# Experience to Impact: A Comparison of Models of University-Based Summer Internships for High School Teachers

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**Introduction**

The Georgia Intern Fellowships for Teachers (GIFT) program, initiated in 1991, is a collaborative effort of corporations, universities and school systems designed to enhance the mathematics and science experiences of Georgia teachers and their students by providing teachers with summer internships in science and mathematics-rich work environments. Over the past fourteen years the Georgia Institute of Technology, through its Center for Education Integrating Science, Mathematics and Computing (CEISMC), has provided summer research experiences for over 900 teachers in both university and industrial settings, with more than 200 teachers working in university laboratories at Georgia Tech and Emory University in the last five years alone. By offering business, industry, public science institute and academic research fellowships to teachers, GIFT allows educators to observe first-hand the skills and knowledge necessary for the preparation of our future workforce: the students currently in Georgia's classrooms.

By participating in GIFT, an average of 75 teachers per summer have had the opportunity to experience the applications of science, mathematics, and computing as they apply to "real world" inquiry, problem solving and reasoning. Each teacher is assigned a science or engineering mentor who is responsible for orienting the teacher to the work environment and guiding the teacher through the summer experience. The teacher also collaborates with the mentor to develop an Action Plan for integrating new perspectives, knowledge, and insights gained from the fellowship experience into the classroom to stimulate student interest in science, technology, engineering and mathematics (STEM). These Action Plans can also include partnership activities such as mentor visits to the teacher's classroom, field trips to the research lab, and high school student research internships in university laboratories.

GIFT placements vary greatly in length, intended scope and type of research experience, and can be grouped into the following six general categories:

1. Fellowships in technical data analysis divisions of corporations;
2. 8-week experiences in which teachers conduct science, engineering, or social science research in academic laboratories;
3. International experiences in which teachers travel with university lab members to conduct research or compare cross-cultural models of academic instruction;
4. Student mentoring experiences where teachers supervise high school student research projects conducted in the university laboratory,
5. Fellowships created to assist teachers in refreshing their knowledge of specific academic content, and
6. Fellowships created to help develop K-12 or informal education curriculum units based on academic research.

In this paper we will compare these models of participation, analyzing the objectives and actual components of the different experiences, as well as the different activities planned for implementation into the classroom. Since CEISMC is located within the Georgia Tech College of Sciences, most of the traditional research positions have historically been in biology and chemistry, topics that clearly align with teachers' instructional obligations. However, in recent years many more engineering faculty members have participated in the GIFT program. These engineering internships will be compared to non-engineering ones, specifically addressing the issue of how engineering content aligns with the K-12 courses GIFT teachers generally teach.

**GIFT Internship Overview**

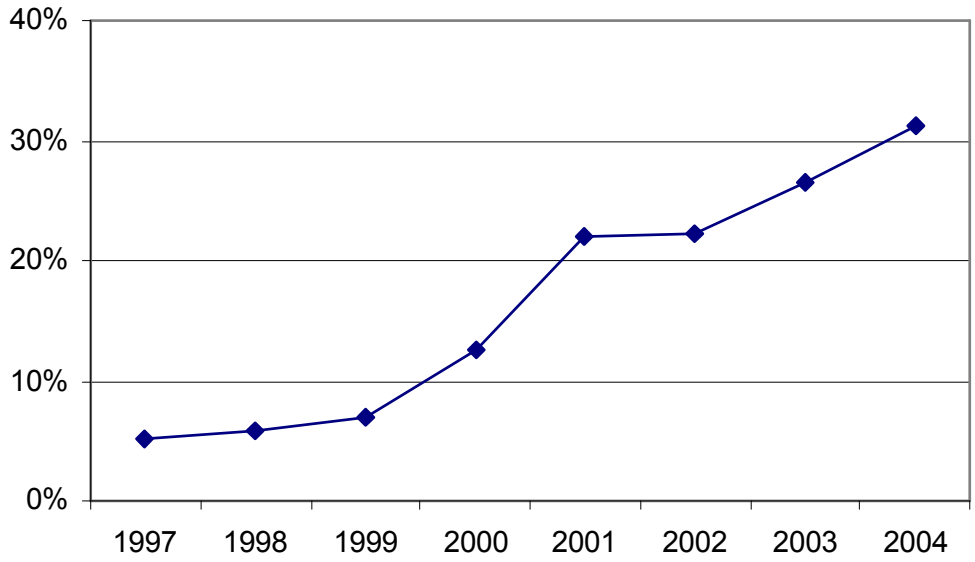
GIFT internship positions can be categorized into three general types: "university" positions, "corporate" positions, and "other" positions (which include positions at informal science entities, such as Zoo Atlanta, and at public health education units such as those at the Centers for Disease Control and Prevention (CDC).) As illustrated in Figure 1, from 1991 – 2001 the number of GIFT positions in universities and corporations were approximately equal—332 worked in industry over that time, 309 worked in academic labs. However beginning in 2002, there has been a dramatic shift in the balance between corporate and university sponsors. The national and local economic downturn caused many long-term corporate GIFT sponsors to terminate their involvement in the program. Concurrently, the National Science Foundation implemented, and

**Figure 1--GIFT Participants 1991-2004**


more importantly began enforcing, the "Criterion 2" category in grant proposals, namely that NSF grantees are required to explicitly address the broader educational impacts of their research. NSF also made readily available Research Experiences for Teachers (RET) grant supplements, enabling faculty and academic units to financially support GIFT teachers without depleting basic

research funds. Within GIFT, this increase in the number of academic positions was assisted by a marked increase in the participation of engineering units at Georgia Tech. This focus on engineering parallels the development of a more national appreciation for the role that engineering can play in K-12 education, a changed illustrated by the American Association for Engineering Education's (ASEE) creation of an Engineering K-12 Center and a new ASEE K-12 Division.

**Figure 2--Percent of GIFT positions in academic engineering labs, 1997-2004**




**The Common GIFT Experience**

Regardless of the type of GIFT placement a teacher participates in, some components remain constant. The average fellowship is for seven weeks, and the teacher is paid a $5,000 stipend. GIFT teachers are primarily from high schools (72% for 2001-2004), are primarily female (64%), and are equally likely to be white (47%) or black (48%). During the summer the teachers are placed in groups of 10-15 teachers and assigned a master-teacher GIFT Facilitator who meets with them weekly and serves as their primary contact with the program. With the help of their Facilitator, teachers develop an Action Plan, a formal document each teacher creates as a blueprint for transferring the summer GIFT experience into his/her classroom during the following year. The Action Plan includes:

- The **Needs Assessment** that contains a self-assessment of the teacher's teaching/learning environment in which they describe their personal or team vision for their classroom.
- **A Summary of the GIFT Fellow's summer work experience** including discipline content, experimental techniques, instrumentation and technologies used, and the underlying rationale and theory.
- A **Portfolio** that represents key points in the learning process. It includes materials, processes, and products the teacher acquires throughout the summer.

- The **Classroom Implementation Plan** contains the teaching and learning goals, classroom implementation, and evaluation plan.
- The **Communication Plan** includes a description of long-range interaction with the mentor.

GIFT staff members follow up with the teachers during the school year to provide support and encourage the transfer of the summer experience into the classroom. Through GIFT, the teachers gain opportunities to network with business mentors, faculty and staff of higher institutions, and teachers from other school systems, and typically report that they feel renewed, more confident, and better able to create more relevant mathematics, science, and technology lessons in their classrooms. They earn Professional Learning Units, required for certification renewal, for a complete and successful Action Plan and often present their summer experience, Action Plan and its outcomes to colleagues at school and at local, state, and national meetings.

**GIFT Placement Models**

At its inception, the GIFT program was composed of two types of positions, industrial/corporate and university research. Since that time multiple models of GIFT placements have emerged. Placement models include:

- The traditional corporate internships in which teachers work in industrial or corporate environments;
- Traditional research positions in which teachers participate in academic research, and
- Modifications of the traditional research positions, which include:
    - Research experiences that include opportunities for teachers to travel internationally,
    - Research experiences that involve the inclusion of high school students conducting related research projects,
    - Academic experiences designed to allow teachers time to refresh their knowledge of specific academic content; and
    - Positions in which teachers develop curriculum and/or websites for informal public science institutes.

In traditional industrial and corporate settings, teachers are usually involved in various data collections and analysis activities, such as researching factors of ergonomics, evaluating survey data to determine if organizations salaries are comparable to the market, creating data charts and completing statistical analysis. They have also contributed expertise in website development, processing financial data, and assisted in the publication of instructional manuals.

Teachers placed in traditional academic research positions are immersed in cutting edge research at major universities. In research settings teachers have studied the use of bacteria to break down pollution, the cloning of DNA sequences which have applications in cancer treatments and genetic disorders, the engineering of viruses to treat diseases, and the processing of sediment samples from contaminated surface aquifer sites. Teachers have been involved in the research of various engineering fields such as aerospace, computing, bioengineering, Materials Science and mechanical engineering. Specifically, they have been involved in research on stress, strain and fracture on various materials and using statistical analysis to analyze the velocity of sound. These positions not only provide teachers with new content knowledge, but also expose them to the nature of science and the inquiry processes used by scientists.

Academic research and corporate positions are similar in that they provide exposure to real world applications of mathematics, science and technology. Teachers also experience the importance of good communication skills, teamwork and problem solving and return to their classrooms with a greater understanding of the skills students need to be successful. Both types of positions often involve data collection and analysis. The differences primarily include exposure to two different "worlds" – the world of a major corporation with thousands of employees generating products or a service, striving to maintain efficiency and excellence while delivering a sound product, or the much smaller, but highly intense world of the academic research laboratory. Teachers in corporate placements are exposed to corporate structure, training, teamwork and problem solving and are generally involved in data collection and analysis. In academic research settings, teachers are more likely to be exposed to the inquiry methods utilized by scientists and to experience traditional methods of science. These academic positions usually begin with an introduction to laboratory equipment, scientific processes and involve reading scientific articles to gain an understanding of previous and current research prior to experimentation. Teachers are often assigned a component of a research study and become a part of a lab team conducting a study.

The traditional academic experience has given birth to multiple modified experiences including opportunities for teachers to travel internationally and gain insight to educational systems and cultures in different countries, opportunities to involve high school students in academic research, and opportunities of academic enrichment for teachers. These positions provide unique enrichment opportunities for teachers. Below are highlighted concrete examples of teachers involved in these different models of GIFT.

**Traditional Corporate GIFT Placements**

In fellowships in technical data analysis divisions of corporations, teachers are immersed in environments rich in applications of mathematics, science and technology. Sponsors have included Georgia Power, Georgia-Pacific, UPS, EMS Technologies, Scientific Atlanta, SunTrust, Gwinnett Medical Center and the Medical Center of Central Georgia. In these internships, teachers typically work with corporate mentors and are often involved in data collection and analysis. These positions are more often filled by mathematics teachers and provide exposure of the applications of mathematics. For example,

- Since1991 the Georgia Power Company has placed teachers in more than 100 positions. In the majority of these positions, teachers work in power generation facilities, specifically the water quality laboratory of a fossil fuel plant. A mathematics teacher collected water samples, conducted laboratory tests, and entered data into various databases. She ran a data analysis that proved to be a very useful tool for the laboratory team and one they have continued to utilize. From her needs assessment, she expressed a desire to reduce "….my use of lecture teaching strategy by increasing the use of problem based learning, discovery learning, and several other hands-on learning strategies" and a desire to integrate technology. Her implementation plan involved simulating the accumulation of material collected on boiler tubes, having students remove and measure the simulated material and design graphs to analyze the data. Her implementation plan is a good example of the cross-curricular lesson plans often developed by GIFT teachers.

Her mathematics students will be exposed to an example of a real world scientific example of the importance of data analysis.

- A GIFT teacher placed in a corporate industrial engineering department spent her summer consolidating and organizing time-study data. She also created databases, executed queries, ran audits and created graphs. From her needs assessment she wrote "I want to place special emphasis on critical thinking and technology because many students fall greatly short in these areas, and they must be proficient in both to be contributing employees." She expressed a desire to implement a curriculum that is more real world oriented and planed to expose her mathematics students to MS Access databases using survey data.

- A high school mathematics teacher spent her summer with a quality assurance statistician whose responsibilities included providing mathematical support and training to engineers and managers of the department as well as analyzing data from experiments. The department assesses the reliability and durability of the devices manufactured by the company. The teacher's responsibilities included editing existing training modules and course materials for a statistics program. From her needs assessment, she expressed that she anticipated gaining "… a stronger understanding of how mathematics, statistics in particular, is used among corporate statisticians, engineers, corporate managers, trainers….." and her goal was "….to establish a mathematics classroom in which students are active participants in developing understanding and learning mathematics." Through this experience she gained a great understanding of the relationships of mathematics and engineering and planned to integrate graphing calculators and MS Excel databases into statistics units.

**Traditional Academic GIFT Placements**

The traditional academic GIFT placement is composed of an 8 week experience in which teachers conduct traditional science, engineering, or social science research in academic laboratories. For example,

- A third year mathematics GIFT Fellow, who spent the summer in the Georgia Tech Research Institute, pondered the importance of increasing the amount of student-centered instruction in his classroom and proposed to address cross-curricular objectives by incorporating a traditional science lesson on aerodynamics into his geometry class. In the implementation plan, he planned for students to review Bernoulli's principle as well as the concepts of lift and drag, build their own airplanes, mathematically estimate the flight distance, and compile their data in Microsoft Access databases.

- A high school Economics teacher spent her summer working in the Public Policy department at Georgia Tech. Her research focus was to study how money is allocated and distributed within a school district and then within individual schools. She then proposed to analyze the relationship between how schools spend money and the level of academic achievement in that school, and then compare those results to other schools within the same district. Her implementation plan involved her economics class gaining an understanding of how schools allocate resources. This activity integrates mathematics and technology into an economics classroom.

- A third year GIFT fellow who teaches Chemistry worked in the Center for Organic Photonics and Electronics at Georgia Tech and spent the summer researching the organic light emitting diode (OLED). Her work experience summary showed evidence of the content knowledge gained by her experience, and in a classroom observation of her implementation plan, students were conducting power point presentations on the uses of the OLED. On a previous occasion, her mentor had spent a day with her and her students.

- Based on his summer experience in a Georgia Tech research laboratory, a GIFT Fellow proposed a seminar in which students assumed the role of a yeast cell biologist given the task of designing an experiment to examine the localization of a gene of their choosing. The plan was for the students to use a *Saccharomyces* genomic database in the completion of the task. His needs assessment noted the need for more authentic inquiry labs and a more comprehensive unit of biotechnology. His GIFT Mentor has participated in the program for 10 of the 14 years and often visits the classrooms of his GIFT Fellows.
- A second year GIFT Fellow spent his summer in a Mechanical Engineering laboratory preparing samples of crystals used in simulated cracked turbine blades to determine the effect of fatigue on crack growth and creep crack growth tests. His implementation plan involved an incorporation of engineering into his classroom by using spaghetti to build bridges. Students were to be instructed on compression, tensile and shear forces, and would build bridges and analyze the forces involved in breaking the bridges. His plans included building compressional and stress testers to use to determine the effects of forces on the breaking of the spaghetti bridges.

**International GIFT Experiences**

International experiences in which teachers travel with university lab members to conduct research or compare cross-cultural models of academic instructions provide teachers with exposure to new technologies and content knowledge, and also insight to different cultures. For example,

- A mathematics teacher spent six weeks in Japan as a part of her "Materials World" GIFT Fellowship through the School of Materials Science and Engineering at Georgia Tech. Her research mentor investigates how brain aneurysms can be detected with CT scans, and develops 3-Dimentional models to predict them and allow for intervention before a rupture occurs. The teacher, who teaches Algebra II and III, planned to integrate the fluid dynamics of physics, anatomy and physiology into her classroom, and has designed activities that will place students as a part of a team that studies aneurysms. These activities will bring more of an inquiry-approach to learning in her classroom. According to her, it is easy for a teacher to "become mundane and stagnant" within their training of thought, almost forgetting applications of their subject matter and forgetting how to connect it to real life.
- A first year GIFT Fellow in Mechanical Engineering spent six weeks at Tsinghua University in Beijing, China as a part of his GIFT Fellowship. His needs assessment expressed a desire to expose students to technology and an understanding that the world "is becoming more global and students are not just competing with students in their own

classroom … but also with students from all over the world." In his Work Experience Summary, he reported that he gained an understanding of Chinese culture and their educational system. His Action Plan proposed to expose students to ADAMS/View Software used during his GIFT experience to simulate the importance of friction in sports.

**Student Research GIFT Placements**

Student mentoring experiences where teachers supervise high school student research projects conducted in university laboratories have increased in number. In 2004, 16 students worked alongside their teachers in laboratories at Georgia Tech. Most of the placements were research teams supported by a grant from the Siemens Foundation as part of an initiative to encourage minority students to consider science and engineering as a career, and to increase the number of minority students submitting research projects to the Siemens-Westinghouse Competition in Math, Science and Technology. Each team consisted of 2-3 high school students, a teacher coordinator who had spent time at Georgia Tech in a research laboratory as part of the 2003 GIFT program, and the personnel from the Georgia Tech laboratory. The students were recruited during the fall of 2003, and encouraged to attend the regional Siemens Westinghouse competition at Georgia Tech. During the 2003-2004 school-year, they were encouraged to work to become familiar with the research lab, to define a research question, to conduct the background work, and to visit the laboratory. Students received $300 for their summer research and an additional $250 upon submission of the project to the Siemens-Westinghouse Competition. Examples of these positions include:

- In 2004, a GIFT teacher supervised a team of 3 students in a biology laboratory at Georgia Tech. During 2003, he gained an understanding of the microbiological lab protocols used by the mentor's research group, and the following summer he supervised a team of students who were conducting research on antibiotic-resistant bacteria in water sources. The experience was a challenge for his students since they were accustomed to "cook book" laboratories at school, whereas in the research lab they were required to develop their own experimental procedures through a process of trial and error. He described the "hands on nature of his experience" as GIFT's most valuable component, as it reinforced the importance of using inquiry-based instruction in the classroom. Inquiry learning requires that teachers have ample patience, since most students have been taught to look for the one "correct" answer, and resist the hard critical thinking required by inquiry-based instruction.

- For the past two years a chemistry teacher has conducted research in a geochemistry laboratory in the School of Earth and Atmospheric Sciences. In 2003 she became familiar with the lab's research on water quality and soil analysis, including participating in water sample collection off the Georgia coast. In 2004, she returned, and brought three of her high school chemistry students to study both the effect weather has on the fluctuations of metro-Atlanta watersheds, and the long and short-term effects of pollution on these watersheds. She described her experience as an "exhale from kids" and an opportunity to bring true applications of science into her classroom. Her implementation plan included activities on polymers. Her mentor has asked her to present a poster at the Southeast Regional American Chemical Society.

- A high school mathematics teacher spent his summer working in an Industrial and Systems Engineering Laboratory at Georgia Tech. His placement involved collecting data and mathematically modeling an optimized solution for electronics recycling in the state of Georgia. During his internship, he supervised a team of 3 students from his high school that entered and placed in the Siemens-Westinghouse Competition. His classroom implementation plan involved introducing the concept of the recycling of electronics through research, and the analysis of electronic recycling data using Visual Express software.

**Content Refreshing GIFT Placements**

In 2004, GIFT created a new type of academic fellowship to assist teachers in refreshing their knowledge of specific academic content. The intent of the fellowship was to help with content knowledge specifically for Advanced Placement (AP) teachers in highly minority schools where there is a shortage of high-level courses offered. Often these teachers do not have the academic background needed to teach these higher level courses. The goal of this type of placement is to provide teachers with the opportunity to take Advanced Placement training courses as well as for them to audit college level science courses, to work through the AP laboratories with assistance from the university staff, and to develop networks and connections with people to serve as content resources. For example,

- In her Needs Assessment, a GIFT Fellow expressed a desire for students to have access to real world situations and technology. She teaches in a critical needs school in Atlanta and will be teaching AP Chemistry in the fall of the year of her GIFT placement. The primary focus of her experience was auditing a freshman chemistry course as well as spending a week with another chemistry teacher to become familiar with the AP curriculum. She also worked with mentors in the School of Chemistry and Biochemistry at Georgia Tech and reviewed a card game developed by the faculty mentor that focuses on chemistry concepts.

**Curriculum Development GIFT Placements**

Less than 10 percent of GIFT Fellowships are created to help develop K-12 or informal education curriculum units based on academic content for informal science organizations. These positions are often filled by middle grades teachers and involve the development of websites, brochures and displays, training manuals, etc. For example,

- A middle school life science teacher developed web-based curriculum units on the brain for the Center for Behavioral Neurosciences and presented teacher workshops at day camp programs for inner city children. His needs assessment expressed a desire to expose students to graphing calculators and proposes the use of graphing calculators and journals to provide students with cross-curricular experiences.

- Another middle school life science teacher worked in the Office of Science Education at the Center for Disease Control and Prevention assisting in the development of a lesson plans and resources to assist teachers in the incorporation of public health in their classrooms. Her proposed implementation plan included student research of the

Morbidity, Mortality, Weekly Report (MMWR) in order to publish a student health journal at a level middle school students can comprehend. Her educational background made her a valuable resource for the Office of Science Education as she helped provide a teacher's perspective on initiatives and programs the office was considering in the future. During the school year, her Mentor visited her classroom, donned in a protective suit and talked with her students about epidemiology. She and her mentor also presented together at the National Science Teachers Convention in 2004.

**Action Plan Analysis**

Action Plans of 16 teachers in various types of positions were analyzed to determine the degree of transferability of the experience to the classroom, the proposed implementation with students and the degree of exposure to real world applications and inquiry. As shown in Table 1, all Action Plans included inquiry-based activities, with 88% showing strong evidence of the inclusion of these types of activities. The use of inquiry learning is embedded in the National Science Standards, and is emphasized by the local school systems. The Action Plans also showed that there was a particularly high degree of transferability of the experience to the classroom, and that most teachers had a strong plan to continue to communicate with their mentor.

| **Table 1** | **No evidence** | **Some degree of evidence** | **Strong evidence** |
|---|---|---|---|
| Needs Assessment included evidence of desired change in teaching practice | 0% | 31% | 69% |
| Needs Assessment included desire to learn more about math/science, real world | 0% | 19% | 81% |
| Degree of transferability of summer experience to classroom | 0% | 19% | 81% |
| Teaching and learning goals include the field of study of mentor/mentoring organization | 0% | 25% | 75% |
| Action plan includes cross-curricular activities | 25% | 31% | 44% |
| Action Plan includes inquiry-based activities | 0% | 12% | 88% |
| Portfolio includes resources to support student understanding of mathematics, science and technology | 0% | 31% | 69% |
| Work experience summary includes practical applications of mathematics, science and technology | 0% | 31% | 69% |
| Work experience summary demonstrated evidence of gaining a greater understanding of mathematics, science and technology | 0% | 25% | 75% |
| Communication Plan includes opportunity for mentor to interact with students | 0% | 25% | 75% |
| Communication Plan includes opportunity for interactions with mentor | 0% | 19% | 81% |

**Program Evaluation**

Fifty of 77 teachers responded to a survey conducted at the end of the GIFT summer of 2004 to determine areas of program impact. A synopsis of the answers are shown in Tables 2 and 3, and indicate that over 70% of teachers experienced real world applications of STEM, utilized new equipment, increased their knowledge of current issues in science or mathematics and increased their knowledge of careers in these fields to a moderate or great extent. Teachers also gained an

understanding of the difficulties students face when encountering new materials. In GIFT positions, a teacher's experience is similar to the experience of a student when learning new content and technologies. This type of experience can be intimidating for teachers and the experience often provides them with a better understanding of their student's perspective when learning new content.

**Table 2**

| Question-- "To what extent, if any, do you feel that you experienced each of the following types of learning as a result of your participation in GIFT?" | **Not at all (0)** | **Small extent (1)** | **Moderate extent (2)** | **Great extent (3)** |
|---|---|---|---|---|
| I gained greater understanding of the applications of science, mathematics, or technology in everyday life. | 4% | 8% | 29% | 61% |
| I acquired greater understanding of fundamental concepts in science, mathematics or technology. | 4% | 18% | 27% | 53% |
| I became familiar with new materials and equipment that I can use in my teaching. | 2% | 10% | 30% | 58% |
| I increased my knowledge or current issues in scientific or mathematical research. | 10% | 14% | 18% | 58% |
| I gained an appreciation of the difficulties some students encounter when learning new material. | 8% | 16% | 27% | 51% |
| I better understand how collaborative inquiry can be done successfully. | 2% | 24% | 28% | 46% |
| I increased my knowledge of careers that utilize science, mathematics or technology. | 4% | 10% | 22% | 64% |

In Table 3 (on the following page), over 80% of teachers agreed the GIFT experience increased their confidence level and enthusiasm for teaching and learning to a moderate or great extent. Not only did the experience increase their personal knowledge, but increased their commitment to seeking new ideas and consider ways they can improve their teaching.

**Discussion**

Many patterns of benefits emerge from a review of the models of GIFT.

- GIFT teachers express increases in levels of confidence and enthusiasm following their GIFT experiences.
- GIFT provides opportunities to interact and create a network with other teachers, thereby developing a professional learning community.
- GIFT facilitates connections with professionals in research institutions and corporations. These ties are invaluable for teachers who are constantly scrambling for resources and approachable content experts.
- Many GIFT Mentors and Fellows continue a relationship after the GIFT experience is over. This includes classroom visitations, presentations at conferences and collaboration on grants. Mentors often serve as contacts for science fair projects and resources for content area questions.

Engineering positions have increased recently at Georgia Tech due the availability of National Science Foundation Research Experience for Teachers (RET) site and supplemental grants. Most traditional academic experiences have been in the fields of chemistry, physics and biology and have been more obviously transferable into the classroom. Engineering positions are often held by mathematics teachers, providing them with examples of how mathematics is used in real world engineering problems. At the present time, engineering courses are not generally offered in K-12 schools in Georgia, so the material is instead most often integrated into physics and mathematics curricula.

**Table 3**

| Question—"To what extent do you agree or disagree with each of the following statements concerning the impact of the GIFT program on you personally?" | **Not at all (0)** | **Small extent (1)** | **Moderate extent (2)** | **Great extent (3)** |
|---|---|---|---|---|
| It increased my confidence in myself as a teacher. | 4% | 10% | 40% | 46% |
| It elevated my level of enthusiasm for teaching/learning. | 0% | 6% | 39% | 57% |
| It increased my interest and commitment to learning and seeking new ideas on my own. | 2% | 6% | 22% | 70% |
| It increased my interest and ability to network with teachers and other professionals. | 0% | 12% | 20% | 67% |
| It stimulated me to think about ways I can improve my teaching. | 0% | 6% | 22% | 72% |
| It increased my personal knowledge level of the subject I teach. | 8% | 20% | 22% | 51% |
| It increased my interest in integrating course curriculum with other subjects or fields of study (writing/math/science). | 4% | 6% | 24% | 66% |
| It increased my ability to incorporate "real life" examples of the subject I teach. | 2% | 6% | 27% | 67% |
| It increased my knowledge base of careers in the areas of math, science and/or technology. | 4% | 12% | 22% | 62% |
| It increased my comfort level with inquiry-based learning strategies. | 8% | 18% | 35% | 41% |

## Conclusion

In an age where the realities of teaching include issues of testing pressures and accountability, GIFT provides an opportunity for teachers to be rejuvenated and gain content knowledge, science resources, and opportunities to connect with a professional learning community of teachers and other professionals.

GIFT experiences provide teachers with first-hand knowledge about how scientists and engineers actually approach problems, how they design experiments, and how they interpret data. GIFT provides teachers with tools, resources, connections to scientists, and exposure to the latest technologies, all of which assist them in meeting the challenges they face in their classrooms. And, in perhaps the most powerful effect of all, teachers in a GIFT position gain a sense of professionalism and renewal that can last a lifetime.

An investigation of the various models of the GIFT program shows that while different in their scope, these models provide teachers with renewed interest and enthusiasm for their subjects and skills and resources to share with their students. The goal of GIFT is to improve student achievement by providing teachers with summer experiences that increase their content knowledge, challenge them to explore new teaching strategies, and show them the practical uses of science and mathematics skills. Research suggests that the quality of the teaching workforce is the single most important factor in predicting student achievement (Hammond & Loewenberg, 1997) [1]. University research laboratories and corporations are in the unique position of being able to help teachers develop their strengths in these areas through GIFT Fellowships.

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[1] [Darling Hammond, L., & Loewenberg Ball, D. "Teaching for high standards: What policymakers need to know and be able to do." Paper prepared for the National Education Goals Panel, Washington, D.C., July 1997