2006-414: INVESTIGATING OUTCOMES FOR GK-12 TEACHER PARTNERS AND GK-12 SUMMER INSTITUTE PARTICIPANTS

Amber Caicedo, University of South Carolina
Jed Lyons, University of South Carolina
Stephen Thompson, University of South Carolina
Investigating Outcomes for GK-12 Teacher Partners and GK-12 Summer Institute Participants

Abstract

The NSF Graduate Teaching Fellows in K-12 Education (GK-12) Program at the University of South Carolina includes two programs for K-12 Teachers: the Teacher Partner Program and the Summer Institute for Teachers. Both programs focus on incorporating engineering related activities into K-12 classrooms, but through different methods. To determine the long-term effects of each program, a follow-up survey was conducted in the Fall of 2005 on all teachers that had participated in either program during the previous four years. Both groups reported long-term benefit due to participation, and although there are slight differences between them, group responses were largely similar. This paper discusses the long-term benefits that were identified and discusses the similarities and differences that were found.

Introduction

The National Science Foundation’s Graduate Teaching Fellows in K-12 Education (GK-12) program provides fellowships to graduate students in science, technology, engineering and mathematics (STEM) disciplines that enable them to enhance STEM instruction in K-12 schools. The program seeks to improve communication, teaching and team building skills for the Fellows, provide professional development opportunities for K-12 teachers, and enrich the learning for K-12 students. Because the program has the unique ability to positively benefit three groups of participants (graduate fellows, teacher participants, and K-12 students), it desirable that the benefit to all three groups be evaluated.

Research focus and attention on engineering-situated GK-12 programs has primarily been on the short and long term benefit to the graduate fellows and the benefit to the K-12 students. Fewer studies have been conducted on the teacher participants. This paper contributes an evaluation of what teachers perceive to be the long-term affects of participating in the University of South Carolina’s GK-12 program. Two components of this program engage teachers: the Teacher Partner Program and the GK-12 Institute for Teachers.

The Teacher Partner Program has been in place since the 2001-2002 academic years. The program consists of assigning a graduate level engineering student, called a GK-12 Fellow, to a K-12 teacher’s classroom for one full school year. GK-12 Fellows enroll in a one-hour graduate course that focuses on teaching strategies for two semesters, work in the assigned K-12 classroom ten hours per week, spend one hour per week planning with their assigned teacher (Teacher Partner), and spend five hours per week in preparing activities for the classroom. The intent is to give engineering students, with plans of entering into industry or academia, exposure to hands-on teaching. The Teacher Partners are likewise provided with a full year of exposure to a fresh perspective that is highly knowledgeable in their field. At the end of the year, the Fellow has gained valuable teaching skills and the K-12 students were provided exposure to real-world connections to the state’s teaching standards. Feedback obtained from the Teacher Partners through surveys and interviews at the end of each year has been positive.
In an effort to culminate the Fellow’s year and to bring the ideas of the Teacher Partner Program into even more classrooms, USC invites K-12 teachers throughout South Carolina to attend a GK-12 Summer Institute for Teachers, which is taught by the Fellows. Each Fellow is expected to gather two or three of their best activities from the year, coordinate with the other Fellows, and create a set of activities and lesson plans for use in the Summer Institute. Under the guidance of the Fellows, the teachers attending the institute (Institute Teachers) complete the activities and are given written lesson plans with an accompanying set of manipulative materials. Attendance numbers have grown each year, with 21 teachers attending the first institute in 2002 and 68 attending in 2005. The duration of the Summer Institute has varied from one to three days over the years. Before leaving, the Institute Teachers were asked to fill out an evaluation survey, which they consistently respond to with praise.

Program evaluation data during and at the conclusion of a teacher’s participation in either the Teacher Partner program or the Summer Institute suggests significant benefits to both groups of teachers. Both groups reported benefits such as new knowledge and new activities to use in their classroom. However, there is a large body of research (e.g. Supovitz and Turner) that indicates that one day exposure to professional development opportunities, such as in our Summer Institute, is not long enough for teachers to ensure sustained growth. Intensive and sustained teacher development that is focused on subject matter pertaining directly to the state’s standards is recommended, which is the case for our Teacher Partners. It is therefore desirable to look at the lasting benefits to each group. This research study takes advantage of the opportunity to investigate the long-term benefits to these two groups of teacher participants, with the intent to maximize the benefit to each group in the future.

**Methodology**

A survey was sent to the 43 Teacher Partners that participated in the Teacher Partner Program between 2001 and 2004 (four academic years) and to the 139 Institute Teachers that participated between 2002 and 2005. However, due to subject mortality, primarily resulting from teacher retirement and relocation, seven subjects could not be located and six surveys were returned with invalid addresses. A few teachers participated in both programs, but since participation in the teacher partner program was more sustained, those teachers were included in the Teacher Partner category for data analysis purposes. A copy of each survey is contained in the Appendix.

The survey instrument was developed by the authors using previously used post-participation surveys as a guide. The developed survey was designed to meet the specific constructs of this study - to determine the long-term benefits to the teachers due to their participation in the Teacher Partner Program or Summer Institute. The survey consisted of 30 items, divided among four main sections:

1. factors influencing participation,
2. long-term benefits,
3. frequency of integrating engineering-related concepts into the classroom, and
4. how participation has affected teaching overall.

The second section, identifying long-term benefits, was subdivided into three subsets for simplicity and organization: content and knowledge, teaching strategies, and attitude and
resourcefulness. With the exception of the fourth survey section, which was free response, all of the survey items utilized either a 4- or 5-category forced choice Likert Scale.

The survey was sent out to the teachers via U.S. Mail including a self-addressed, stamped return envelope and a cover letter ensuring confidentiality and identifying the goals of the survey. The cover letter also provided a web address for the survey, should the teacher prefer to respond to an online version. Ten days following the initial survey mail-out, an email follow-up was sent with similar information that was included in the initial cover letter and a link to the HTML version of the survey, located on the university’s website. Thus, the teachers were given two methods to complete the survey; most chose the hard copy in the initial mailing.

The survey methodology resulted in the return of 77 completed surveys, a 42% response rate. To facilitate data interpretation, the results were evaluated within the two major groups, Teacher Partners and Institute Teachers, and then broken into year of participation, as shown in Table 1. The number of math and science teacher participants shown in the table includes the teachers whose current address could not be located. The “math teacher” designation includes teachers that teach both math and science. The greatest loss of subjects was from the first year of participation. It was determined that responses did not vary substantially according to the year of participation, thus the two main groups were not divided by participation year for data analysis. Due to the nature of the two programs, the sample sizes are substantially different.

Table 1: Survey Response by Participant Year

<table>
<thead>
<tr>
<th>Year Participating</th>
<th>Teacher Partners</th>
<th></th>
<th></th>
<th>Institute Teachers</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Math Teacher Participants</td>
<td># Science Teacher Participants</td>
<td># Survey Responses</td>
<td># Math Teacher Participants</td>
<td># Science Teacher Participants</td>
<td># Survey Responses</td>
</tr>
<tr>
<td>2001 - 2002</td>
<td>0</td>
<td>18</td>
<td>5</td>
<td>2</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>2002 - 2003</td>
<td>0</td>
<td>11</td>
<td>6</td>
<td>6</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>2003 - 2004</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>2004 - 2005</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>30</td>
<td>38</td>
<td>38</td>
</tr>
</tbody>
</table>

In the following sections, the survey results from the Teacher Partners and the Institute Teachers are discussed independently and then compared and contrasted.

Results for Teacher Partners

Factors Influencing Participation. To analyze the teacher responses, each of the four main sections of the survey were analyzed independently. The first section, perceived benefits of participation, resulted in the information shown in Figure 1. Three items stand out as the “primary influences” for teacher participation; increasing content knowledge, learning more science education methods, and improving ability to do hands-on activities with Teacher Partners responding with 53%, 44%, and 35%, respectively, in the category of “primary influence”. Thus, all participants were at least somewhat influenced by the opportunity to increase their content knowledge. The largest cluster of responses was in the category receiving ready-to-use lesson plans, indicating that 50% of Teacher Partners felt that this was a “strong influence”. The items receiving a stipend for participation and receiving college or CEU credit had the least
influence, with 75% of the teachers reporting that CEU credit “did not influence” their decision and a combined 76% saying that the stipend either “did not influence” or only provided “some influence” for participation.

![Figure 1: Factors Affecting Participation as Reported by Teacher Partners](image)

**Long-Term Benefits.** The second section contained a total of 15 items, broken into three subcategories of 5 items each. The subcategories were (a) content and knowledge, (b) teaching strategies, and (c) attitudes and resourcefulness. The responses within the subcategories were added to first identify the subset with the most identified lasting benefits. As shown in Figure 2, the subcategory teaching strategies had the most teachers responding that the program “significantly improved” their ability to incorporate engineering based activities into their instruction. However, content and knowledge has the largest combined response of “improved” and “significantly improved”, and has the fewest number of teachers responding with “no change”. Thus, it was determined that content and knowledge contained the items which carried the long-term benefits for most Teacher Partners. This subcategory was selected for further analysis.

Figure 3 shows the results of individual survey items for the content and knowledge subcategory. Note that no Teacher Partners responded to “no change” in each of three categories: understanding what engineers do, understanding what scientists do, and science content knowledge. It can be inferred that all participants at least “slightly improved” in each of these content areas. Because 56% of Teacher Partners reported an increase in understanding of what engineers do, and another 31% reported a significant increase, this item was identified as having the greatest long-term effect for Teacher Partners. Both science and engineering content knowledge received 35% of Teacher Partners reporting “significant improvement”. The responses to math content are not clustered around any one response, and noticeable one-fourth of the Teacher Partners responded with “no change” due to their participation. However, it should be noted that most of our Teacher Partners were science teachers and the teachers were not provided a “not applicable” answer choice.
There were also a few items that demonstrated strong long-term benefits within the other two subcategories. For example, within the teaching strategies subcategory, 53% of Teacher Partners responded that their ability to use real-world applications in the classroom had “improved” and another 30% reported “significant improvement.” In response to comfort with hands-on activities, 35% reported no change and only 29% to either “improved” or “significantly improved.” While it is desirable that two-thirds reported “improved” or better, it is discouraging that the remaining one-third did not have any improvement in their level of comfort with hands-on activities, after having a Fellow in their classroom for a full year. It is possible that many of the teachers considered themselves completely comfortable in this situation prior to their participation. It is also possible that the teachers did not feel comfortable repeating the activities that the Fellow brought to the classroom without the Fellow’s presence. When asked about their comfort with teaching with inquiry, the responses of the Teacher Partners were evenly spread throughout the answer choices, suggesting that this item unevenly affected on the teachers.
Under attitude and resourcefulness, 71% of teachers responded that their enjoyment of math and science, as well as their enjoyment of teaching math and science, had either “improved” or “significantly improved.” 53% of Teacher Partners reported that their ability to find resources on their own had “improved.” In response to whether the program helped them to use the Internet to their advantage, the selections were fairly evenly dispersed throughout the available answer choices, suggesting that the program did not affect the participants uniformly.

Integrating Engineering into the Classroom. The fourth section of the survey identified the frequency of integrating engineering-related concepts into the classroom. As shown in Figure 4, the frequency of integrating engineering-related concepts in the classroom prior to participation in the GK-12 Program varied, with 50% of the Teacher Partners reporting “almost never.” Following participation in the program, 43% of the Teacher Partners used engineering-related concepts “monthly” and 28% used them “two to three times a month” or more.

The teacher’s response to how often they use the lessons provided by the GK-12 Fellows do not align with the frequency within which the teachers are using engineering lessons. Fourteen percent 14% of the teachers “almost never” use them and 43% only use them “two to three times per year.” This indicates that many teachers are obtaining engineering activities from a source other than the Teacher Partner Program. This correlates with the strong positive response to their ability to find resources on their own and their awareness of existing resources as determined in the second section of the survey.

![Figure 4: Frequency of Using Engineering-Related Concepts as Reported by Teacher Partners](image)

Figure 4: Frequency of Using Engineering-Related Concepts as Reported by Teacher Partners

A later survey item inquires whether the Teacher Partners believe that the state’s science standards are supported by engineering concepts. The response of the teachers to this item concurs with the before and after shift in frequency of integrating engineering-related concepts into the classroom. Although it may seem difficult to incorporate engineering concepts into some of the lower grade levels, 67% of the Teacher Partners are elementary school teachers that
teach grades as low as first grade and only 7% of all Teacher Partners responded that they almost never use the engineering concepts in their lessons. All Teacher Partners agreed that engineering supported the state standards: 67% responded Agree and 33% responded strongly agree.

**Long-term Changes in Teaching.** In the fifth section of the survey, the teachers were asked to respond an open-ended question: how has participation affected your teaching in the long-term? As shown in Figure 5, the Teacher Partners had one frequent theme that exceeded the rest; new enjoyment or permanent change in their teaching. Responses were received such as,

“I never felt comfortable teaching science concepts or doing hands-on activities. Now, I feel much more confident teaching science and much more comfortable doing hands-on activities.”

Figure 5: Long-term Changes in Teaching Due to Program Participation as Reported by Teacher Partners

Four other themes emerged with 15% or more teachers responding similarly. Teacher Partners reported a new awareness of real-world connections with statements such as,

“I try to integrate engineering into my lessons more than before and I tell my students that "an engineer would probably do this”.”

Another 15% of Teacher Partners responded with comments indicating an improved awareness of cross-curriculum connections,

“I was shown how connections to science and math are in everything you teach”

About one-third of the teachers commented on the collection of new lesson plans or ideas for creating new ones. For example,

“I continue to use some of their activities. It has caused me to think about incorporating different types of activities.”
Unfortunately, almost one-fourth of the Teacher Partners responded that the program had no long-term effect in their classroom. This was illustrated by statements such as,

“I really enjoyed the teamwork, but I knew it couldn’t last forever. Time constraints still don’t allow me to do all that was accomplished during the GK-12 program at my school.”

The latter emerged completely from teachers who poured praise on the program when it was in place in their classroom, but explained that they did not have the time to find and develop the activities that their Fellow had used.

**Results for Institute Teachers**

**Factors Influencing Participation.** The responses from the Institute Teachers, shown in Figure 6, are surprisingly similar to the responses from the Teacher Partners. The main factors influencing participation in the Summer Institute were reported to be learning more science education methods, increasing their content knowledge, and improving their ability to do hands-on activities with approximately 40% of the Institute Teachers indicating each of these areas as their “primary influences.” Additionally, at least one-third of the Institute Teachers responded that these three areas were a “strong influence.” 60% of the Institute Teachers reported that receiving ready-to-use lesson plans was a “strong influence”, which was the largest cluster of responses for Institute Teachers. The only survey item in this section in which no influence was not selected by any Institute Teacher was increasing content knowledge, thus every teacher in attendance at the Summer Institute participated with the intent to increase his or her content knowledge. Roughly half of the Institute Teachers responded that they were either “influenced” or “strongly influenced” by the incentive to receive a stipend for participation or receive college or CEU credit. The other half responded that these influences either “did not influence” or only “somewhat influenced” them. Therefore, the influence of the college / CEU credit and stipend incentives had varying amounts of influence for participation, but only 20% stated that it had “no influence.”

**Long-Term Benefits.** Similar to the Teacher Partner data analysis, the results of the second main section of the survey were evaluated first as a whole, and then as three separate subsets. The items within the three subcategories were added in order to identify the subset with the most lasting benefits. As shown in Figure 7, teaching strategies has slightly the most teachers responding with “significantly improved” but also has the most number of teachers responding with “no change.” However, content and knowledge has the largest combined response of “improved” and “significantly improved” (78%), and has the fewest number of teachers responding with “no change.” Thus, it was determined that content and knowledge contained the most long-term benefit for the Institute Teachers.
Figure 6: Perceived Benefits of Program Participation as Reported by Institute Teachers

Figure 7: Long-Term Benefits by Subcategory as Reported by Institute Teachers

Figure 8 shows the content and knowledge subcategory broken down into individual items. Note Institute Teachers responded with “no change” to every category except engineering content knowledge. Thus, engineering content knowledge was the only content category that affected a full 100% of the teacher participants. Science content knowledge received largest number of “improved” or better responses, 86%, however almost half of the Institute Teachers responded that their understanding of what engineers do “significantly increased.” The number of responses indicating “improved” or better is approximately the same for the items understanding what engineers do and understanding what scientists do, (67% engineering, 69% scientists). Although only a small number of teachers (4%) responded that their math content knowledge “significantly improved”, almost half responded with “improved.”
Under attitudes and resourcefulness, two items had an 80% response of improved or better: enjoyment of teaching math and science and awareness of existing resources. Items such as ability to use the Internet to my advantage and ability to find resources on my own received a 56% and 61%, respectively, of “improved” or better. This would not seem to be a likely outcome for the Summer Institute given its nature, and although the percentages seem high, they are low with respect to the other survey items. One test item under teaching strategies also received a strong response from the Institute Teachers, with respect to the other items: the ability to use real-world applications in the classroom. A full 80% of teachers responded that their ability to use real-world applications in classroom at least “improved” and only 3% reported “no improvement.” At least 70% of all Institute Teachers responded with “improved” or better to every survey item under teaching strategies including such items as technology and instruction, which was not addressed during the Summer Institute.

These overwhelmingly positive responses to elements that were not introduced during the Summer Institute implies the possibility of the Halo Effect occurring with a group of very satisfied teachers. It is because of this possibility that the percentage of teacher responses are being compared within their own group rather than contrasting the percentage of responses directly against the Teacher Partners. Should the Halo Effect exist here, the key elements or benefits can still be identified within the single group for the purposes of comparison.

Integrating Engineering into the Classroom. Section three of the survey probed into how frequently the learned concepts or activities are regularly being used in the classroom. As shown in Figure 9, before participating in the Summer Institute, 66% of the teachers “almost never” used engineering-related concepts in the classroom. Only 14% of teachers used the concepts “monthly” or more frequently. Following their participation, only 5% reported that they “almost never” use engineering-related concepts and 47% of Institute Teachers report that they incorporate engineering concepts at least “once a month or more.” However, only 29% indicate that they use the GK-12 activities at least “monthly.” Since the percent response to this usage
frequency is about 20% greater, it indicates that at least some of the teachers use or find engineering-related activities from another source.

![Frequency of Using Engineering-Related Concepts as Reported by Institute Teachers](image)

Figure 9: Frequency of Using Engineering-Related Concepts as Reported by Institute Teachers

Long-term Changes in Teaching. In the fifth section of the survey, the Institute Teachers were asked to respond to the same open ended question as the Teacher Partners: how has participation affected your teaching in the long-term? In their responses, the Institute Teachers had one theme that exceeding the rest; gaining new lesson plans. Responses were received with comments such as “The institute gave very good and relevant experiments for students and the materials to do the experiment. That saved time and made it easier to do the experiments.” Within the lesson-plan themed comments, approximately half of the teachers referred to a specific lesson plan they received from the Summer Institute. Two other themes emerged with 15% or more teachers responding similarly. Teachers reported a new enjoyment or change in teaching with comments such as,

“I am more excited about the concept I am teaching. The kids are more excited about the concepts because they know it will lead to a "cool" lab.”

Others described a new awareness of real-world connections as shown in the following teacher’s statement.

“The institute has made me aware of the different ways to teach the science standards and to increase student participation. Students were not interested in science and had low motivation because they could not apply the standards to the real world.”

As shown in Figure 10, many of the same themes that were reported by the Teacher Partners emerged, with the exception of careers in engineering. None of the other themes had a strong percentage of Institute Teachers responding.
Discussion of Results

The responses from both Teacher Partners and Institute Teachers were similar in some respects and different in others. Both groups considered the potential to increase their content knowledge, improve their abilities with hands-on activities, and learn science education methods the strongest incentives for participation. A large majority of Teacher Partners reported that they were not influenced or only somewhat influenced by the CEU credit and stipends while Institute Teachers had a majority of participants reporting that these were strong and primary influences.

Both sets of teachers reported that the greatest long-term benefit was in the area of content knowledge, however responses varied within the content and knowledge subset. The greatest long-term effect for Teacher Partners was understanding what engineers do, while the greatest long-term effect for Institute Teachers was science content knowledge. All Teacher Partners reported at least a slight improvement in understanding what engineers and scientists do as well as science content knowledge. All Institute Teachers concurred at least a slight improvement only in engineering content knowledge. A noticeably higher percentage of Teacher Partners than Institute Teachers reported that their participation had no effect on their ability to do hands-on activities. It has been suggested that a teacher may not be able to distinguish changes due to program participation versus changes that occur simply from another year of teaching experience, whereas any amount of change that happens in a one-day seminar is easily attributed to participation. A large majority of both groups reported at least an improvement in their enjoyment of teaching math and science and a large majority of Teacher Partners reported an increase in their enjoyment of science.

At least half of each group of teachers affirmed that before their participation in the program, they almost never used engineering-related content in their lessons. Following their participation, all Teacher Partners incorporated engineering-related content, 70% of them, at least monthly. Only a few Institute Teachers still did not integrate the content in their classroom,
and almost half incorporate engineering related activities at least monthly. Both groups report
that they use the activities prepared by GK-12 Fellows less frequently than they are integrating
engineering-related content into their lessons, implying that they are both able to find
engineering activities on their own.

Because of the Institute Teacher’s high marks of improvement and significant improvement
throughout the survey, especially in areas that were not introduced during the Summer Institute,
it was surmised that the survey was a victim of the halo effect by very satisfied teachers. During
exit interviews, Institute Teachers frequently reported that the GK-12 Summer Institute was
much better than other professional development opportunities they had. However, the open-
ended response questions provided an opportunity to receive less dictated responses from the
teacher groups, and it was in this portion that the Institute Teachers’ responses varied the most
from that of the Teacher Partners. The Teacher Partners concurred with 15% or greater in five
areas, while the Institute Teachers only had two.

Almost half of the Teacher Partners reported their greatest long-term teaching benefit as a new
enjoyment or change in their teaching along with four other strong common themes. 60% of the
Institute Teachers reported their greatest long-term teaching benefit as new lesson plans and
approximately half of the comments in this area specifically referred to one or two activities
from the Summer Institute. New lesson plans and activities also emerged as common theme to
the Teacher Partner, yet their comments were not exclusive to any activity in particular.

A cluster of responses from the Teacher Partners conveyed that while they loved the program
when it was active in their classrooms, they were not able to maintain the lessons the Fellows
brought in. The results of this survey do not explicitly state the reason for this misfortune,
however the authors’ experience and discussion with some of the Teacher Partner provides a
potential explanation. Although the GK-12 Fellows are spending many hours in preparation of
new activities for the classroom, many of them are not leaving behind completed lesson plans for
the teachers. Thus, in order to repeat the lessons, the Teacher Partners would have to recreate the
activity or perform it from memory. Additionally, many of the Fellows have reported in their
weekly journals that when they do activities in the classroom, the teacher does not always
participate or pay attention and either grades papers or attends to other administrative duties.
This lapse in awareness of the responsibility each person has in the relationship creates a
weakness in the maximized long-term benefit. The Institute Teachers, however, are taught the
lesson while giving their undivided attention to the Fellows and leave with completed lesson
plans.

Of course, the groups are not entirely independent. Without the Fellows first spending a year in
the classroom with their Teacher Partner, the Fellow’s teaching abilities at the Summer Institute
would be lacking and there would be no pre-tested activities to present. This co-dependent
relationship makes it impossible to presume that the results from the Institute Teachers could be
obtained without the implementation of the year long Teacher Partner Program. However,
because they coexist, the possibility of long-term, broad community impact is in place, but is
executed by two different means.
Conclusion

The results of the preliminary investigation indicate many positive effects of USC’s GK-12 Program on both the Teacher Partners and Institute Teachers, but also raise a number of concerns. Future research should utilize the teachers’ perceived long-term benefits to create a pre- and post-test to more quantitatively evaluate the long-term effect on the two teacher groups. Additionally, plans should be implemented to better communicate the full responsibility of the Teacher Partner / Fellow relationship to avoid the misfortune of the Teacher Partners’ disability to continue using the Fellows’ activities. The authors intend to investigate the actual factors that are enabling or disabling the Teacher Partner from continued use of lessons developed by GK-12 Fellows and how to better enable Institute Teachers to integrate engineering content into their classroom.

Acknowledgement

This material is based upon work supported by the National Science Foundation under Grant No. 0440568.

Bibliography


Engineering in Education in Grades K-12
GK-12 Engineering Fellow's Teacher Partner Survey

Thank you for taking the time to complete this survey. We are trying to obtain feedback from teachers regarding their participation in the GK-12 Engineering Fellows program, and its long term benefits of integrating engineering-related learning in K-12 classrooms. Your responses are valued and will remain confidential. Please return this survey before November 1, 2005.

Jed Lyons, Professor
University of South Carolina
Department of Mechanical Engineering
Columbia, SC 29208

1. Gender:
   - Male
   - Female

2. Teaching Experience:
   - 1 - 2 years
   - 3 - 5 years
   - 6 - 9 years
   - 10 - 15 years
   - 16 - 22 years

3. Educational Background:
   - Associates
   - Bachelors
   - Masters
   - Masters + 30
   - Doctorate

4. What factor(s) contributed to your participation in the GK-12 Engineering Fellow program?

<table>
<thead>
<tr>
<th>Possible Influencing Factors</th>
<th>Did not Influence</th>
<th>Some Influence</th>
<th>Strong Influence</th>
<th>Primary Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received ready-to-use lesson plans</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Improved my ability to do hands-on activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Received college/CEU credit</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Increased my content knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Received a stipend for my participation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Learned more science education methods</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Fax to: (803) 777-0106
Attention: Jed Lyons
OR
University of South Carolina
Department of Mechanical Engineering
Columbia, SC 29208
5. Below is a listing of possible long-term benefits due to your participation in the GK-12 Engineering Fellow program. Please circle the value that indicates how you were affected in each area in the *long-term* due to your participation.

<table>
<thead>
<tr>
<th>Possible Long-Term Benefits</th>
<th>No Change</th>
<th>Slightly Improved</th>
<th>Improved</th>
<th>Significantly Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONTENT AND KNOWLEDGE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science content knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Understanding what scientists do</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Engineering content knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Understanding what engineers do</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Math content knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other:______________________________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>TEACHING STRATEGIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to use real-world applications in the classroom</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Comfort with inquiry based teaching</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Ability to integrate math with science activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Comfort with hands-on science activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Comfort with technology and instruction</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other:______________________________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>ATTITUDE AND RESOURCEFULNESS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of existing resources</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Ability to find resources on my own</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Ability to use the internet to my advantage</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Your enjoyment of science/math</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Your enjoyment of teaching science/math</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other:______________________________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
6. How often have you continued to use lessons or activities created by an Engineering GK-12 fellow in your classroom? (Circle one.)

A. Almost Never  B. 2-3 times per year  C. Monthly  D. 2-3 times per month  E. More than once a week

7. Before you participated in the GK-12 Engineering program, how often did you integrate engineering-related concepts into your lessons? (Circle one.)

A. Almost Never  B. 2-3 times per year  C. Monthly  D. 2-3 times per month  E. More than once a week

8. Since your participation in the GK-12 Engineering program, how often have you integrated engineering-related concepts into your lessons? (Circle one.)

A. Almost Never  B. 2-3 times per year  C. Monthly  D. 2-3 times per month  E. More than once a week

9. I believe that the science standards I am required to teach are supported by teaching engineering-related concepts. (Circle one.)

A. Strongly Disagree  B. Disagree  C. Agree  D. Strongly Agree

10. I believe that the math standards I am required to teach are supported by teaching engineering-related concepts. (Circle one.)

A. Strongly Disagree  B. Disagree  C. Agree  D. Strongly Agree

11. How has your participation in the GK-12 Engineering program affected your teaching of science and/or mathematics now that the GK-12 Fellow is no longer in your classroom?

______________________________________________________________________  
______________________________________________________________________  
______________________________________________________________________  
______________________________________________________________________

12. How has your participation in the GK-12 Engineering program affected your students’ learning of science and/or mathematics now that the GK-12 Fellow is no longer in your classroom?

______________________________________________________________________  
______________________________________________________________________  
______________________________________________________________________
Engineering in Education in Grades K-12
USC Summer Engineering Institute Participant Survey

Thank you for taking the time to complete this survey. We are trying to obtain feedback from teachers regarding their participation in the USC Summer Engineering Institute, and its long term benefits of integrating engineering-related learning in K-12 classrooms. Your responses are valued and will remain confidential. Please return this survey before November 1, 2005.

Jed Lyons, Professor
University of South Carolina
Department of Mechanical Engineering
Columbia, SC 29208

1. Gender: □ Male □ Female
   □ 1 - 2 years □ 3 - 5 years □ 6 - 9 years □ 10 - 15 years □ 16 - 22 years
2. Teaching Experience: □ Associates □ Bachelors □ Masters □ Masters + 30 □ Doctorate
3. Educational Background: □ Did not Influence □ Some Influence □ Strong Influence □ Primary Influence

13. What factor(s) contributed to your participation in the USC Summer Engineering Institute?

<table>
<thead>
<tr>
<th>Possible Influencing Factors</th>
<th>Did not Influence</th>
<th>Some Influence</th>
<th>Strong Influence</th>
<th>Primary Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received ready-to-use lesson plans</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Improved my ability to do hands-on activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Received college/CEU credit</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Increased my content knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Received a stipend for my participation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Learned more science education methods</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
14. Below is a listing of possible long-term benefits due to your participation in the USC Summer Engineering Institute. Please circle the value that indicates how you were affected in each area in the *long-term* due to your participation.

<table>
<thead>
<tr>
<th>Possible Long-Term Benefits</th>
<th>No Change</th>
<th>Slightly Improved</th>
<th>Improved</th>
<th>Significantly Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content and Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science content knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Understanding what scientists do</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Engineering content knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Understanding what engineers do</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Math content knowledge</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other: _____________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Teaching Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to use real-world applications in the classroom</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Comfort with inquiry based teaching</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Ability to integrate math with science activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Comfort with hands-on science activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Comfort with technology and instruction</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other: _____________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Attitude and Resourcefulness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of existing resources</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Ability to find resources on my own</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Ability to use the internet to my advantage</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Your enjoyment of science/math</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Your enjoyment of teaching science/math</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Other: _____________________</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
15. How often have you continued to use lessons or activities that you received from the USC Summer Engineering Institute in your classroom? (Circle one.)

A. Almost Never  B. 2-3 times per year  C. Monthly  D. 2-3 times per month  E. More than once a week

16. Before you participated in the USC Summer Engineering Institute, how often did you integrate engineering-related concepts into your lessons? (Circle one.)

A. Almost Never  B. 2-3 times per year  C. Monthly  D. 2-3 times per month  E. More than once a week

17. Since your participation in the USC Summer Engineering Institute, how often have you integrated engineering-related concepts into your lessons? (Circle one.)

A. Almost Never  B. 2-3 times per year  C. Monthly  D. 2-3 times per month  E. More than once a week

18. I believe that the science standards I am required to teach are supported by teaching engineering-related concepts. (Circle one.)

A. Strongly Disagree  B. Disagree  C. Agree  D. Strongly Agree

19. I believe that the math standards I am required to teach are supported by teaching engineering-related concepts. (Circle one.)

A. Strongly Disagree  B. Disagree  C. Agree  D. Strongly Agree

20. How has your participation in the USC Summer Engineering Institute affected your teaching of science and/or mathematics?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

21. How has your participation in the USC Summer Engineering Institute affected your students’ learning of science and/or mathematics?

______________________________________________________________________
______________________________________________________________________

Page 11.845.22