2      5-3/week=1      2-1/week=1      5-3/month=2      ≤ 2/month=1

24. Why do you typically access the WWW? do not have access=0

current events=1      research subject=3      product info/order=0      general information=4      personal use=5      +1=advanced placement physics ideas

25. Does your school/district maintain a website? yes=7 no=0

26. Have you visited the UT-D website ([http://www.utdallas.edu/dept/sci\\_ed](http://www.utdallas.edu/dept/sci_ed))? yes=2 no=5

Please comment on what you liked best/would like to see on the UT-D Science Education website:

+1 had not hit site: class schedule and links to websites relating to secondary science

**APPENDIX D. WEB SITE STATISTICS**

"HitBOX", a service provided by WebSideStory, collects statistical information about the program website. Further information is available online at <http://www.hitbox.com>.

Table II. Sample "HitBOX" Statistics

**Science Education at UTD**

(automatically updated every 30 seconds)

Global Information		
Account ID	I31788733	
Total Number Of Hits	3,265	
Total Impressions	3,174	
Total Unique Visitors	2,664	
Total Reloads	91	
Average Impressions/Day	20	
Average Uniques/Day	16	
Average Reloads/Day	0	
Local Time	Mon Mar 2 14:57:33 1998	
Counting Since	Thu Sep 25 14:15:32 1997	
Last Reset	Thu Sep 25 14:15:32 1997	
Last Impression	Mon Mar 2 14:56:24 1998	
Last Unique	Mon Mar 2 14:56:24 1998	
Last Reload	Sat Feb 28 01:42:14 1998	
Today's Statistics		
Impressions	19	
Unique Visitors	15	
Forecasted Impressions	30	
Forecasted Uniques	24	
Reloads	0	
Average Impressions/Hour	1	
Average Uniques/Hour	1	
Average Reloads/Hour	0	
Returns Within 1 hour	4	
Returns After 1 hour	0	
Highest Rated		
Date	Dec 3, 1997	51
Hour	3PM	31
Day	Wednesday	51
Month	February	715

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