KENAN FELLOWS PROGRAM EVALUATION

2008-09

Kenan Institute for Engineering, Technology & Science

North Carolina State University

Prepared by
Donley Educational Evaluation Consulting, Inc.

http://www.edeval.org/index.htm

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EXECUTIVE SUMMARY

Program Rationale and Overview

Increasingly, students are expected to enter the workforce prepared with sophisticated skills in science, mathematics, engineering and technology (STEM) in order to function effectively in a global economy that emphasizes these skills. However, recent assessment data continue to show that students' math and science skills lag behind those seen for students internationally. Sources of this problem include a failure to retain high quality STEM teachers, and a lack of innovative STEM curriculum that encourages students' enthusiasm within these areas. The Kenan Fellows program, which has graduated 66 teacher-fellows to date, is a two-year model internship program designed to encourage teacher leadership and inquiry-based STEM curriculum development in partnership with a university or business/industry mentor. The program has recently expanded to include 42 (27 from the class of 2010 and 15 from the class of 2011) Fellows across many of North Carolina's counties, including economically disadvantaged regions with historically higher teacher attrition and poorer student achievement. Evaluation data are collected regularly and an external evaluator provides annual reports on the program's effectiveness.

Key Findings

The program continues to provide highly rated professional development consistent with National Staff Development Council standards, and staff regularly adjust programming based on formative evaluation data. Results from the most recent report completed for the Kenan Fellows program suggest this model has been very effective in addressing its goals.

Teacher Leadership and Retention

The Kenan Fellows program seeks to develop highly motivated teacher leaders through programming that emphasizes educator advocacy, working with state leaders, enhancing

knowledge of state STEM initiatives, and fireside chats with education leaders. A review of program data yielded the following findings:

- Many Kenan Fellows enter the program with outstanding credentials, with 30% having attained National Board certification, and nearly half (43%) holding an advanced degree in their field.

- The program has encouraged nearly one-quarter (24%) of its Fellows to subsequently attain National Board certification and/or to initiate or complete an advanced degree.

- Many Kenan Fellows (53%) have received some type of educational award ***since*** entering the program, such as "Teacher of the Year" in their school or district. In addition, almost half (46%) have received a grant award during this time.

- Approximately three-quarters (74%) of 2010 Fellows have made professional presentations or provided formal professional development to their colleagues at their schools or at state, national and international conferences since joining the program.

- More than 80% of 2010 Kenan Fellows report that their program participation has helped them become instructional leaders in their school, and helped them expand their leadership roles through interactions with educational leaders and policy makers.

- A substantial majority (83%) of all Kenan Fellows are still teaching, and all but one of the Fellows who have left remain in the education field as leaders in some capacity (e.g., education consultant with NCDPI or school principal). Many Fellows attribute their decision to remain in teaching in part to their participation in the program. Given that often the best STEM teachers leave teaching for other more lucrative professions, the program may provide a cost effective way to encourage Fellows to remain in the classroom or exert their influence more broadly in some other educational capacity.

Advancing Effective Teaching and Innovative and Relevant Curriculum Development

The program attempts to advance teaching by enhancing Fellows' use of inquiry-guided instructional techniques and technology, enriching content knowledge, and fostering innovative curriculum development in STEM areas. Evaluation results show that:

- Curriculum projects developed by Fellows have attracted more than 650,000 "hits" and have been viewed by more than 275,000 visitors thus far.

- Fellows have given highly rated conference presentations to teachers from almost all counties in North Carolina as well as to teachers nationally and internationally, and provided extensive professional development to their school colleagues.

- All or almost all (at least 85%) 2010 Fellows believe that the program has enriched their STEM knowledge, broadened and/or refined their content knowledge, helped them develop innovative and challenging curriculum and helped them become better teachers. Relatively fewer (56%) reported that they have significantly changed their instructional approach since becoming a Fellow. It is possible that many Fellows entered the program already using many innovative instructional techniques such as inquiry-based instruction, and therefore did not report appreciable gains in this area.

- 2010 Fellows reported the most gains in their knowledge of STEM careers (which was more of a focus of summer programming than in previous years), teacher leadership and use of classroom technology. They also believed their students were more likely to successfully use inquiry-based learning strategies and sophisticated and meaningful technology since they became Kenan Fellows.

Establishing Synergistic Partnerships Among Teachers, Researchers and Industry

In order to ensure that students are the beneficiaries of relevant STEM instruction, the Kenan Fellows program seeks to help Fellows develop partnerships with practitioners in the field, including university faculty, business and industry leaders, and education leaders within the state. It is also expected that the university or business Mentors will derive benefits from their relationships with their Kenan Fellow. Evaluation results show:

- Almost all (85%) of Fellows report that the program has helped them establish partnerships within the broader educational community, and 93% indicate that networking with other Kenan Fellows enhances their teaching and leadership skills.

- Survey results show that adjustments made by staff to the summer programming in the form of increased time with their Mentor and more structure and monitoring of curriculum projects were largely successful. Nearly two-thirds of Fellows and Mentors report having developed a close professional relationship, and at least three quarters of 2010 Fellows reported that their Mentor had enhanced their content knowledge and helped them make STEM instruction more relevant to their students.

- Mentors report that their participation has fostered their work in university extension/engagement (75%), scholarly contributions within their field (63%), and understanding and respect for the K-12 classroom (89%).

- A substantial majority of Mentors believe their Kenan Fellow has enhanced their content knowledge (82%) and research skills (71%). Almost all also believe the program enhances teachers' ability to use sophisticated technology and inquiry-based instruction, and provides innovative curriculum change that will ultimately improve student achievement.

- While Fellows and Mentors report that summer programming allowed them enough time to work on their project, Mentors believe more time is needed for contact with their Fellow throughout the school year.

Conclusions

The Kenan Fellows program evaluation results suggest that the program has continued to fulfill its goals of enhancing Fellows' teacher leadership and retention, promoting their use of innovative teaching strategies, helping them develop and disseminate valuable curriculum widely, and encouraging them to form vital strategic relationships with others within the educational community. Data suggest that the program may be a cost effective model to promote STEM teacher retention, as well as develop and disseminate much-needed STEM curriculum. An additional evaluation question of interest is whether these types of valuable gains translate into direct positive impacts on student achievement and learning. Currently, longitudinal value-added student achievement data are being collected from the 2010 class of Fellows, which will reveal whether they are able to make enhanced academic growth on standardized tests with their students as they progress through the program. These Fellows are also capturing student learning and attitudinal outcomes based on the curriculum area they are targeting with their project. These data along with those already collected on Fellows will provide a more complete picture of the impact of the Kenan Fellows program.

EVALUATION REPORT YEAR EIGHT: KENAN FELLOWS PROGRAM JUNE 2008 - JULY 2009

PROGRAM RATIONALE AND OVERVIEW

Recent national reports on the state of education in the United States suggest that there is cause for some concern regarding the educational preparation of students to compete in the new global economy. The emerging workforce will necessarily consist of highly skilled and educated workers with sophisticated skills in science, mathematics, engineering and technology, as scientific and engineering occupations are expected to continue to grow more quickly than other occupations.[1] Unfortunately the evidence continues to show that while there has been improvement in math scores since the 1990's, performance in science has not improved, and the performance of disadvantaged populations continues to lag far behind their peers. Recent international assessment results show that the United States continues to trail other nations in terms of science and mathematics literacy; in fact, more than half (55%) have significantly higher science literacy scores and 79% have significantly higher mathematics scores than the U.S. [2]

North Carolina student performance tends to reflect national trends. National Assessment of Educational Progress (NAEP) results from 2005 showed that one-fourth (25%) of North Carolina's fourth grade students and just 22% of eighth graders were considered proficient or advanced in science. [3] Contributing to this problem is the fact that many North Carolina students do not take science coursework that may lead to science proficiency. ***Slightly less than one-quarter (24%) of NC high school students enroll in advanced science courses (e.g., chemistry or physics) compared with 31% nationally, and percentages have declined since 1996.[4]***

Attracting and retaining qualified science and math teachers is of paramount importance to improving student achievement in science and math coursework. Many teachers in

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[1] National Science Board (2006). America's Pressing Challenge – Building a Stronger Foundation. Retrieved from: http://www.nsf.gov/statistics/nsb0602.

[2] National Center for Education Statistics, U.S. Department of Education and Institute of Education Sciences, Highlights from PISA (Programme for International Student Assessment) 2006, 2007.

[3] National Assessment of Educational Progress (2005). Retrieved from: http://nationsreportcard.gov/science_2005/.

[4] State Indicators of Science and Mathematics Education: 2007. Retrieved from: http://www.ccsso.org/content/pdfs/SM%2007%20tables%20and%20figures1st.pdf.

North Carolina and nationally lack the qualifications necessary to teach science and mathematics, and this likely contributes to the achievement problem. The most recent state indicators available (from 2006) show some improvement in the percentages of North Carolina middle school science and math teachers who are certified to teach in their area.[5] However, more than a quarter is still not certified to teach math (26%) or science (29%), and more than half of the states reporting this data had higher percentages of certified teachers. At the high school level, more than 85% of North Carolina science/math teachers were certified to teach these subjects, and these percentages slightly exceed those seen nationally. Research has consistently shown that teacher training in science education is of critical importance to student achievement. For example, recent NAEP reports suggest that achievement in eighth grade science is directly related to whether the student's teacher majored in science education.[6] Therefore it would appear important for NC to continue to address ways to increase certification rates for middle school science and math teachers.

Compounding the issue is the problem of retention of high quality teachers in North Carolina and nationwide. ***While the attrition rate in North Carolina is somewhat lower than that seen nationally (approximately 13% versus 17%), nearly a quarter of the turnover rate can be considered to be "turnover that might be reduced."***[7] Data on teachers' perceptions of working conditions inform the development of strategies targeted towards reducing this aspect of the teacher turnover rate. The most recent survey on teacher working conditions showed that school leadership, teacher engagement in decision-making, and teachers' sense of empowerment were strongly related to teacher attrition.[8] Teachers who were more likely to feel empowered within their school and supported by administration were less likely to leave. Investment in targeted funding for professional development in teacher leaders who can lead the way towards improving the teaching and working conditions for all teachers is critical to keeping teachers in the profession.

Unfortunately, while most states have professional development policies to require teacher training, most teachers spend significantly less time than is generally recommended to invoke significant change. School districts typically allocate only approximately one percent of their budgets to professional development, and less than half of teachers surveyed report that they received release time to attend training sessions. Many professional development efforts may primarily involve one-shot workshops that lack a connection to the real-world challenges teachers face in the classroom. The need

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[5] State Departments of Education, Data on Public Schools, 2005-06. Council of Chief State School Officers, State Services and Technical Assistance, Washington, DC, 2007.

[6] National Assessment of Educational Progress. Op.cit.

[7] Public Schools of North Carolina, Department of Public Instruction (2008). Teacher Turnover Report: Annual Report on the Reasons Teachers Leave, 2007-2008.

[8] New Teacher Center, (2009). North Carolina Teacher Working Conditions Survey Brief: Working Conditions Influence Teacher Retention.. Retrieved from: http://www.ncteachingconditions.org/sites/default/files/attachments/NC_teacher_retention.pdf.

for ongoing and sustained quality professional development may be even more critical in the fields of science and technology:

> "With the advances in science and technology, it cannot be expected that teachers will understand – and then teach students – about the advances in DNA sequencing, or cloning, or a myriad of other scientific breakthroughs if they have not themselves had a solid scientific foundation. Obviously this lack of professional development has a direct bearing on the content knowledge of our teachers and on their classroom practices." [9]

In order to address the problem of quality in professional development of teachers, the National Staff Development Council recently provided revised standards for staff development that improves the learning of all students.[10] These standards encourage staff development efforts that:

- are organized based on learning communities;
- provide appropriate leadership and resources for continuous instructional improvement;
- allow teachers to apply research to classroom decision making and collaborate with other teachers in their knowledge development; and,
- encourage equity and family involvement in their improvement efforts.

The process of identifying and retaining qualified teachers, as well as fostering their teaching and leadership skills through professional development based on national standards and cutting-edge advances in science and technology in order to positively impact student achievement is a challenge of great importance. In order to address this challenge, the Kenan Fellows Program for Curriculum and Leadership Development seeks to enhance teacher professionalism and leadership by encouraging teachers to develop novel curricular resources in collaboration with the private sector, public schools, and institutions of higher learning. Fellows are encouraged to develop curriculum that emphasizes inquiry-based learning and helps students apply academic knowledge to authentic, real-world problems. The program was established in 2000 as a result of a community effort to address teacher retention and recruitment in the area of science, mathematics and technology instruction, as well as the need for relevant and meaningful curriculum in these areas.

The Kenan Fellows Program is administered by the Kenan Institute for Engineering, Technology and Science at NC State University, whose goal is to seek out partners who share its vision and who have the capacity to help transform the results of university scholarship into an improved quality of life. The program is supported by grants from foundations, government organizations, corporations and individual partners. The North

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[9] National Science Board op.cit., p. 4.

[10] National Staff Development Council. (2001). NSDC Standards for Staff Development. Retrieved from http://www.nsdc.org/educatorindex.htm.

Carolina Department of Public Instruction (NCDPI) provides direction for curriculum development based on current classroom needs.

While a major program goal is to help teachers develop curriculum tools and resources, the Kenan Fellows program also focuses on process. The program places great emphasis on leadership development through ongoing professional growth based on national standards for staff development, and nurtures the art of teaching by providing opportunities for teachers to pursue creative and innovative ideas. The program allows teachers to experience learning in stimulating ways, leading to new discoveries and approaches to the art of teaching – all while teachers remain fully active in their classrooms. In addition, the program promotes National Board Certification by linking teacher-Fellows with local universities, thus satisfying a key requirement for certification.

Kenan Fellows program goals include:

- Identify, develop and retain teacher leaders in the classrooms across North Carolina;
- Advance effective teaching that prepares students for success in a 21st century;
- Create synergy among teachers, researchers, and industry to ensure STEM (science, technology, engineering and math) instruction is relevant and that best practices are infused across the spectrum; and,
- Develop innovative and relevant curricular tools and resources for teachers and students across North Carolina to enhance student learning.

Outstanding classroom teachers selected as Kenan Fellows engage in a two-year fellowship in partnership with scientists and university faculty. Fellows participate in two summer internships as well as special seminars and events throughout the school year to foster their professional growth. A product of their annual month-long partnership with their university or business/industry Mentor is a curriculum project in an area that is deemed important by NCDPI; this project is then disseminated through a web site developed by the Fellow, presentations at state and national conferences, and professional development for their school colleagues. They also earn six graduate credits from NC State University through their participation as a Fellow and participate in national and state conferences.

Currently eight classes of Fellows have been selected; two classes are currently active (classes of 2010 and 2011). So far 66 Kenan Fellows have successfully completed the program; the program currently includes 27 and 15 Fellows from the classes of 2010 and 2011, respectively. In order to accommodate Fellows from across the state, the program has also recently added a residential component as well placing Fellows with Mentors from local institutions of higher education across North Carolina.

EVALUATION METHODS

An external evaluation consulting firm, Donley Educational Evaluation Consulting, Inc., evaluates the Kenan Fellows Program. The Evaluation Plan, which is developed in

conjunction with program staff, provides a description of how data sources relate to program goals.[11] Much of the data for this report are provided for the class of 2010 Fellows (who have recently completed their first year of the Fellowship); however relevant data for previous cohorts are also included where appropriate. The following instruments and procedures were used to assess the program:

- ***Professional Development Evaluations*** from the 2008 summer internship sessions that provided data on whether Fellows find sessions challenging and useful for application to the classroom;
- ***Impact Surveys*** completed by Fellows in spring 2009 that gauge Fellows' perceptions of program impact related to key goals, including teaching/ leadership ability, comfort levels in developing and maintaining partnerships with the community, and relationships with University Mentors;
- ***Leadership data on National Board Certification rates, presentations at conferences, and grants*** obtained by Fellows provided information on how the program has enhanced Fellows' leadership skills and how curriculum have been disseminated;
- ***Teacher retention data*** provided an indicator of how successful the program has been at encouraging participants to remain in teaching;
- ***Teacher Leadership Survey[12] data*** were used to detect changes to Fellows' perceived teacher leadership skills from the beginning to the end of the fellowship;
- ***Professional Efficacy Survey[13] data*** were used to determine whether Fellows' self-efficacy in teaching changed from the beginning to the end of the fellowship;
- ***Teachers' Beliefs About and Use of Inquiry Survey[14] data*** were used to document changes to Fellows' perceptions of, and use of inquiry in the classroom;

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[11] Donley, J. (2009). Evaluation Plan for the Kenan Fellows Program for Curriculum and Leadership Development. Available: http://www.ncsu.edu/kenanfellows/?q=eval_archive

[12] Survey adapted from a Teacher Leader Survey developed by Barnes, N. & Dozier, T., Center for Teacher Leadership, Virginia Commonwealth University, 2003. As of the writing of this report, only baseline data were available for this instrument, final results will be provided in a subsequent report.

[13] Survey adapted from the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Hoy, 2001) and Teacher Self-Efficacy Scale (Bandura, undated). As of the writing of this report, only baseline data were available for this instrument, final results will be provided in a subsequent report.

[14] Adapted from Marshall, J.C., Horton, R. M., Igo, B. L., & Switzer, D. M. (In Press). K-12 Science and Mathematics Teachers' Beliefs About and Use of Inquiry in the Classroom. International Journal of Science and Mathematics Education. As of the writing of this report, only baseline data were available for this instrument, final results will be provided in a subsequent report.

- ***Student learning and attitudes towards STEM*** involve examining Fellows' students' achievement through a value-added analysis of test data,[15] as well as other documentation of how Fellows' projects impact their students' learning and attitudes.[16]

The remainder of this report describes the Kenan Fellows, the summer internships, school-year training and other programming they have received, and how the program has impacted them in areas that pertain to key program goals.

PROFILE OF KENAN FELLOWS

Selection Process

Kenan Fellows are selected through a competitive application process that targets outstanding K-12 science and mathematics teachers within North Carolina. Fellowships are also available for teachers across additional content areas; for example an NSF-funded BioMusic project consists of both a music and science teacher from the same school working together to develop curriculum that integrates the two disciplines. Announcements soliciting applications are made via a variety of methods including print notification, email, calls and radio. The program targets school and district administrators, and a broad range of business, state, county/community and education leaders statewide. Applicants must be nominated and must complete an online application that provides information about professional achievement, the nature of their commitment to teaching, and a statement about how they propose to address the specific Fellowship opportunity for which they are applying.

From the applications received, a Kenan Fellows selection team composed of university faculty, Kenan Fellows staff, NCDPI representatives, and industry partners selects candidates for personal interviews. The rubric used for the Kenan Fellows selection process ranks the teachers on their leadership potential, content knowledge, initiatives taken to grow professionally, and recommendations from principals and colleagues.

Characteristics of Program Participants[17]

Kenan Fellows constitute a group of teachers with excellent teaching and leadership skills; the Kenan Fellows program seeks to further enhance these teachers' skills and

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[15] Statistical analyses of this data are being conducted by SAS staff under separate contract using the EVAAS (Education Value Added Asseessment System) software (please see: http://www.sas.com/govedu/edu/services/effectiveness.html for more information). Data entry is underway and results from these analyses will be included in a future report.

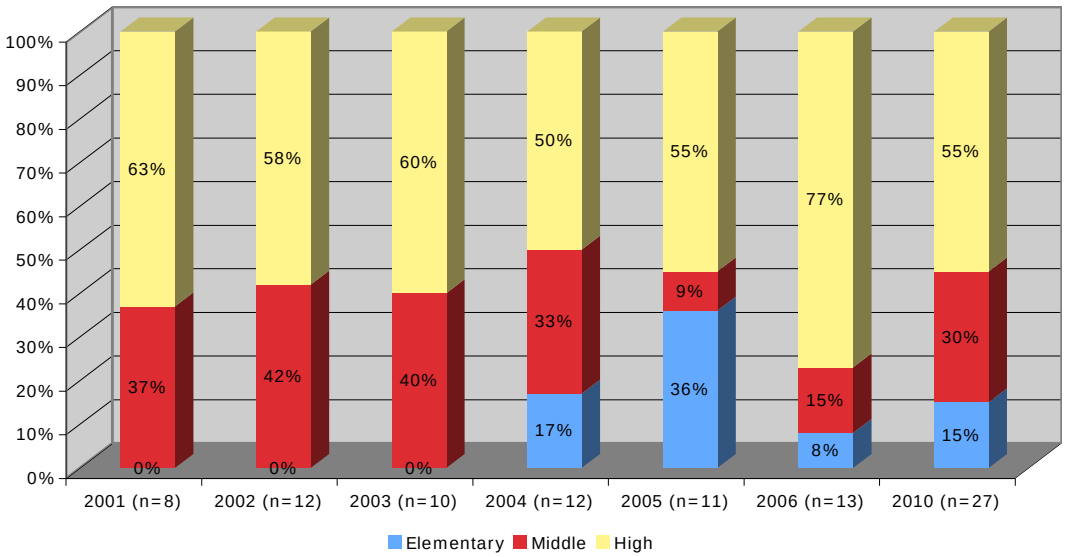
[16] Fellows develop an Evaluation Plan to collect and document this data in collaboration with their Mentor.

[17] Note: data described in this section refer to all classes of Kenan Fellows through the 2010 cohort. No new Fellows entered the program in 2007. Beginning with the group of Fellows who entered in 2008, cohorts are now referred to by their graduation year, i.e., Fellows beginning in 2008 are referred to as the 2010 cohort.

disseminate the products of their work to other teachers in North Carolina. Kenan Fellows are required to make a two-year commitment to the fellowship program. ***A total of 66 Fellows have completed the program thus far, and the program has expanded to include 27 Fellows for the class of 2010 and 15 for the class of 2011.***

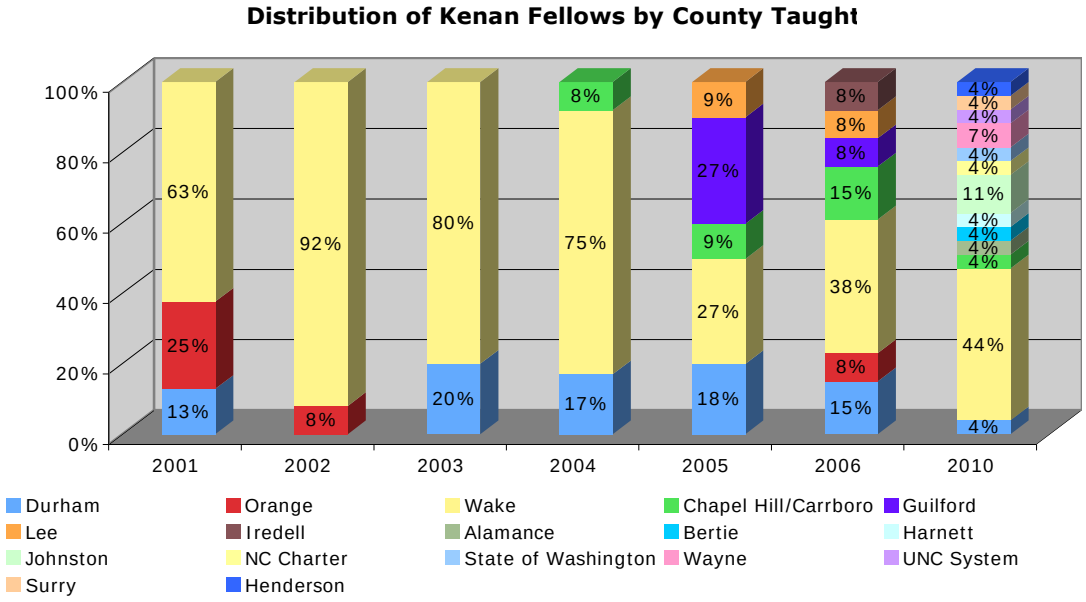
While the Kenan Fellows program has primarily attracted secondary teachers, elementary teachers have also been participating over the last few years. Some are regular elementary classroom teachers, while others have included science specialists, academically gifted specialists, and even a music teacher currently working under a BioMusic grant from NSF. Most middle and high school Fellows teach science, but other areas have included math, agricultural education, career/technology education, and visual arts education. More than two-thirds of high school Fellows taught within the sciences, with biology, chemistry and physics being the most frequently represented disciplines.

Distribution of Kenan Fellows by Grade Level Taught



The Kenan Fellows program targets high quality mid-career teachers, and on average Fellows enter the program with ten years of teaching experience. ***Teachers within the program are likely to have pursued advanced training; in fact nearly half (43%) have received an advanced degree prior to beginning the program and 30% have already attained National Board Certification.***

The Kenan Fellows program has expanded its targeted geographic area and now includes more counties (including the class of 2011 18 are represented) within North Carolina than in previous years. While at least three-quarters of Fellows taught in Wake County in the first four years of the program, ***the program now attracts teachers from a broader geographic region, and includes teachers from more economically disadvantaged regions that have had historically high teacher turnover rates and poorer student achievement.***



Statewide expansion has also brought increasing diversity to the Kenan Fellows program. Lateral entry teachers make up 43% of the current 2010 class of Fellows. In addition, while historically the program has attracted predominantly white teachers, ***19% of Fellows currently participating represent ethnic minority groups, thus closely mirroring the state teacher workforce demographic profile***.[18]

PROFESSIONAL DEVELOPMENT PROGRAM ACTIVITIES FOR 2008-2009

The description of programming which follows contains information covering the summer 2008 internship through the end of the academic year 2008-09, and thus represents programming for the class of 2010 during their first year. The summer internship professional development experiences were designed to foster teacher development in each of the program's key goal areas. A discussion of the professional development and participants' reactions to the sessions is provided below.

Professional Development: Summer Internship Experience

As part of their program participation, each Kenan Fellow engages in a two-year fellowship that includes two summer internships focusing on leadership and curriculum

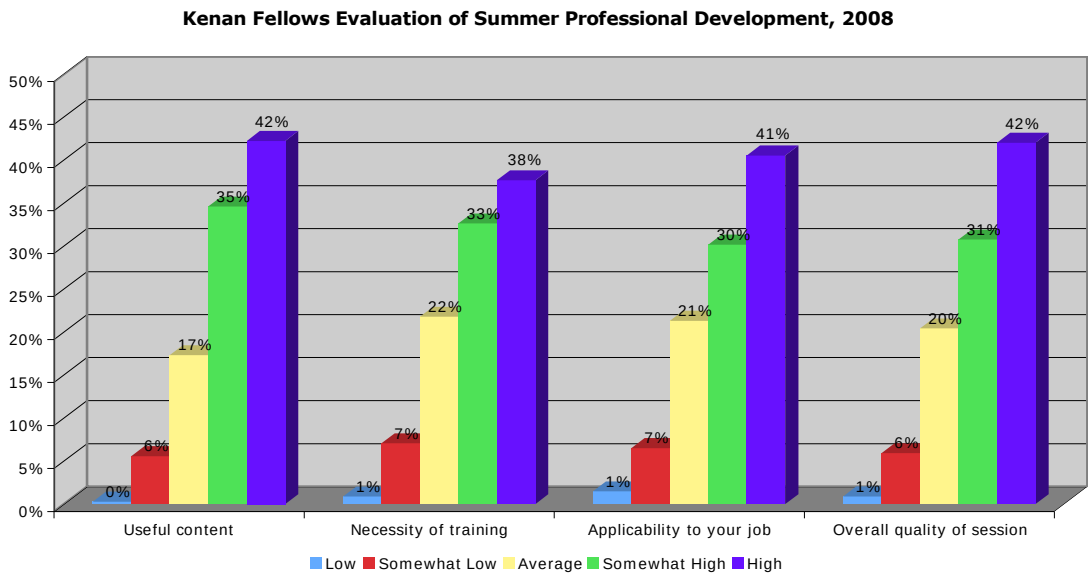
[18] Source: NCDPI website's Education Statistics Access System: available from: http://www.ncpublicschools.org/fbs/resources/data/esas/

development, goals that are central to program success. In 2008, these six-week summer internships included the following professional development sessions:

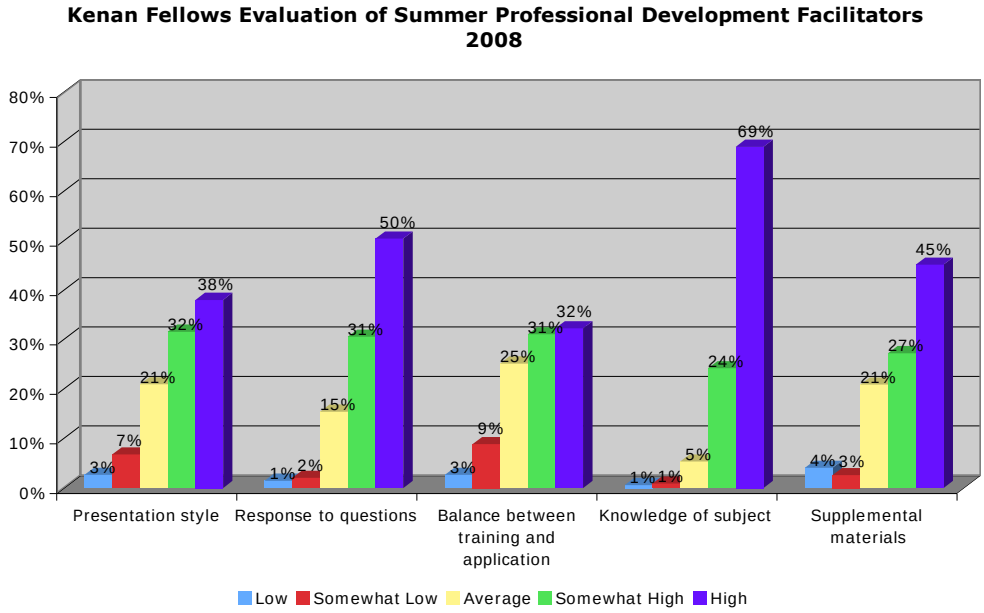
- Global views of education
- Personal and professional change
- Connectivity initiatives in NC conducted by MCNC staff
- New Professional Teaching Standards and state-level education policy making
- NC State STEM initiatives
- How museums design exhibits to facilitate learning
- Discussions on 21st century skills with a representative from Triangle Leadership Academy
- Innovation and Industry-University Partnerships
- Team Building using Bond Park Ropes Course
- Working with the Media and Effective Communication

Staff revised the summer institute in 2008 to increase the amount of time for Fellow-Mentor collaboration on the curriculum project. A full two-thirds of the summer institute was spent on this Fellow-Mentor collaboration.

2010 Fellows completed evaluation forms via the secure website for each professional development session provided. These surveys asked for Fellows' perceptions of session quality as well as relevancy to their teaching. ***Fellows rated the professional development sessions very favorably, with more than 70% assigning a high or somewhat high rating regarding usefulness/necessity of content, applicability to their job, and overall session quality.***

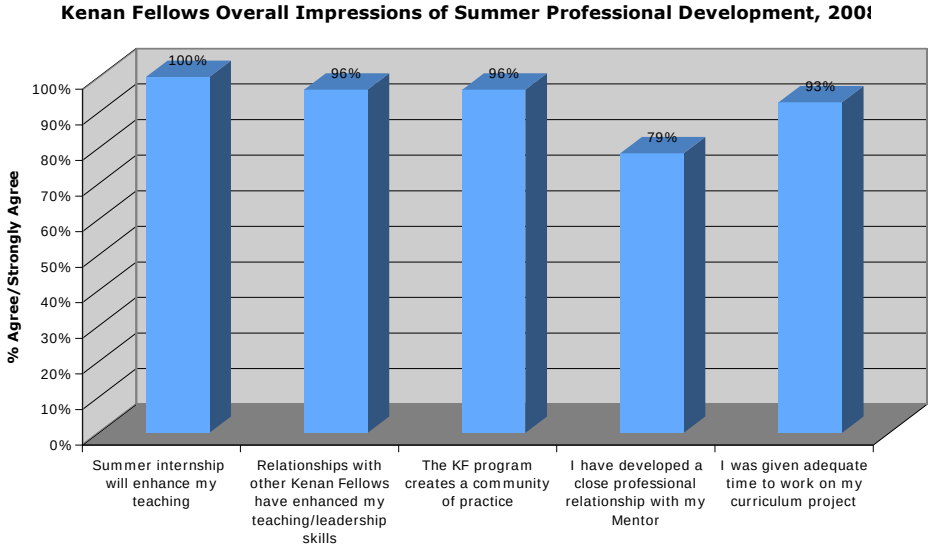


The facilitators who provided the sessions were also rated positively, with more than two-thirds of Fellows assigning a rating of at least somewhat high in the areas of responsiveness to questions, providing balance between training and application, knowledge of subject and providing supplemental materials.



When asked to reflect at the end of the summer about the overall impact of the summer professional development, 2010 Kenan Fellows were very positive. All or almost all agreed that the summer internship and collegial relationships with other Fellows served to enhance their teaching and leadership as well as create a "community of practice," thus suggesting that the professional development provided was consistent with National Staff

Development Council standards. Fellows were much more likely to report having enough time to work on their project and develop a close working relationship with their Mentor than in previous years, thus suggesting that programming changes put in place to enhance these processes were effective.



Kenan Fellows were also overwhelmingly positive regarding the value of the summer experience for their professional lives***. A full 96% believed that most of the sessions benefited them professionally, and two-thirds believed that more than three-quarters of the experiences were valuable.*** These results are also more positive than those seen for the previous summer session.

Although Fellows participate in extensive professional development during their summer institute, additional program activities continued to take place during the school year. For example, the "Fireside Chats" provide an arena for Fellows to dialogue and network with state leaders in education. Fireside Chats are informal dialogues held with local, state or national leaders in government, education, or business. These meetings provide an opportunity for Kenan Fellows to discuss their ideas and experiences with individuals who can influence public policy and help advance the teaching profession. During 2008-09 the Fireside Chats included sessions with leaders such as J.B. Buxton, Deputy State Superintendent for NCDPI, regarding school governance in NC and how the NC Standard Course of Study will be changing through the 21st Century. In addition, Fellows met with Dr. Charles Coble of the Third Mile Group to discuss the STEM imperative from a national perspective.

Changes to the secure portion of the Kenan Fellows website allowed Fellows and Mentors to easily communicate with each other through "blogging" regarding their project and summer programming, and keep track of their time spent as Fellows. Program staff communicated with Fellows through the site and surveys and leadership data were collected as well. During the school year, Fellows remained engaged in their work with their Mentor through strategic planning, Mentor classroom observations and presentations, content area enrichment, and joint presentations at conferences.

ATTAINMENT OF KEY PROGRAM GOALS

Development and Retention of Teacher Leaders in North Carolina

The Kenan Fellows program attempts to identify, develop and retain teacher leaders in classrooms within North Carolina through its emphasis on empowering high quality teachers to assume even greater roles as leaders as they work with university and business/industry partners to develop high quality STEM curricula. Program success in this area is measured by documenting Fellows' reports of leadership activities, perceptions of program impact on surveys and other instruments, and attrition rates of Fellows within the teaching profession.

Leadership Behaviors

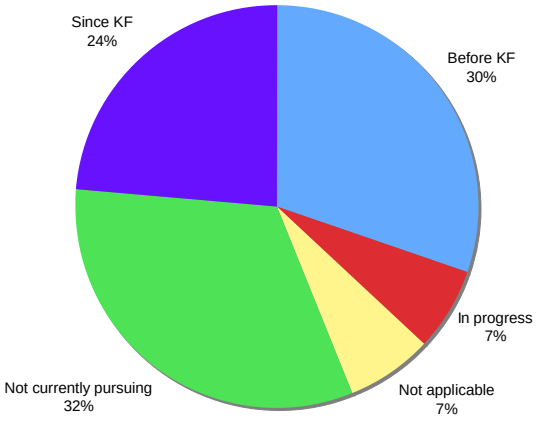
Fellows provide leadership data to the secure Kenan Fellows web site regularly in the areas of National Board Certification status, awards received, grant writing, professional presentations given and attended, professional development provided to colleagues, site-based leadership, mentoring, and other leadership activities (e.g., curriculum writing). Leadership data collected include only activities undertaken by Fellows ***since*** becoming a Kenan Fellow.

National Board Certification and Advanced Degrees

One way teacher leadership can be exemplified is by Fellows modeling the importance of acquiring the highest credentials possible in their teaching area to other teachers in their schools. Statewide, only approximately 11% of teachers hold National Board Certification in their teaching area.[19] The Kenan Fellows program promotes National Board Certification by linking teacher-Fellows with local universities, thus satisfying a key requirement of certification. Fellows are encouraged but not required to pursue this certification upon entry to the program; many of the program components are aligned with expectations and requirements of the certification process. Fellows who have already achieved certification present information and encourage others to begin the process.

[19]Results from the NC Teacher Working Condition Survey, 2008.

National Board Certification Status, All Kenan Fellows



Leadership profile data show that 30% of Kenan Fellows were Nationally Board Certified prior to their program participation. ***Since becoming Kenan Fellows, an additional 24% have received this certification.*** Nearly half (43%) of Fellows hold an advanced degree (master's or doctorate) upon entry to the program, ***and an additional 24% complete an advanced degree or initiate one either during or after their fellowship.***

Awards and Grants Received

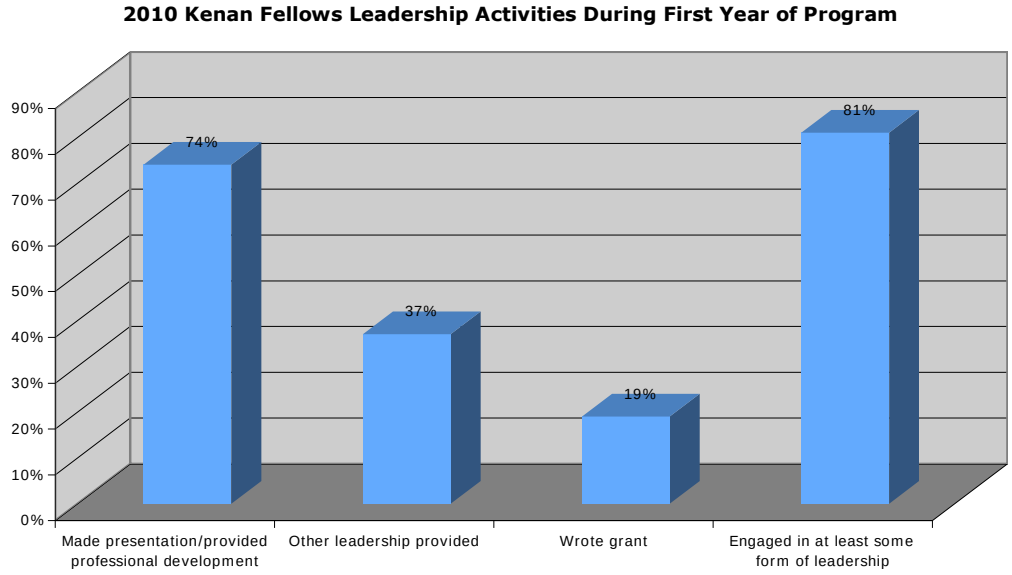
Many Kenan Fellows received awards since beginning their Fellowship; more than half (53%) of all Fellows have received an award such as "Presidential Award for Excellence in Mathematics and Science Teaching," "Teacher of the Year," or community service awards. ***Program data collected also show that almost half (46%) of Fellows received grant awards since becoming a Kenan Fellow; these data are consistent with programming efforts which have encouraged and supported grantsmanship.*** Examples of funding sources of grants received by Kenan Fellows include:

- $20,000 grant from Motorola Foundation for Podcasting STEM project;
- $6,000 grant from NC Biotechnology Center to promote classroom biotechnology;
- Artist in Residence grant funded by the NC Arts Council;
- Creative Project Grant from the Johnston Education Foundation; and,
- Donors Choose grant to buy solar car kits to teach "green" engineering and sustainability within an Applications of Science course.

2010 Kenan Fellows' Leadership Influence on their Colleagues

One of the expectations of the Kenan Fellows program is that Fellows will both disseminate their project through professional presentations and use the skills/knowledge they acquire through the program to positively influence teaching and learning at their school. Fellows track their leadership behaviors in the areas of professional presentations given, professional development provided to school colleagues, mentoring, site-based leadership and other leadership activities.[20] Even though 2010 Fellows have only completed one year of the program, they have already had substantial influence on their colleagues.

A substantial majority (81%) of Fellows have engaged in some type of leadership activity since beginning the program. ***Approximately three-quarters (74%) have made a conference presentation or provided formal professional development to their colleagues, impacting more than 1,300 teachers.*** Conferences included the North Carolina and National Science Teachers' Association Conferences, the Pisgah Astronomical Research Institute conference and the North Carolina Science Summit.



In addition, slightly more than one-third (37%) have engaged in some other form of leadership, such as:

- Benchmark committee work for Henderson County to oversee benchmark science assessments;

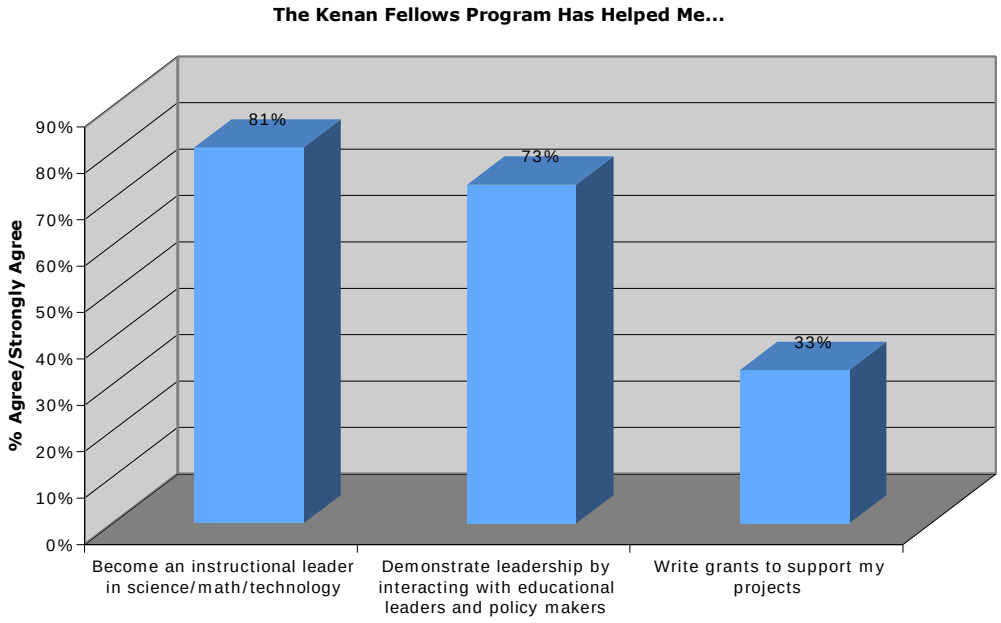
[20] The leadership data collection process was refined beginning with the class of 2010, to include multiple categories of leadership; therefore data in this area are only included for the class of 2010 and only include their first year of programming.

- Working with the CDC (Centers for Disease Control) as a science ambassador to develop public health related lessons plans through collaboration with CDC scientists; and,
- Writing a learning and teaching guide for Wake County teachers of Algebra I.

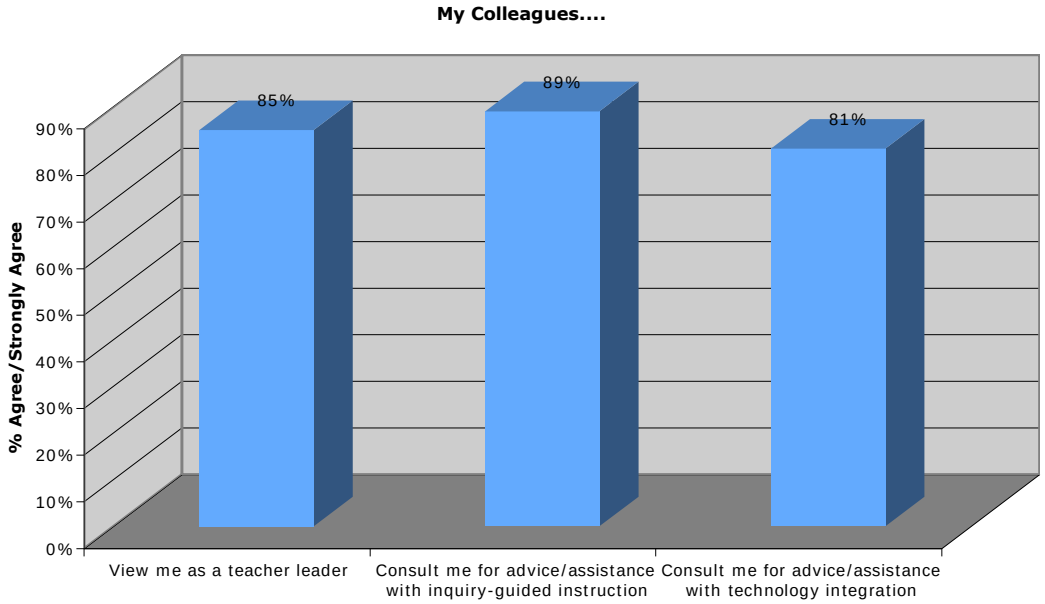
Clearly, Kenan Fellows in the first year of the fellowship have engaged in leadership activities in which they serve as role models to their colleagues in the area of teacher leadership.

Fellows' Perceptions of Program Impact on Leadership

To further assess program impact in the area of teacher leadership, 2010 Fellows were asked several questions as part of an Impact Survey administered in spring of 2009. ***Most 2010 Fellows agreed that the program helped them become an instructional leader in their school and demonstrate leadership by interacting with educational leaders and policy-makers.*** Only approximately one-third reported that the program helped them with grant writing, however.



A substantial majority of 2010 Fellows reported that their colleagues viewed them as teacher leaders, and consulted them for help with inquiry-guided instruction and use of classroom technology, two areas which were strongly emphasized in the program's professional development.



These enhanced leadership skills were also reflected in Fellows' responses to open-ended items addressed on the survey. Apparently although Fellows may have served in leadership roles before program participation, they now experienced increased opportunities and confidence, as well as extension to new areas of teacher leadership:

> "Being part of the Kenan Fellows program has prompted me to reach out past my school. I have given a brief overview of my project to Algebra 2 teachers in Wake Co. Before I was viewed as a leader in my school. I hope to expand that reach to the county."
>
> (2010 Fellow Jennifer Elmo)

> "The professional development offered in the summer program provided me with fresh ideas and resources, as well as the "cutting edge" theories and practices in education. I gained a deeper understanding of the educational system in NC. Every teacher should have this opportunity and knowledge! The entire experience has motivated me to continue developing new, interdisciplinary lesson plans."
>
> (2010 Fellow Jenny Rucker)

> "As a young teacher at a prestigious school, I lacked the confidence necessary to promote my ideas and push for changes at my school (prior to the KF program). However, the summer institute, fireside chats, and curriculum project helped my confidence grow to the point where I now feel comfortable proposing new ideas and advocating for change."
>
> (2010 Fellow Jeff Milbourne)

> "The KF program provides the opportunity to expand your understanding of your subject matter so that you can provide students with applications of science as well as future careers in science. Other teachers recognize the value of this knowledge and are grateful when you share materials, time and advice."
>
> (2010 Fellow Lisa Hibler)

Kenan Fellows perceive real gains in their teacher leadership, and these gains benefit not only the Fellows themselves, but also their colleagues and students.

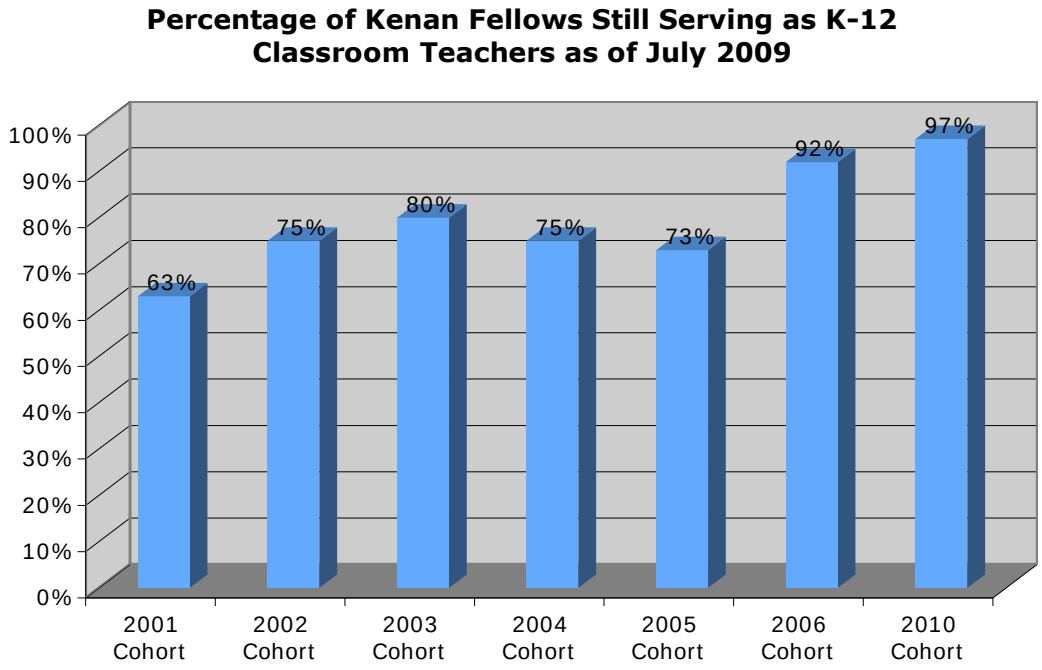
Program Statistics: Teacher Retention

Teacher retention in North Carolina has become a pressing concern in recent years. Recent statistics for the cohort of teachers who began teaching in North Carolina during 2000-01 show that only approximately half of teachers with previous teaching experience, one-third of new teachers with no experience and fewer than half of lateral entry teachers were retained beyond their third year.[21] In addition, the N.C. Center for Public Policy Research reports that teacher retention is probably most crucial in subject areas with the most acute shortages of qualified teachers, namely math, science, special education and foreign languages.[22]

It is expected that through its emphasis on leadership development, partnership-building with university faculty and business leaders, and collegiality with other teaching professionals, the Kenan Fellows program will enhance the likelihood that participating teachers remain in the teaching profession. It is also hoped that Fellows will at least indirectly promote the retention of other teachers, as they promote professionalism and leadership within their own schools. However, it is also possible that participating in the program may encourage some Fellows to take on new leadership roles/careers within education as they refine and expand their leadership capabilities.

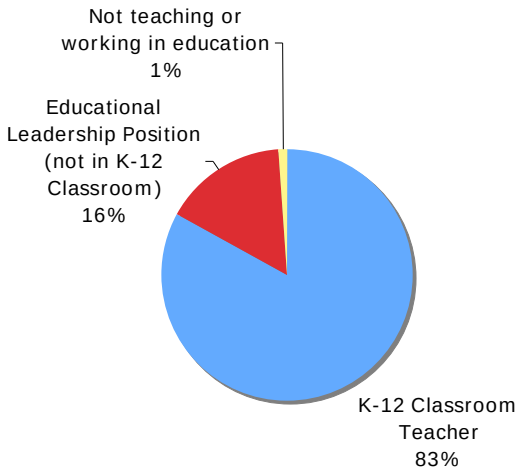
[21] Report and Recommendations from the NC State Board of Education Teacher Retention Task Force, February, 2005.

[22] N.C. Center for Public Policy Research (2004, August). Press Release: Center Says Shortage of Teachers an Impending Crisis – State Action Needed. Retrieved July 24, 2005.



Not surprisingly, more Fellows from recent cohorts have remained as classroom teachers as of the writing of this report; overall 83% remain as active teachers in the classroom. While this percentage is somewhat lower than the 93% reported last year, it is important also to track what types of positions Fellows take on if they choose to leave the K-12 classroom.

Career Area of Kenan Fellows as of July 2009



Currently all but one of the Kenan Fellows who have left classroom teaching remains in the education field in some leadership capacity. Examples of some of these careers include:

- Curriculum Developer/Facilitator;
- Vice President of Programs with Wake Education Partnership;
- Education Consultant with North Carolina Department of Public Instruction
- School Principal/Assistant Principals

Therefore, almost all Kenan Fellows no longer teaching continue to serve as educational leaders, and have the potential to have an even broader impact within education as they influence larger groups of teachers/students. Impact Surveys of 2010 Fellows show that the program may contribute to some Fellows' decisions to remain in the classroom, and may encourage others to plan for a future educational leadership role:

> "I have considered leaving education for more acknowledgement and opportunities. The Kenan program has opened some new doors for me to get involved in different aspects of education while still in the classroom. I see more opportunities to become a leader than were previously visible to me."
>
> (2010 Fellow Danielle DiFrancesca)

> "The consideration to leave teaching has crossed my mind, but it would be to take on a larger leadership role, for instance, as a State supervisor. The KF program has allowed me to hone skills and develop new contacts that could benefit others in the profession."
>
> (2010 Fellow Harold Mackin)

> "I wasn't sure when I started teaching if it was something I would stick with for the long term. I'm still fairly young, so I can't say with 100% confidence that I will be a teacher for the rest of my career. That being said, I think I'm more likely to remain in the profession if I constantly challenge myself with new projects and keep learning about the profession. The KF program certainly helped me achieve both of these objectives."
>
> (2010 Fellow Jeff Milbourne)

> "I have never considered leaving teaching, but the Kenan Fellows program has helped me realize that not only do I love teaching, but teaching is the best profession for me. I love learning new things and bringing innovation into my classroom to provide valuable learning opportunities for my students."
>
> (2010 Fellow Anna Smith)

Comments such as these illustrate the vital role that the Kenan Fellows program can play in building the leadership capacity of North Carolina's teachers, and increasing the likelihood they will remain committed to the teaching profession even if they choose to subsequently leave the classroom but pursue an educational leadership role. Research has shown that often the "best and brightest" teachers, particularly those from math/science disciplines, tend to exit the profession for other areas more often than other teachers.[23] Kenan Fellows clearly possess these qualities, and therefore programming that encourages them to remain in the profession is vital.

As stated earlier, a recent 2007 report from NCDPI on teacher turnover and teacher working conditions showed that school leadership and teachers' sense of empowerment are key indicators of how likely teachers are to remain in the profession.[24] The Kenan Fellows program's emphasis on developing teacher leadership through partnering teachers with research scientists to develop and disseminate cutting-edge curriculum, as well as professional development centering around key leadership issues (i.e., working with the media, teacher advocacy, grant-writing) are intended to boost Fellows' belief that they can positively affect student learning within their classroom and school. Fellows' enhanced leadership and empowerment to affect change at their school may make them more likely to remain in the profession, and it is possible that they may positively affect their colleagues in this area as well.

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[23] Guarino, C., Santibanez, L, Daley, G., & Brewer, D. (2004). *A review of the research literature on teacher recruitment and retention.* (TR-164-EDU). Santa Monica, CA: RAND. Retrieved June 30, 2009, from http://www.rand.org/pubs/technical_reports/2005/RAND_TR164.sum.pdf.

[24] For full report see: http://www.ncpublicschools.org/docs/recruitment/surveys/turnover/compare-ttr-src-twc.pdf.

Advancing Effective Teaching

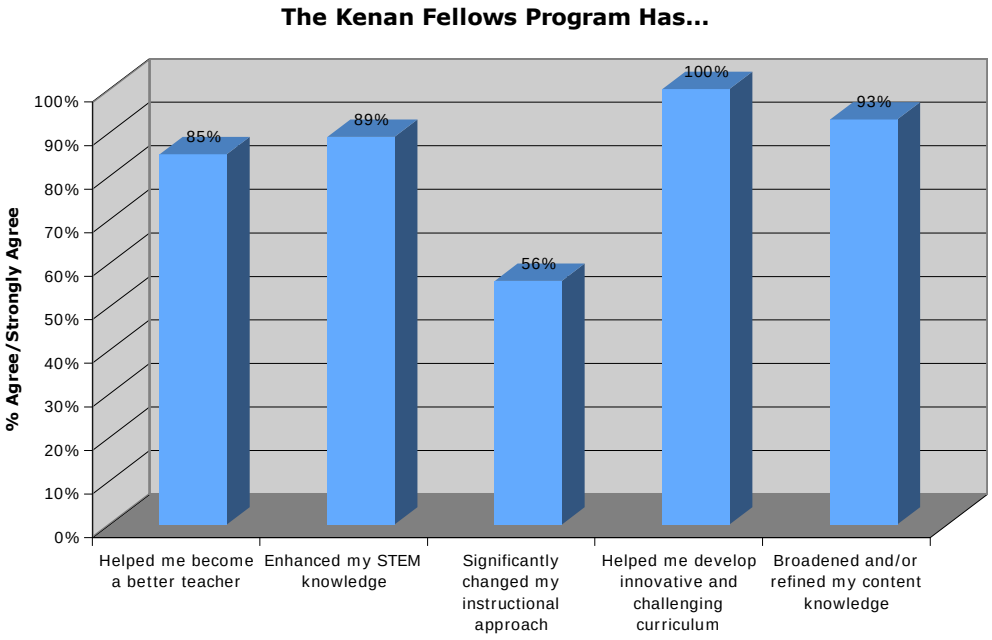
The Kenan Fellows program seeks to contribute to students' 21st century success by advancing Fellows' content knowledge, research skills, and ability to use inquiry-guided classroom instruction. Data are collected to address program effectiveness in the following areas:

- Fellows' self-reports of teaching skills, professional efficacy, and use of inquiry practices
- Value-added student academic achievement data
- Student learning and attitudes towards STEM topics addressed within Fellows' projects

Student achievement data are currently being collected/analyzed and will be available in a future report. As part of their program requirements, Fellows build an Evaluation Plan into their Curriculum Project that addresses the impact of the project on their students' learning and attitudes. Since 2010 Fellows' projects were not completed at the time of this report, these results will also be described in future reports. The remainder of this section of the report will describe Impact Survey findings as they relate to this goal area.

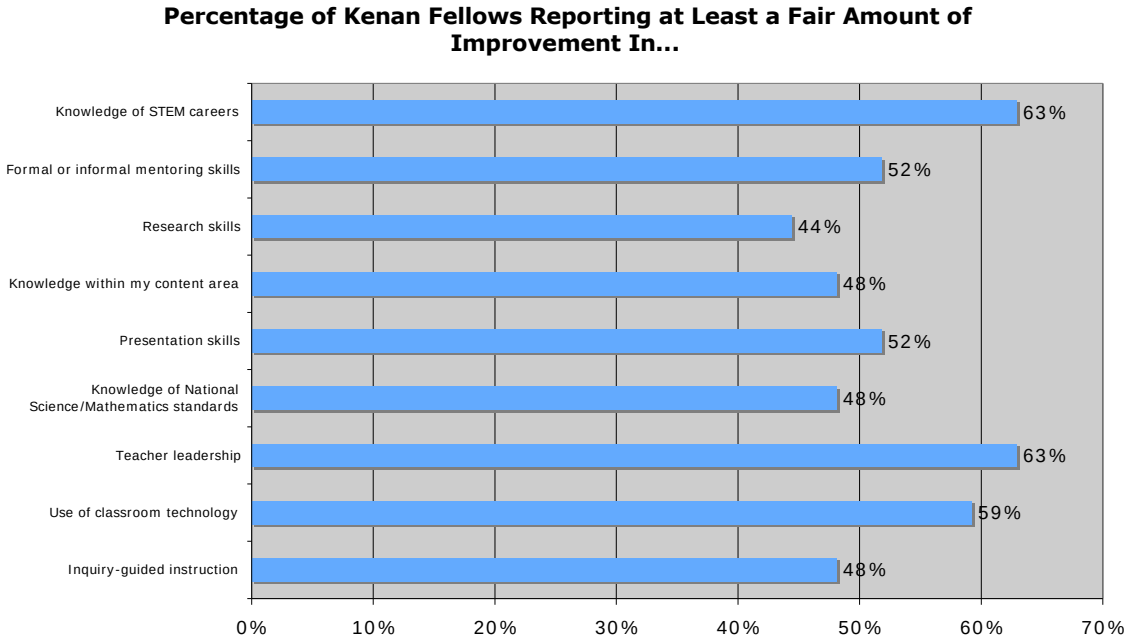
Impact Survey Results

Results from the survey in the areas of teaching, curriculum development, and content knowledge show that 2010 Fellows perceive positive changes in all areas. ***All or almost all (at least 85%) 2010 Fellows believed that the program has helped them become a better teacher, enhanced their science, mathematics and technology knowledge as well as broadened their knowledge within their discipline, and develop innovative and challenging curriculum***. Relatively fewer Fellows indicated that they had significantly changed their instructional approach, however.

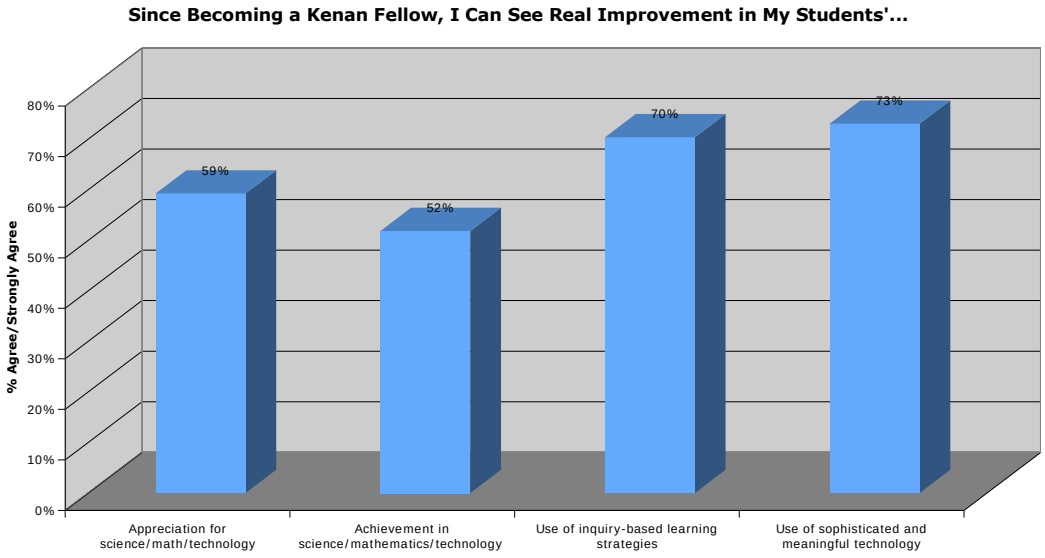


Most 2010 Kenan Fellows reported noticeable improvement in their use of inquiry-guided instruction, classroom technology, and knowledge of National Science Standards.[25] These results are somewhat less positive than results from previous surveys, however, in which approximately two-thirds of Fellows completing the program reported significant improvement in theses areas. This finding may reflect the types and quantity of professional development provided; Fellows spent increased time with their Mentor and spent more time with business/industry leaders learning about STEM careers than in previous years.

[25] National Science Education Standards, National Committee on Science Education Standards and Assessment, National Research Council, 1995. Full text available for searching at http://books.nap.edu/catalog/4962.html)



Most Kenan Fellows who began in 2010 reported significant improvement in their students' achievement in, and appreciation for, science mathematics and technology. However, Fellows were more likely to report significant improvement in their students' ability to use sophisticated technology and inquiry-guided learning techniques. It may be that changes in students' attitudes or achievement take longer to be detected than their actual use of classroom strategies and technology.



Survey comments from Fellows describe how their participation has impacted their teaching:

> "It has given me the confidence to attempt use of cutting-edge technologies. The knowledge I have gained has given me insight into how and what I should really be teaching instead of following the norm."
>
> (2010 Kenan Fellow Derek Dennis)

> "The most profound effect on my teaching has been the knowledge I gained in my subject matter and the ability I now have to communicate that knowledge to my students. Because of the experience I had working with my mentor, I am much better equipped to explain subject matter to my students."
>
> (2010 Kenan Fellow Lori Stroud)

> "I have really become comfortable incorporating inquiry based learning and now my students no longer view me as the authority for answers; instead, my students learn by discovering. I think this method of teaching has also allowed my students to naturally develop a higher level of thinking."
>
> (2010 Kenan Fellow Anna Smith)

> "My motivation has improved greatly since becoming a KF! The site visits during the summer allowed me to listen to and experience what our students need to know. Incorporating this information into my lessons has gained the interest of the students."
>
> (2010 Kenan Fellow Jenny Rucker)

Fellows clearly experienced enhanced confidence with content knowledge, inquiry-based instruction, technology and ability to make STEM relevant to students, which are central goals of the Kenan Fellows program.

Developing and Disseminating Innovative and Relevant Curriculum

While a major goal of the Kenan Fellows Program is to foster teaching and curriculum development, an equally important goal is to disseminate the innovative curricula developed by Fellows to other teachers. Each Fellow is expected to create a web site with the support of KF staff, including key components of their curriculum project and how the project is aligned with national and state standards.[26] NCDPI and LEARN NC provide guidance on web site development and on other statewide dissemination strategies as well. In addition, each Fellow presents at conferences such as the NC Science Teachers Association Conference and National Science Teachers Association conference (see previous discussion of conference presentations). Evaluation evidence

[26] See http://www.ncsu.edu/kenanfellows/?q=project for links to Fellows' web sites.

suggests that 2010 Fellows are already actively disseminating their projects to other teachers through presentations and professional development to colleagues at their school.

One way that dissemination data are collected is by tracking "hits" to Fellows web sites. ***Curriculum projects developed by Kenan Fellows have attracted more than 650,000 "hits" and have been viewed by more than 275,000 visitors thus far***.[27] An inspection of the source of recent website hits reveals that the curriculum project sites are attracting viewers from all across the country as well as internationally.

Beginning with the class of 2010 Fellows, the evaluation of the curriculum projects involves ongoing formative assessment as projects are developed. Fellows develop a Project Plan with their Mentor that includes documentation of their projects' impact on students learning and attitudes towards STEM topics. In addition, Quality Assurance Teams monitor the curricula developed by Fellows in the fall and spring of each year, and provide formative feedback to enable improvements to ensure that projects are of the highest quality possible. Finally, in the spring of Fellows' second year when their projects should be complete, they will recruit at least one peer teacher to use the curriculum and respond to an evaluation of its effectiveness; these data will be reported in future reports.

Establishing Synergistic Partnerships Among Teachers, Researchers, & Industry to Ensure Relevant STEM Instruction

In order to ensure STEM instruction is based on best practices and relevant to students, the Kenan Fellows program seeks to help Fellows build and maintain synergistic relationships and partnerships with others in the community, including university faculty, community agencies/industries and businesses, and the NC Department of Public Instruction. The program also provides an arena for Fellows to form partnerships/relationships with one another, thus giving them a chance to interact with other teacher leaders with similar interests and skills. Kenan Fellows spend extensive amounts of time with their mentor during the summer and school year as they develop, refine and evaluate their curriculum projects. Fellows also participate in summer programming on forming and sustaining school/business partnerships, and attend "Fireside Chats" throughout the year with industry, business and educational leaders.

A substantial majority (85%) of 2010 Fellows reported on the Impact Survey that the program has enabled them to build relationships/partnerships with the broader community, and almost all (93%) indicate that opportunities to network with other Fellows benefits their teaching and leadership skills.

[27] Includes all classes of Kenan Fellows who have completed curriculum projects to date (does not include class of 2010 as their projects are not completed; the number of hits is actually higher as data tracking did not begin until September of 2005.

Comments from the Impact Survey illustrate how Fellows believe these relationships and partnerships have broadened their interests and concerns, contributed to their leadership and teaching skills, and enhanced their ability to work with others in business/industry:

> "As social as teaching may be, it can still be an incredibly isolating profession, at least from the standpoint of colleague interactions. As such, it was very refreshing for me to meet and interact with a group of STEM teachers from across the state. It is also valuable to learn about the different challenges faced by teachers across the state. My classroom has a very different set of issues than the classroom of someone in a rural area, and it's helpful to learn from their experiences. If nothing else, learning about the diversity of challenges faced by all teachers will help me design a more effective curriculum project (effective from the standpoint of its accessibility to all teachers in the state)."
>
> (2010 Fellow Jeff Milbourne)

> "I have built relationships across the state, both within DPI and in business partnerships. I recently attended a state-wide competition in my field and ran into a key contact from DPI and another from SMT, both of whom had met me last summer or fall. I have been asked to join an advisory board in a partnership with a major business in our area."
>
> (2010 Fellow Celia Rowland)

> "Through meeting with other teachers from around the state who are interested in teaching reform and creating networks and contacts is what I felt I benefited the most from. These individuals have been instrumental in getting me thinking about content and science delivery."
>
> (2010 Fellow Rebecca Hite)

> "I have been to and worked with companies and individuals in my area that I did not know existed. I have students going to do research with companies that would not have happened without the KF program."
>
> (2010 Fellow Harold Mackin)

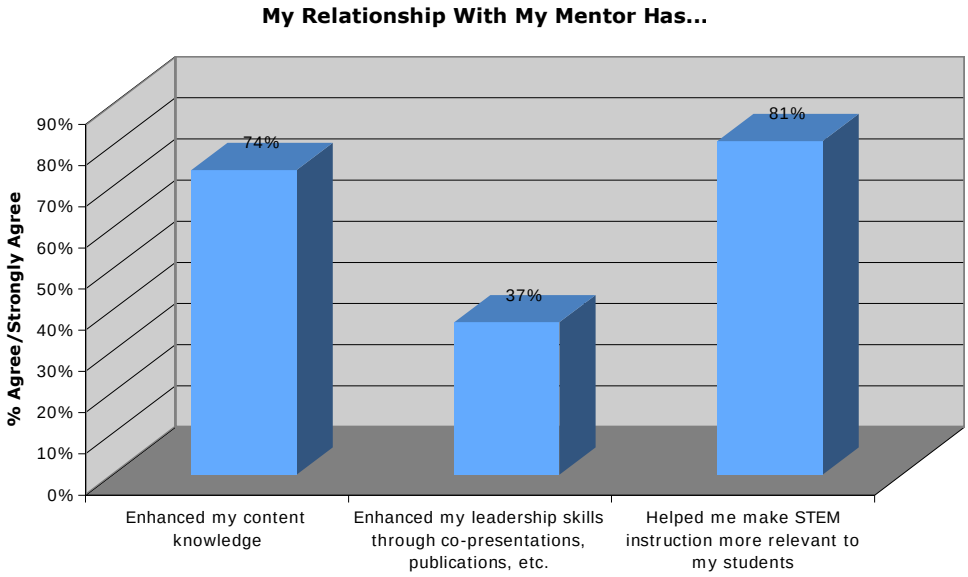
Fellow/Mentor Relationship

A key partner to each Kenan Fellow is the university or business/industry Mentor, who provides guidance as they develop their curriculum project and often helps enrich their content knowledge in the process. During the summer Fellows work extensively with their Mentor on their curriculum project, and Mentors frequently attend parts of the summer internship experience with their Fellow. Fellows continue to communicate with their Mentors throughout the school year. Each Fellow/Mentor team develops a project plan that details their methods for continuing their work on the curriculum project. Some Fellows work with their Mentor on Saturdays, bring Mentors into their classrooms to talk

with students, attend university classes taught by Mentors to enrich their content knowledge, and make joint presentations at conferences.

Kenan Fellows Impact Survey Results

Nearly two-thirds of Fellows (65%) report that they have already established a close and lasting professional relationship with their mentor; this finding is improved over last year when just half reported this outcome. Results from the survey also show that a ***substantial majority of Fellows believed that their relationship with their mentor had enhanced their content knowledge (74%) and helped them make STEM instruction more relevant to their students (81%).*** However**,** fewer reported that it had impacted their leadership skills through presentations or publications; it can be expected that this percentage will increase when Fellows are surveyed again towards the end of their second year.



Survey results show an improvement over last year in terms of Fellows' perceptions of their relationship with their mentor, suggesting that program improvements put in place by staff to ensure that the relationship is a productive one, are working. Comments made by Fellows illustrate how they and their students have benefited from their mentor relationship:

> "I have an arrangement with my mentor where he comes into my classroom several times during the course to share chemical engineering situations with my students. The students look forward to his "stories" and I learn something new each time. I have also arranged to take some students to NC State where we have toured the labs and learned about the research that is going on in the areas of nanotechnology and liquid ion battery development."
>
> (2010 Kenan Fellow Lisa Hibler)

> "I really enjoyed collaborating with my mentor and his team of scientists. Being in the field working on the research with them was such a memorable experience. I was able to "live the life" as a professional scientist and help with projects,

> which really gave me a clear perspective of the role of a researcher outside of a classroom environment. This was truly a fabulous experience and one that I share with my students quite regularly."
>
> (2010 Kenan Fellow Anna Smith)

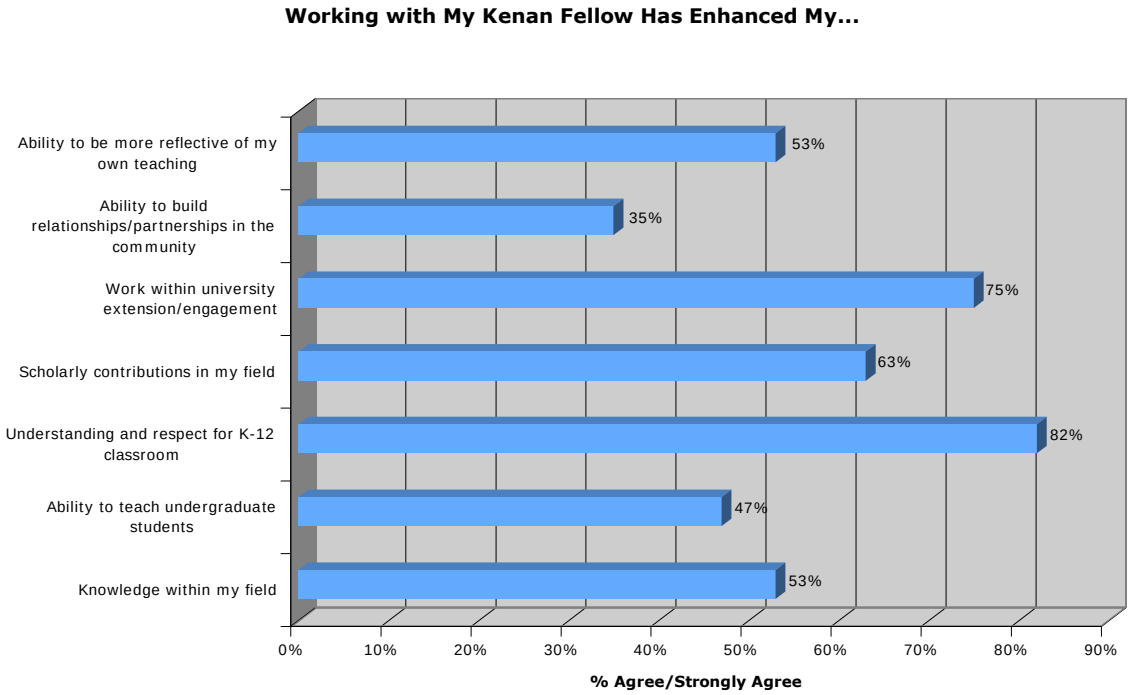
Mentors clearly provide Kenan Fellows with valuable experiences with university researchers and business/industry professionals, and help them translate these experiences to the classroom to make STEM instruction more relevant and engaging for their students.

Mentor Survey Results

Kenan Fellows Mentors of 2010 Fellows responded to a survey addressing their opinions of how the program had impacted their Kenan Fellow as well as themselves professionally.[28] Similar to Fellows, nearly two-thirds (65%) of mentors report that they have already developed a close and lasting professional relationship with their Fellow. While most mentors reported they had sufficient time during the summer to work with their Fellow (71%), only slightly more than half (53%) believed they had maintained sufficient contact during the school year. An inspection of survey comments revealed that some mentor-Fellow pairs were able to work out a sufficient schedule of contact during the year through face-to-face meetings, emails, and phone calls, but some mentors mentioned that excessive school demands prevented more regular contact.

Mentors were asked to report how serving in this capacity had impacted them professionally. Mentors were most likely to report significant benefits from working with their Kenan Fellow in the areas of university extension/engagement (75%), scholarly contributions within their field (63%), and understanding and respect for the K-12 classroom (89%). Mentors were relatively less positive that the relationship had caused them to be more reflective of their teaching or increased their knowledge within their field (53%), enhanced their ability to teach undergraduates (47%), or build partnerships with others with similar interests (35%).

[28] A total of 17 of 39 Mentors responded to the survey (44%), so results should be interpreted with caution.

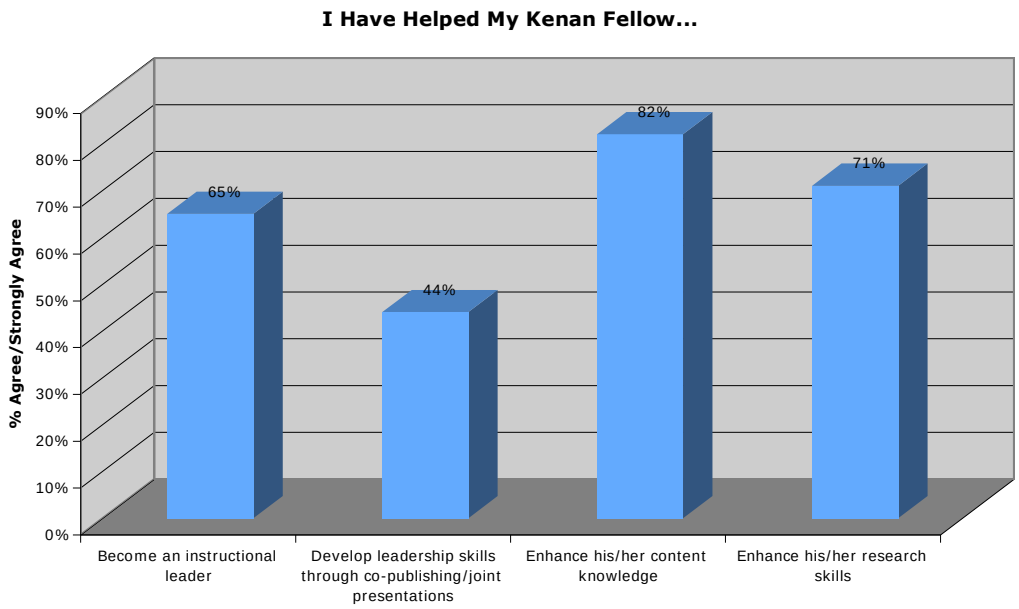


Comments from Mentors illustrate the ways the relationship has been most beneficial both within academia and business/industry:

> "The Fellow brings current 'real world' school experience into the research arena. This has expanded the scope of my research questions and potential translation of my research into practical action."
>
> (2010 Kenan Fellow Mentor Patricia Porter)

> "When considering the skill requirements of future employees, this experience has had a significant impact on how I think about organizational development and the critical social and technical aptitudes of the K-12 population."
>
> (2010 Kenan Fellow Mentor William Beck)

Mentors also reported on their relationship's impact on their Kenan Fellow. Mentors were most positive about the benefits for their Fellow in terms of their content knowledge (82%) and research skills (71%). Not surprisingly, fewer mentors reported benefits to their Fellows in terms of leadership skills through professional presentations or co-publishing; these activities are typically more likely to be expected during the second year of the program.

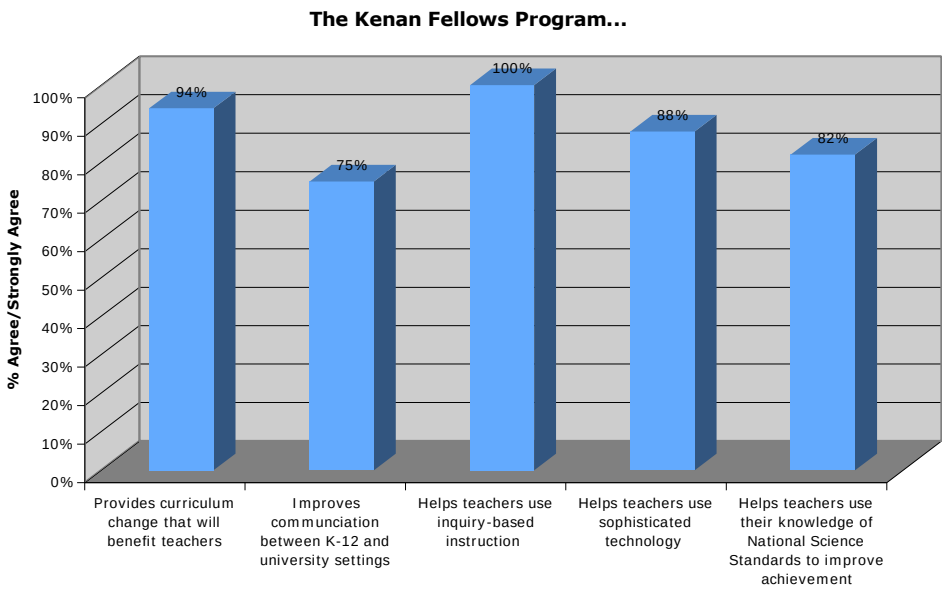


Mentors' comments show how Fellows' content knowledge, knowledge of STEM careers, and teaching skills have been positively impacted:

> "My KF has a better understanding of the types of jobs in the biomanufacturing industry, and has a better understanding of how to incorporate many different aspects into a single lab activity, i.e. learning biotech, data collection, data analysis, documentation, etc."
>
> (2010 Kenan Fellow Mentor Rick Lawless)

> "The KF working with our institution has had to balance the time and workload of teaching and this project's demands. The confidence of the KF with content has increased over the past year and he has followed models of teaching presented through this program when visited by our staff. Attendance at NSTA conference was a real bonus for both parties."
>
> (2010 Kenan Fellow Mentor Christi Whitworth)

When asked about the broader impacts of the Kenan Fellows program, mentors were very positive. All or almost all believe the program helps teachers use inquiry-based instruction and sophisticated technology and provides curriculum change that will help teachers. More than three-quarters also indicate that the program helps teachers improve student achievement through their knowledge of National Science Standards, and enhances K-12/university communication.



Based on survey results to date, the Kenan Fellow-Mentor relationship appears to be working largely as intended to enhance Fellows' content and research knowledge, develop university/business/industry/education partnerships to foster cutting-edge K-12 curriculum development, and enhance understanding of the K-12 environment by Mentors.

CONCLUSIONS

Results from this evaluation of the Kenan Fellows Program suggest that it continues to fulfill its goals and is laying a foundation to provide much-needed benefit to the state of North Carolina in the area of science and mathematics education. This is especially true, given that the program has continued to expand outside the immediate Triangle area, and has recently targeted underserved areas within the state. An increasingly diverse group of outstanding educators are given an opportunity to further hone their teaching and leadership skills, and through the curriculum dissemination process will ultimately help to improve science and mathematics instruction statewide. The types of professional development provided were consistent with National Staff Development Council standards and were perceived to be of high quality and applicable to the professional lives of Fellows. Many Fellows commented that a major strength of the program is that it provides an arena for them to form and maintain ***ongoing*** supportive relationships with other colleagues who are also interested in further enhancing their leadership and teaching skills.

The Kenan Fellows program appears to foster teacher leadership, as evidenced by reports of actual leadership behaviors and Fellows' perceptions of program impact. The program has encouraged many Fellows to pursue National Board Certification and/or pursue an advanced degree. The majority has received an award and/or grant, and approximately three-quarters made at least one professional presentation or provided formal professional development to their colleagues. Fellows also engaged in a variety of other leadership activities, such as curriculum writing and committee work. Fellows clearly recognize the contribution of the Kenan Fellows program to their enhanced leadership, as evidenced by high percentages reporting that the program had contributed to their increased confidence as teacher leaders, and allowed them both to be leaders within their school as well as make valuable connections with other educational partners.

The enhanced teacher leadership Fellows experience through their program participation may also contribute to their likelihood of remaining in the teaching profession, or alternatively may encourage them to pursue other leadership roles within education. Although it is impossible to link teacher retention directly to the Kenan Fellows program without a controlled research design, 83% of all Kenan Fellows to date have remained as classroom teachers, and many attribute their decision to remain to their participation in the program. When they do leave teaching, almost all remain within the field of education, often taking on broader leadership roles. This suggests that the program may possibly be a cost effective way to ensure that quality STEM teachers remain in classrooms in North Carolina, or contribute their skills as innovative teacher-leaders in other educational capacities.

Kenan Fellows also reported that the program enhanced their content knowledge, and helped them become a better teacher. Most Fellows indicated that they had improved in the areas of inquiry-guided instruction, knowledge of STEM careers, technology use, mentoring skills, presentation skills and knowledge of National Science Standards. They also noticed positive changes in their students' ability to use inquiry learning strategies and sophisticated technology within lessons. Data collection in the area of student achievement, learning, and attitudes towards STEM topics will yield valuable information as to whether changes Fellows report translate into more positive outcomes for students.

Changes to the structure of the summer internship appear to be working as intended, with both Fellow and Mentor survey results suggesting that increased time spent with the Mentor resulted in a more positive and productive Fellow-Mentor relationship. Staff also reported that requiring the Fellow-Mentor team to develop a Project Plan that outlines the curriculum development process, timelines, and evaluation have worked as intended. In addition, having a Quality Assurance Team review these plans regularly has resulted in a greater percentage of projects being of high quality and "on-target" for timely completion. Survey results suggest that it may be necessary, however, to build in more formal mechanisms to ensure adequate Mentor-Fellow communication/collaboration during the school year.