

# Professional Development that Changes Teaching and Improves Learning

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Each year school districts invest financial resources in professional development for their educators. Beyond the cost, educators spend countless hours in workshops, training, webinars, and other learning environments intended to enhance and deepen their knowledge and skills to increase student success. Too often the return on this investment is minimal in learning transfer for educators or measurable academic gains for students and maximum in participant dissatisfaction. Substantial research in effective professional development models exists. When applied to professional development, measurable change in the learning process occurs.

In 2015 WakeEd Partnership and Wake County Public School System (WCPSS), North Carolina's largest school system, applied that research to the design of an engaging, results-oriented professional development opportunity for elementary and secondary educators - SummerSTEM. WakeEd Partnership is an education non-profit (501c3) that exists to inform, mobilize and engage the business community in support of strong public schools in Wake County. During its 35-year history WakeEd has differentiated itself as an organization dedicated to supporting educators through professional development and resources. SummerSTEM is a hands-on professional development experience that addresses the needs of educators - adult learners - and brings real-world lessons to the classroom. As part of SummerSTEM, teachers receive seven days of professional development (five in the summer and two in the fall) in project-based learning following the Buck Institute for Education Gold Standard model. Additionally, they are immersed in STEM businesses and industries to experience work processes and workforce development needs. Teachers, who participate as teams of two, remain focused on integrating the components of PBL with lessons learned from their immersion, as they create Project-Based Learning (PBL) units and transform their classroom culture. Throughout the experience they are coached by current WCPSS teachers. SummerSTEM culminates in STEMposium, a public event in which teachers and their students share their PBL outcomes.

## Effective Professional Development

Effective teaching, defined as "instruction that enables a wide range of students to learn" (Darling-Hammond, 2012), is the strongest school-level determinant of student achievement (Hanushek, 2011; Leithwood et al., 2004; Nye, Konstantopoulos, & Hedges, 2004; Rivkin, Hanushek, & Kain, 2005). Teacher professional development that supports effective teaching practices is therefore critically important for improving student learning. Despite this, most professional development programs experienced by teachers involve traditional workshops (Darling-Hammond et al., 2009), which rarely change teachers' practice and have no positive effect on student achievement (Yoon et al., 2007; Bush, 1984).

Research on teacher professional development reveals that while teachers may learn new practices, they rarely apply them to their work. This is often due to lack of support during the implementation stage, including lack of encouragement and guidance when implementing new approaches in the classroom. Thus, professional development must be structured in such a manner that it inspires teachers to change their practice. Research into effective professional development, defined as professional development that changes teachers' practice, reveals the following:

Teachers desire professional development that supports their autonomy, mastery, and purpose. For professional development to be effective, it must be based on research findings about theories of motivation and learning. In his seminal book *Drive* (2009) Daniel Pink identified the three main drivers that cause persons to strive to do their best work: autonomy (the desire to direct one's own life), mastery (the urge to continually improve at something that matters), and purpose (the desire to do what we do in the service of something larger than ourselves).

Ongoing, embedded professional development is needed to ensure learning transfer to practice. Research has shown that only ten percent of teachers can transfer a new skill to actual practice when no additional support is provided. In comparison, embedded support for implementation can result in over 90% of teachers transferring the skills they developed to their practice (Bush, 1984; Truesdale, 2003). Additional research reveals that coaching is one way to successfully change teacher practice (Showers, 1984; Slinger, 2004; Knight 2007; Batt, 2009; Stephens et al., 2007; Knight and Cornett, 2009), including modeling by coaches before teachers attempt implementation (Roy, 2005; Goldberg, 2002; Rice, 2001; Black, 1998; Licklider, 1997).

It takes time for teachers to become comfortable enough with new skills to use them with their students. Studies show that effective professional development programs require anywhere from 30 to 80 hours of instruction, practice, and coaching before teachers master new skills (French, 1997; Banilower, 2002; Joyce & Showers, 2002; Yoon et al., 2007). One-shot or fragmented workshops lasting 14 hours or less show no statistically significant effect on student learning (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009).

Developing content knowledge is particularly important in STEM professional development. Particularly for math and science professional development programs, research indicates that to improve student learning most teachers need to acquire math and science content knowledge as well as pedagogical techniques specific to the STEM content area. (Blank, de las Alas, & Smith, 2008; Heller, Daehler, Wong, Shinohara, & Miratrix, 2012).

Effective professional learning communities support teacher collaboration and changes practice. Structured and focused professional learning communities that support teacher collaboration and risk-taking change teacher practice and increase student achievement (Dunne et al., 2000; Rosenholtz, 1989; Louis & Marks, 1998; Little, 1982). Student success has also been shown to be higher in schools with strong professional communities where collective responsibility, collaboration, and collegiality among teachers are fostered (Little, 1982; Newmann & Wehlage, 1995; Louis et al., 1996; Vescio et al., 2008). Research on teacher collaboration has shown that teachers who collaborate with colleagues are more effective, have higher student achievement (Kraft & Papay, 2014), and are more willing to adopt new practices (Granovetter & Soong, 1983). In addition, teachers improve at greater rates when they work in schools where collaboration is the norm (Ronfeldt et al., 2015).

Administrator support is key to teachers' willingness to change their practices. School administrators are second only to teachers in their effect on student achievement (Leithwood et al., 2004). Their influence can come in the form of instructional leadership, expectations of codes of conduct and climate, and support (verbal, written, financial) for change. Teachers whose administrators support their efforts apply new skills and strategies more frequently than teachers whose administrators do not provide such support. (Showers & Joyce, 1996).

Additionally, many of these tenets are included in Learning Forward's Standards for Professional Learning:

- Learning Communities: Professional learning that increases educator effectiveness and results for all

students occurs within learning communities committed to continuous improvement, collective responsibility, and goal alignment.

- Leadership: Professional learning that increases educator effectiveness and results for all students requires skillful leaders who develop capacity, advocate, and create support systems for professional learning.
- Implementation: Professional learning that increases educator effectiveness and results for all students applies research on change and sustains implementation of professional learning for long-term change.

### **SummerSTEM: By Design**

In a survey of SummerSTEM participants (66 out of 193 for a 33% response rate) from the past two years, 98% reported that they would recommend SummerSTEM to their colleagues. This endorsement is because SummerSTEM represents professional development that is designed with the teacher -- the adult learner -- in mind. Participants come to SummerSTEM in teams of two, representing various disciplines and roles within the school. They must have the foundational skills necessary for effective collaboration. The application process sets the tone for the program's rigor and expectations. The participants must not only receive their principal's endorsement, but must also sign an agreement that outlines the program's requirements: a) attend each of the seven days of the program, b) develop a Project-Based Learning unit, c) present the unit and its impact at the year-end culminating event (STEMposium), and d) share the SummerSTEM and PBL experience with colleagues in at least two formats. Educators are compensated for their time and their work, including stipends for participating in the summer workshop and payment for curriculum development.

SummerSTEM balances structure with learner autonomy throughout the program. Once accepted into the program, teams rank the career clusters they wish to explore. Learner choice is embedded and evident from the start. Career clusters reflect the STEM industries of the host organizations.

SummerSTEM's unique design is apparent from the first day. Participants come to the workshop as teams that have been endorsed by their principals. Their SummerSTEM coaches, who have contacted them prior to the first day, meet with them to create a kind of "advisory group" that will be their anchor placement throughout the eight days of the program. This coach, a master teacher from WCPSS, has successfully implemented PBL and coached others to do the same. The coaches guide participants throughout the program; since they are colleagues and teacher leaders, they cultivate authenticity and credibility with the teachers.

On Day 1 of SummerSTEM, teachers self-identify their level of PBL design skill: novice, proficient, or advanced. This creates opportunities for all learners to develop mastery in new areas. Teachers do not have to participate in this portion of the program with their teammate. SummerSTEM coaches facilitate leveled PBL workshops throughout the week when participants are not immersed in a STEM industry experience, a total of 2.5 days of professional development.

In the novice session, the coach's approach combines inquiry with didactic instruction to teach the essential project design elements of the Buck Institute Gold-Standard PBL process: Challenging Problem or Question; Sustained Inquiry; Authenticity; Student Voice and Choice; Reflection; Critique and Revision; and Public Product. The goal is for novices to understand the PBL components at a knowledge level. They will apply this knowledge as they continue their work with their teammate during the school year. The proficient workshop builds on the PBL framework, with focus on specific challenge areas, like classroom culture, the "messy middle," developing collaborative teams, project and process management, and other topics that are sourced from the participants' level of understanding and experience with PBL. The goal is for participants to improve areas of their practice that have

challenged them in prior PBL experiences. The coach provides didactic instruction and one-to-one support based on areas of need. Finally, the advanced session functions as a seminar, with participants sharing problems of practice in their work with PBL that the “community of learners” who are present explore with them. At this level, the coach functions as a facilitator for the group. Throughout the week, participants may alter their perceived skill level with PBL and move between the differentiated groups.

Professional learning, pedagogy, child development, classroom culture, are the standard areas for educator professional development. SummerSTEM’s industry immersion experience brings the unexpected to the program. Each team participates in 2.5 days of STEM immersion. Host business/organization sites structure their immersion with the PBL cycle in mind. They integrate information about their core business, workforce development, and talent pipeline needs with hands-on engagement, thus providing teachers with experience in problem simulation and professional processes essential to the site’s daily operations. Teachers engage with diverse employees, who are subject matter experts, from across the business, gaining insight into the knowledge, skills, attitudes, and aptitudes students need.

In addition to the industry immersion experience, educators spend a half-day in a community college class that aligns with the career cluster. This experience serves many purposes, including broadening educators’ understanding of the value and resources of technical post-secondary programs. Educators benefit from exploring the certificate, diploma, and degree programs of high-need career areas. The immersion also provides teachers with an opportunity to do the work that is required in these applied STEM fields. This demonstrates to teachers the need for all students to understand math and science and to develop the essential skills of collaboration, critical thinking, communication, and creativity.

Embedded in the two and half days of professional development participants are provided blocks of time to work with their school teams to process and synthesize their pedagogical growth as well as the “nuggets” gained from their immersion experience. Their coaches, who have participated with them in the industry immersion, support their leap from immersion to PBL unit development. The coach’s goal for each team is the successful design and implementation of a PBL unit that may be submitted to the school district’s curriculum warehouse for use by all WCPSS educators.

The SummerSTEM five-day experience serves as a launch for teachers’ development of a PBL unit. During the academic year, the coach supports their efforts. Essential to teachers’ success is the addition of two professional development days, spaced one month apart, during the first semester of the school year. These days re-ignite educators’ passion for PBL, provide additional learning opportunities, and, most importantly, include dedicated time for them to continue developing their PBL unit. Educators can experiment with their PBL unit while receiving coaching; they are encouraged to review and revise their work to best support student proficiency and learning transfer, key components for impactful professional development.

SummerSTEM culminates in STEMposium, a public display of the impact of the immersion experience and the integration of teachers’ PBL units with their classes. Educator and student representatives meet with colleagues and community leaders and provide them testimony about the program’s effectiveness. Students are the real evidence of SummerSTEM’s impact and, most frequently, it is the students who act as spokespersons for SummerSTEM’s success.

Teachers devote 65–75 hours to the SummerSTEM learning process. The combination of differentiated instruction, coaching, and engaging experiences along with the requirements of presenting a high-impact unit lead

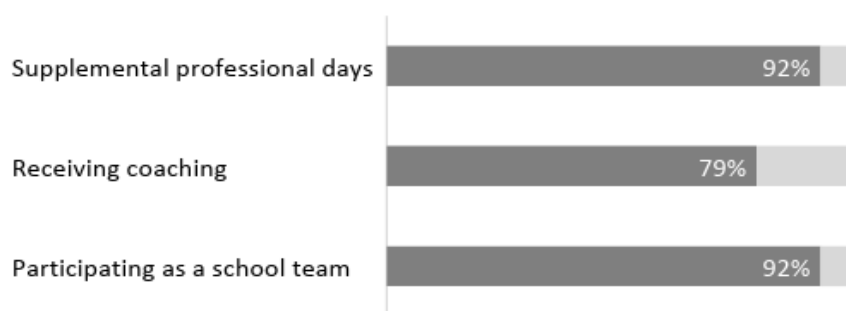
to the sustained interest, engagement, and enthusiasm necessary for successful professional development. Thus, actual learning transfer occurs.

### SummerSTEM and Best Practices in Professional Development

The table below outlines best practices in teacher professional development as identified through research and explains where SummerSTEM reflects these best practices.

Best Practices	SummerSTEM
Supports teachers' autonomy, mastery, and purpose	<ul style="list-style-type: none"> <li>Provides teachers with the opportunity to develop PBLs on a topic of interest to them and with the support of a STEM host.</li> </ul>
Incorporates active learning	<ul style="list-style-type: none"> <li>Teachers immerse in STEM businesses and community college simulations as they work in pairs to develop materials, videos, etc. related to their PBL.</li> </ul>
Uses models of effective practice	<ul style="list-style-type: none"> <li>PBL is a dynamic student-centered instructional approach whereby students gain deeper knowledge through exploring real-world problems.</li> </ul>
Provides coaching and expert support	<ul style="list-style-type: none"> <li>Select colleagues who have graduated from SummerSTEM lead the professional development and provide ongoing support as coaches.</li> </ul>
Offers feedback and reflection	<ul style="list-style-type: none"> <li>Teachers are provided time to reflect on how to improve their PBL to ensure greater student learning. Coaches offer guidance throughout the process.</li> </ul>
Is ongoing and embedded	<ul style="list-style-type: none"> <li>Teachers spend five days in the summer and two days in the fall working with coaches on their PBLs.</li> </ul>
Provides time for teachers to develop new skills	<ul style="list-style-type: none"> <li>Across the seven months/ 56+ hours of formal support, teachers learn how to develop and implement effective PBLs.</li> </ul>
Develops teachers' content knowledge	<ul style="list-style-type: none"> <li>Teachers' immersions with STEM organizations support new learning and skill development.</li> </ul>
Supports learning communities / teacher collaboration	<ul style="list-style-type: none"> <li>Teachers work in pairs as part of a larger learning community.</li> </ul>
Is supported by administrators	<ul style="list-style-type: none"> <li>As part of the application to Summer STEM, administrators submit a Principal's Endorsement, in which they commit to providing time for teacher collaboration and coverage for professional development. In addition, administrators create opportunities for teachers to share their SummerSTEM experience and PBL with faculty through Professional Learning Teams (PLTs) and teacher-led professional development.</li> </ul>

Participants reported that SummerSTEM’s design positively contributed to their overall experience. Over 90% of participants reported that supplemental professional days and participating as a school team positively affected their experience and 79% indicated that receiving coaching positively affected their experience. As one teacher reported, “Time is always a limited resource in the world of teaching. Having that time set aside for us to devote to our PBL units was awesome. Also, being able to come together with the other SummerSTEM members was helpful because we were able to share our ideas and utilize each other.” Another explained, “I think that one of the issues with PD for teachers is that there is never any built-in time to reflect, ask questions, get feedback, or start implementing what you learned. SummerSTEM was amazing because it included time to work on your unit, time with coaches to ask questions or get clarification, and time to talk with other teachers/groups to get feedback and other opinions. I think the extra days were a part of making this so successful!” Summarily, teachers know their content and they “make the leap” from their SummerSTEM experience to their classroom, their colleagues, and their schools.



A review of SummerSTEM’s design further reveals that it supports a variety of essential teaching standards linked to Standard IV of North Carolina’s Teacher Evaluation Rubric (a copy of which is included in the Appendix). Standard IV: Teachers Facilitate Learning for Their Students includes the following subcomponents:

- Teachers know the ways in which learning takes place, and they know the appropriate levels of intellectual, physical, social, and emotional development of their students.
- Teachers plan instruction appropriate for their students.
- Teachers use a variety of instructional methods.
- Teachers integrate and utilize technology in their instruction.
- Teachers help students develop critical thinking and problem-solving skills.
- Teachers help students work in teams and develop leadership qualities.
- Teachers communicate effectively.
- Teachers use a variety of methods to assess student learning.

SummerSTEM supports appropriate instructional planning using a variety of methods and incorporating technology under the framework of Project-Based Learning. Students’ critical thinking, problem-solving skill, and leadership skills are developed through Project-Based Learning as they collaborate to answer the overarching question. As part of SummerSTEM, teachers develop plans for formative and summative assessments of students’ understanding and learning and use these data to review and improve their PBL lessons.

## Evaluation of SummerSTEM

To evaluate SummerSTEM, EvalWorks, a local firm with experience evaluating national/federal, state, and local STEM initiatives conducted surveys, focus groups, and teacher and student interviews to understand impacts.

Evaluation questions were designed to determine teacher development in the four levels of professional impact identified by Kirkpatrick (1994): Reaction (how participants perceive the professional development), Learning (the extent to which professional development has improved knowledge and/or skills), Behavior (the extent to which those who received the professional development have changed their behavior because of what they learned in the professional development), and Results (the impact of participants' behavioral changes due to the professional development). Using this model as a framework, the evaluation of SummerSTEM sought to understand the degree to which participants believed that the professional development was relevant, meaningful, useful, and worthwhile; the degree to which participants learned how to develop and implement PBL units (or improve their development and implementation of PBL units); the degree to which participants developed and implemented PBL units or other activities/methods they learned related to PBLs in the interim; and the impact of implementation of PBL units on students' engagement, understanding, and achievement.

The evaluation utilized a mixed-methods concurrent design, giving equal priority to both quantitative and qualitative methods (Creswell, Plano Clark, Gutmann, & Hanson, 2003). A mixed-methods approach to conducting evaluation is different from using multiple methods or a combination of methods in that data from one type of method (quantitative or qualitative) is merged, connected, or embedded with data from the other type of method (Creswell & Clark, 2006). The study's quantitative and qualitative methods occur simultaneously and are assigned equal weighting in the interpretation of findings.

### SummerSTEM: Teacher Impacts

At the conclusion of SummerSTEM, participants are asked to indicate the degree of impact their SummerSTEM experience had on such areas as instruction, collaboration with colleagues, views about themselves as teachers and teacher leaders, and the degree to which they have assumed new responsibilities. They also rate the changes they have seen among their students. Ratings are on a 5-point scale as follows: Very Small, Small, Moderate, Large, and Very Large. Two years of data have been collected thus far.

The percentage of SummerSTEM participants that reported that SummerSTEM had changed their instruction and increased their collaboration to a large or very large degree was 83% and 79%, respectively.



Participants also reported that their business immersion experience and the program's coaching helped them identify new ways to strengthen their role as facilitator, thus engaging more students and supporting them to take responsibility for their own learning. As one teacher shared, "This PBL unit opened a door for our 3rd graders and one was offered a scholarship to attend a summer camp at the Arboretum. This student comes from a low-income family and would not have been able to attend without this program. PBL and SummerSTEM has taught teachers to network and take advantage of what the community has to offer. This experience may change this child's

whole future for the better. “

Comments by educators on SummerSTEM’s impact include the following:

“The information presented at SummerSTEM empowered me with processes, procedures, and protocol to effectively lead my students and team through PBL creation and implementation.”

“SummerSTEM has motivated me to empower a global approach and leadership skills with my students. It has also inspired me as an educator to motivate others in my profession!”

“I cannot stress enough how this experience was truly amazing and cannot wait until next year to see what my students come up with. My students owned this experience and as their teacher I was humbled by their actions. Please continue projects like this because it makes the content relevant and the students are actively engaged.”

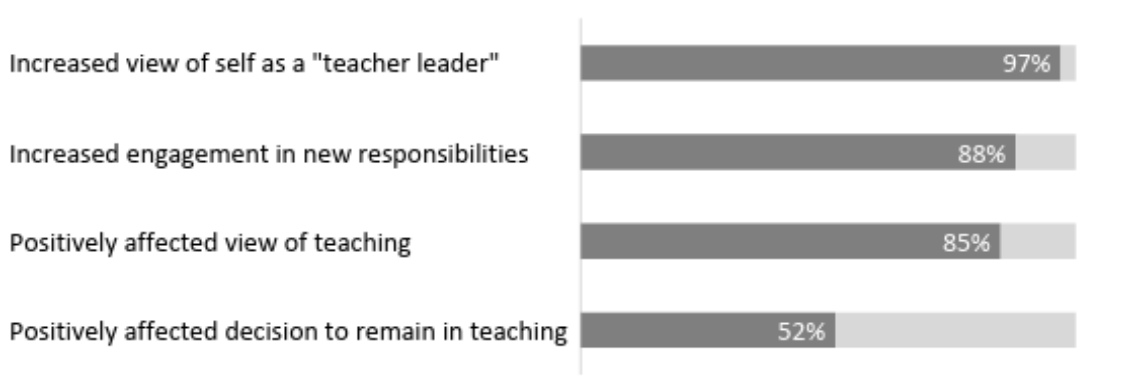
“I have written a grant to help with other PBL opportunities within the school. I have also worked to get other teachers in our school to try PBL or participate in more PBL professional development.”

“SummerSTEM empowered me to be a teacher that is willing to take risks for her students. Giving students creative freedom and choice in a project, instead of the traditional teacher-leads-everything, allowed them to grow in a way I didn't realize was possible.”

“I now have knowledge of the types of jobs available to my students and the skills needed to perform them. I make links to my kids ALL the time now. Even though they are elementary students, I try to plant the seed for possible jobs for the future based on their talents and interests.”

“Many other teachers in our school have inquired about PBL experiences. Several have asked to attend next year's SummerSTEM training.”

97% of teachers indicated that participation in SummerSTEM largely or very largely increased their view of themselves as a teacher leader, 88% indicated that they had taken on new responsibilities, and 85% indicated that SummerSTEM had positively affected their view of teaching to a large or very large degree. For over half of participants, SummerSTEM had a large or very large positive effect on their decision to remain in teaching.



Following are several exemplary comments:

“I really enjoyed the process of it all. With the students, teachers, community and specialists and anyone else that was involved. It just shows that this profession is ever changing and ever growing



which just makes me want to stick around to see what will happen next!”

“Sometimes as the years go by, you wonder if you really make a difference in our students’ lives. This experience validates why we do what we do. I know I make a difference as a teacher and hope to continue to inspire on a daily basis.”

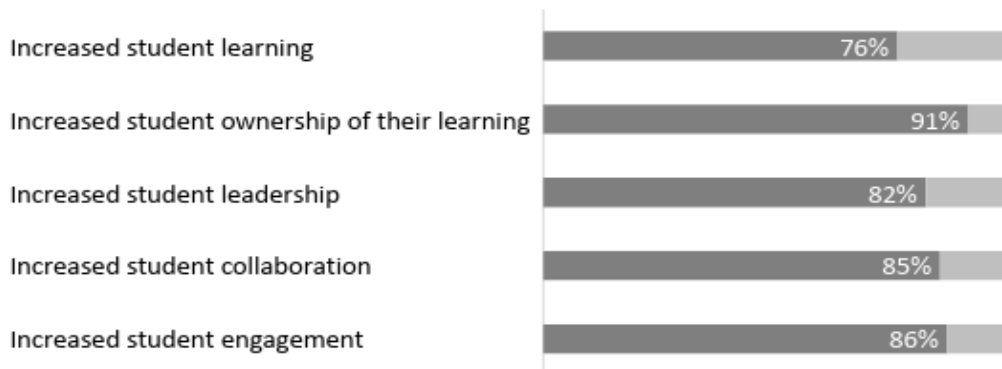
“Knowing that companies are willing to volunteer time and resources to my classroom helps me believe that what I'm doing is important.”

“SummerSTEM helped me to see the "bigger picture" that lies before our students in terms of their future. I now better understand that I need to plan and facilitate tasks that allow students to build soft skills to use in their future professional lives.”

“I have enjoyed the freedom of choice my students have to explore the world around them. They feel more confident about their learning and I feel like more like a facilitator and less like the only decision maker in the classroom.”

### SummerSTEM: Student Impacts

Over three-quarters of SummerSTEM participants reported that SummerSTEM had a large or very large impact on students’ learning, engagement, collaboration, and leadership, with over 90% indicating that it had a large or very large impact on the degree to which their students took ownership of their learning.



Participants cited the following as evidence for their agreement to the above statements:

- Student projects /products resulting from PBL (91%)
- Student oral presentations demonstrating deeper understanding of core objectives and content (67%)
- Student or class completion of assignments (65%)
- Student performance on teacher-made assessments, including formative and summative assessments (58%)
- Student performance on standardized assessments (20%)

### SummerSTEM: A Model for Effective Teacher Professional Development

“I thoroughly enjoyed my SummerSTEM experience. The coaches who helped were extremely supportive. The program was SUPER organized and well thought out. I enjoyed the support of the community / business and being able to experience a day in the life of a scientist, etc.--a field trip

for teachers! Mostly, I appreciate that I was able to apply what I had learned to my teaching!”

The structure of SummerSTEM (differentiated professional development, team collaboration time, use of PBL coaches) is critical to its success. The time for collaboration and reflection, especially the professional development days during the school year, was highly valued. SummerSTEM participants used the business immersion as a catalyst for developing appropriate and effective PBL units, and for understanding the knowledge, skills, and behaviors employers are seeking in potential employees.

“SummerSTEM was a fantastic experience. Networking with the professionals at the various businesses and learning about the Scrum project management style has broadened my knowledge about current real-life opportunities. It has transformed the way that I introduce, implement, and manage student projects. It was also refreshing and rejuvenating for me personally, which translates to putting more excitement and energy into my craft.”

As a result of developing their PBL units, teachers increased their collaboration with others and changed their classroom practices. Many participants indicated that they saw themselves increasingly as teacher leaders, which led them to take on new responsibilities and roles, and positively affected not only their view of teaching, but also, for over half of the participants, their decision to remain teaching. The PBL units benefitted students by increasing their opportunities to collaborate and lead, and, as a result, encouraging them to assume greater ownership of their learning. Taken together, findings are that SummerSTEM is a model for effective teacher professional development that positively impacts students by changing teachers’ practices and mindsets.

“Thank you for this career changing experience. I have completely revived my instructional methods and have a renewed passion for a job that I already loved.”

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## Appendix A

### Standard IV: Teachers Facilitate Learning for Their Students

***Teachers know the ways in which learning takes place, and they know the appropriate levels of intellectual, physical, social, and emotional development of their students.***

Teachers know how students think and learn. Teachers understand the influences that affect individual student learning (development, culture, language proficiency, etc.) and differentiate their instruction accordingly. Teachers keep abreast of evolving research about student learning. They adapt resources to address the strengths and weaknesses of their students.

- Know how students think and learn
- Understand the influences on student learning and differentiate instruction
- Keep abreast of evolving research
- Adapt resources to address the strengths and weaknesses of students

#### **Teachers plan instruction appropriate for their students.**

Teachers collaborate with their colleagues and use a variety of data sources for short- and long-range planning based on the North Carolina Standard Course of Study. These plans reflect an understanding of how students learn. Teachers engage students in the learning process. They understand that instructional plans must be constantly monitored and modified to enhance learning. Teachers make the curriculum responsive to cultural diversity and to individual learning needs.

- Collaborate with colleagues
- Use data for short- and long-range planning
- Engage students in the learning process § Monitor and modify plans to enhance student learning
- Respond to cultural diversity and learning needs of students

#### **Teachers use a variety of instructional methods.**

Teachers choose the methods and techniques that are most effective in meeting the needs of their students as they strive to eliminate achievement gaps. Teachers employ a wide range of techniques including information and communication technology, learning styles, and differentiated instruction.

- Choose methods and materials as they strive to eliminate achievement gaps
- Employ a wide range of techniques using information and communication technology, learning styles, and differentiated instruction

#### **Teachers integrate and utilize technology in their instruction.**

Teachers know when and how to use technology to maximize student learning. Teachers help students use technology to learn content, think critically, solve problems, discern reliability, use information, communicate, innovate, and collaborate.

- Know appropriate use
- Help students use technology to learn content, think critically, solve problems, discern reliability, use information, communicate, innovate, and collaborate

#### **Teachers help students develop critical thinking and problem-solving skills.**

Teachers encourage students to ask questions, think creatively, develop and test innovative ideas, synthesize knowledge and draw conclusions. They help students exercise and communicate sound reasoning; understand connections; make complex choices; and frame, analyze, and solve problems.

#### **Teachers help students work in teams and develop leadership qualities.**

Teachers teach the importance of cooperation and collaboration. They organize learning teams in order to help students define roles, strengthen social ties, improve communication and collaborative skills, interact with people from different cultures and backgrounds, and develop leadership qualities.

- Teach the importance of cooperation and collaboration.

- Organize learning teams in order to help students define roles, strengthen social ties, improve communication and collaborative skills, interact with people from different cultures and backgrounds, and develop leadership qualities

**Teachers communicate effectively.**

Teachers communicate in ways that are clearly understood by their students. They are perceptive listeners and are able to communicate with students in a variety of ways even when language is a barrier. Teachers help students articulate thoughts and ideas clearly and effectively.

- Communicate clearly with students in a variety of ways
- Assist students in articulating thoughts and ideas clearly and effectively

**Teachers use a variety of methods to assess what each student has learned.**

Teachers use multiple indicators, including formative and summative assessments, to evaluate student progress and growth as they strive to eliminate achievement gaps. Teachers provide opportunities, methods, feedback, and tools for students to assess themselves and each other. Teachers use 21st century assessment systems to inform instruction and demonstrate evidence of students' 21st century knowledge, skills, performance, and dispositions.

- Use multiple indicators, both formative and summative, to evaluate student progress
- Provide opportunities for self-assessment § Use assessment systems to inform instruction and demonstrate evidence of students' 21st century knowledge, skills, performance, and dispositions.

**About the Author**

Amy A. Germuth leads EvalWorks which evaluates STEM and other education projects.