

2013-2014 Program Evaluation Supplemental Update

STEM Infusion is designed to serve as a professional/career preparation model which employs elementary, middle, and high school teams to train in-service and pre-service teachers to deliver high quality, relevant, interdisciplinary, problem/project based, engaging STEM instruction through technology integration. The evaluation of this design and its implementation focuses on measurements of **1)** student achievement and engagement, **2)** classroom teachers' (client) engagement and resulting professional development, **3)** STEM team job performance and quality of collaborative experiences, and **4)** STEM community engagement, communication, and efforts to plan for sustainability.

This **2013-14 Program Evaluation Supplemental Update** completes the **2013-14 Program Evaluation Report** which was shared with you in September 2014. Throughout this project, we have used our interim and final yearly program evaluations to encourage the project's participants and stakeholders to build on the successes of **STEM Infusion** and implement effective strategies to better meet the goals of the project.

This strategy has been effective in directly communicating with Moore County Schools and providing them with clear recommendations for project improvement. Their successes in implementing the recommendations we provided were clearly evidenced at the classroom/teacher level. The recommendations we provided at the district and community leader levels seemed much more challenging and were met with less success. With three months remaining in the **STEM Infusion** grant period, we are providing those recommendations to you as considerations for future project implementations. Those recommendations begin on Page 8 of this report.

Submitted by Dr. Linda C. Bost, Keith Beamon and Bruce Middleton

March 5, 2015

2013-2014 Evaluation Summary

Student Achievement and Engagement

- End-of-grade results show improvement in student achievement **growth** in classrooms where teachers adopted the **STEM Infusion** approach to teaching and learning in relation to teachers in the same grade level who did not use **STEM Infusion**:

	STEM Infusion Adopters	Non-STEM Infusion Adopters
Science	3.1	-.7
Math	8.6	2.6
Reading	2.6	.7

- Benchmark data from Grade 5 Science indicates a strong correlation between the amount of exposure to **STEM Infusion** lessons and student performance on the benchmark assessments tests. The correlation indicates that students who were exposed to an average of 8 STEM lessons improved their benchmark scores from Test 1 to Test 2 by 25% percentage points while students exposed to an average of 1 STEM lesson showed only a 7.9 percentage gain.
- Gains in student achievement between pre and post-tests for each lesson taught remained high. The average student grade on the lesson pre-test was 49% and the average post-test was 89%. Statistically, the change in student achievement from pre to post-test is extremely significant.
- There is a significant increase in the exposure of students to STEM Infusion lessons in 2013–14:

- 497 lesson presentations have been delivered compared to 109 for 2012-2013, the first year of STEM Infusion implementation.
 - 139 new STEM lessons have been developed this year compared to 40 for 2012-2013.
 - There have been 6711 student contacts made through the delivery of STEM lessons in 2013-2014.
 - The six teachers on the Team have had a total of 6204 contacts with teachers this year. This averages to 1034 contacts per Team member.
- Exit data for 2013 –14 collected from students about the STEM lessons indicate:
 - 94% agree or strongly agree that lessons have been interesting.
 - 84% believe that the lessons caused them to work cooperatively with other students to some degree to a significant amount.
 - 93% believe they would like to do more STEM lessons compared to 83% in the first year of implementation.
 - Exit survey data from the Summer **STEM Infusion** Camp indicated that students who want to participate in the Camp in the future remained at 74%, the same as 2012-2013, however participation numbers increased from 54 in 2013 to 65 in 2014.
 - A computer programming camp for high school students was initiated in the summer of 2014. 10 student (camp cap) began the camp with 8 students completing and receiving high school cred for Computer Programming I. 30% of the students said they had an interest in computer programming as a career at the beginning of the camp but 100% of the students said they were interested in the career at the end of the camp.

- 
- 97% of the client teachers felt the STEM project had success this year, up from 93% last year.
 - The percentage of client teachers indicating they have been involved in lesson plan development with the STEM Team has increased by 7%.
 - 92% of the Client teachers stated that STEM lesson plans addressed the stated objectives of the lesson, up 9% from last year.
 - 83% of the teachers developing lesson plans with the Team indicated they learned at least one new teaching strategy during the experience.
 - 92% of the Client Teachers developing lesson plans with the Team reported the lesson effectively addressed the stated objectives of the lesson, up from 83% last year.
 - 100% of the Client Teachers participating rated the collaboration between themselves and the Team as effective, up from 96% last year.
 - Principals generally agree that more focus on the STEM Infusion project is needed by their administration.
 - A new website was established by the Team to share resources, including lesson plans. The main page of the website received a median of 27.6 hits per day.
 - The Student Teacher role on the STEM Team continues to meet the needs of the student teachers and the expectations of their University Supervisors based on the following feedback from each group:
 - Student teachers felt that the experience was more than what they had originally expected from student teaching.
 - It provided the opportunity to work with more than one teacher, have access to more resources than expected, and have more opportunity for professional development.

- The experience provided broader exposure to the curriculum and provided access to technology that may not have been otherwise available.
- None of the student teachers felt there was something they needed from student teaching that they did not receive.
- The student teachers would like to have seen more organization in the work plan so that there were not so many last minute surprises that pulled the STEM teachers and themselves from their assigned schools. All of the student teachers would recommend that their IHE's continue the partnership with the STEM Infusion Project.
- University student teacher supervisors noted that student teachers in the STEM Infusion program have the opportunity to work with many more teachers than the traditional model. Related to this opportunity is the chance for the student teachers to build their teamwork soft skills. They also have access to many more resources, especially technology, than traditional programs provide.
- University student teacher supervisors also noted that student teachers involved in the STEM Infusion program have more opportunities for professional growth than those in a traditional pre-service program. This is made possible through the additional opportunities to attend state conferences and through the interactions with seasoned teachers.
- University supervisors mentioned very few opportunities for program improvement. All of the University supervisors expressed a desire to

continue the relationship between their IHE and the STEM Infusion project.



- The Community Leaders Group has made significant strides to reorganize and increase its effectiveness. Three subcommittees have been formed to do the work of the Group. Each subcommittee is meeting independently and as a whole at the quarterly Community Leaders meetings. In addition, the chairs of the various committees meet as needed with the Superintendent.
- The three committees report their goals as:
 - **Resources**
 - Small picture goals: Get supplies into the teachers and students hands. talking about a place to store supplies, possibly a warehouse where teachers can access these supplies as needed
 - Big picture: Funding from companies and possibly individuals. grants to help fund materials, utilize the fact that local organizations like to hear a story and have their money go towards a particular project or needed materials, address the need and means for sustainability
 - **Marketing**
 - Need a visual and a story so when the STEM Leaders go out into the community they can give something for individuals to take away from the meeting to remind them what STEM represents.
 - Work on a story and put together a short video to take with them as they visit and speak to different organizations and companies.

- This committee hopes to have the visual branding and video story completed by the April meeting.
- The Marketing Committee designed a MCS STEM Logo to be utilized to publicize STEM infusion in Moore County Schools.
- The Marketing Committee has arranged for several presentations at civic clubs (Kiwanis, Rotary, and Lion's Club).
- **Partnerships**
 - Develop a story to take out into the community about the ATL intern partnership with their successful internship with Pinecrest High School students.
 - This committee wants to create partnerships ready for students to go into as interns.
 - Would like to get internship process started at the other high schools as well and have this done before the April meeting.
 - By April, they hope to have identified more partnerships.
- The Community Leaders Group has reached out to several organizations to provide presentations. However, the only other publicity was an article for the local newspaper about the STEM Infusion project authored by Superintendent Spence.

Recommendations for Future Implementations

Recommendation One: *If one of the expectations of future projects is that a community leaders' group and the school district create and implement a viable plan for the sustainability of the project after the grant period, this plan could be developed and vetted prior to the final awarding of the grant.*

Recommendation Two: *While changes in district leadership are inevitable and those changes may not always have a negative effect on the implementation of a grant, a significant number of leadership changes and those changes which do have a negative effect on project implementation could be articulated in the memorandum of understanding as possible reasons to suspend/discontinue implementation.*

Recommendation Three: *School districts tend to relegate the leadership of project implementation to central office staff members, especially if the project involves more than one school. However, teachers tend to see principals as their leaders, not central office staff. The leadership responsibilities of school principals in the implementation of projects should be clearly articulated to them by the superintendent and principals should be included in all district meetings and trainings necessary for project implementation. Principals should be strongly encouraged to be the site leaders of the project.*

Recommendation Four: *Responsibilities for publicizing the successes of future projects should be relegated to superintendents and their district public relations officers. While community leaders' groups usually have members who have some public relations skills, they generally do not*

have the expertise nor the time necessary to effectively publicize the project. However, a district public relations officer should have both the time and the public relations skills necessary and usually reports directly to the superintendent.

Recommendation Five: *The pre and post testing protocol continues to be a “best practice” in informal, teacher-led efforts to assess student learning and achievement and is a great example of informal assessments which give classroom teachers immediate feedback on student achievement and teacher performance. However, due to continuing changes and perceived unreliability of state testing, teachers and principals tend to discount the importance of collecting and analyzing student achievement data prior to end-of-course/grade results. Sustained efforts to collect and analyze both formal and informal data by teachers and principals participating in projects designed to boost student achievement should be clearly articulated in project designs.*

Recommendation Six: *Social media venues and sites dedicated to a particular project which are created and maintained by participating teachers, principals, students, and parents can be powerful tools to inform and engage stakeholders. Parameters for creation and maintenance of such accounts should be clearly articulated in project designs if they are to be used.*

Recommendation Seven: *While technology has become extremely important in teaching and learning, it is critical to clearly align project goals with the choice of technological devices as well as ensure on-going teacher professional development in the effective uses of the chosen devices.*

Recommendation Eight: *The inclusion of student and beginning teachers in a project does present issues of inexperience. However, if properly supervised by master veteran teachers, teachers new to the profession tend to approach an innovative project with ease and enthusiasm. Depending on the nature of the project, student and beginning teachers can contribute greatly to a project's success and the project can help prepare them for the professional in ways that traditional beginning experiences do not.*

Recommendation Nine: *Summer, internship and extra-curricular opportunities afforded to students and teachers which clearly align with project goals tend to be extremely valuable in engaging all stakeholders in the project.*

Recommendation Ten: *Teachers and principals who are invested in a project tend to assume a high level of accountability for all aspects of project implementation and project fidelity. School districts would do well to empower these teachers and principals to actively participate in project implementation decision-making, especially in the areas of budget.*