

Theory and Implementation of an Innovative Teacher Professional Development Program

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U.S. teachers have less time to plan, collaborate, and research related work in comparison to teachers in competing countries (NECTL) and time is needed for teachers to learn new skills, understand new concepts, and to integrate new ideas into their practice (Corcoran, 1995). The MSUrbanSTEM Teaching and Leadership Fellowship program is a professional development program that works with a selected group of K-12 STEM teachers in the Chicago Public School system. This untraditional program tackles the issues of teachers needing more time to learn new skills and integrate them into practice by using one academic year to develop teachers

in four ways: (a) Inspiring teachers to embrace an Deweyian educative experience to teaching, (b) encouraging an unorthodox approach and lens to teaching and learning, (c) creating supportive teaching communities, and (d) expanding teacher pedagogical practices with technology and creativity. These four theoretical frameworks make up the overall philosophy that grounds the MSUrbanSTEM program while always considering the challenges, benefits, and unique customs of urban context that the teachers work. This article also includes some reactions of some of the participating fellows, expressing what they learned from this program and how it inspired them or altered their view.

Keywords: Urban education, teacher education, educative experience, TPACK, transformative learning, proximity to practice, communities of practice, teacher professional development.

TEACHER PROFESSIONAL DEVELOPMENT CONTEXT

In 2005, the National Education Commission on Time and Learning (NECTL) reported that U.S. teachers have less time to plan, collaborate, and research related work in comparison to teachers in competing countries. Moreover, traditional school schedules do not include time for teachers to work with or observe colleagues, engage in research, learn and practice new skills, develop curriculum, or engage in professional reading. To meet these expectations, teachers need the time to learn new skills, understand new concepts, develop new attitudes, reflect, and integrate new ideas into their practice (Corcoran, 1995; Troen & Bolles, 1994). This is important so that teachers can be effective in teaching and developing their students. This makes the careful design and implementation of teacher professional development programs (PD) critical and it encourages PD to be dynamic in developing an array of skills in a teacher. A PD experience that can help teachers meet their long list of expectations will have to be concentrated, continuous, and classroom centered. A PD with these elements is more likely to improve teacher knowledge and classroom instruction (Wayne, Yoon, Zhu, Cronen, & Garet, 2008), therefore improving learning and growth for students.

Guskey (1995) states that in order to have the most impact on teaching and learning, PD must be designed to meet the needs of particular teachers in particular settings, additionally, PD should be integrated in the daily work

of teachers (Joyce & Showers, 2002). Finally, providers of PD often lack capacity to provide support in an ongoing basis and lack resources to address all stages of career development (Corcoran, Shields, & Zucker, 1998; Garet, Porter, Desimone, Birman, & Yoon, 2001). “Teacher professional development is more than a series of training workshops, institutes, meetings, and in-service days. It is a process of learning how to put knowledge into practice through engagement *in practice* within a community of practitioners” (Schlager & Fusco, 2003, p. 205). Schlager & Fusco (2003) use the premise that trainings tend to pull teachers from practice where they learn information about the practice but do not put the practice into play. They address this issue by using online communities to complement in-person professional development. An online community creates a community of practice which a rich learning environment for educators. (Brown & Duguid, 2000, p. 127)

Despite the years of research and recommendations, PD still falls short (Zaslavsky & Leikin, 2004; Zepeda, 2012; Gersten, Taylor, Keys, Rolffhus, & Newman-Gonchar, 2014). In a report by the Gates Foundation (2014) majority of teachers do not believe that PDs help them prepare for the natural changing environments of their jobs. This includes a lack of preparation for technology use, analyzing student data, and differentiating instruction. Moreover, teachers want more structured collaboration time and are most satisfied when the PD can impact their day to day teaching. In addition, coaching, along with active learning techniques has been shown to expand teachers’ pedagogical practices (Gates Foundation, 2014).

The MSUrbanSTEM program is well aware of the research and recommendations and aims to address these issues. The MSUrbanSTEM program specifically focuses on the needs of teachers who face the specific challenges of being in urban community and teaching STEM subjects. The program is structured to provide a yearlong PD experience (as opposed to a one-off seminar or “sit and get” workshops.) Teachers are not only supported financially (with full tuition and stipend) but also with 1:1 mentoring support from program faculty, not only during the program, but beyond the experience as well. All of these supports coalesce to make the MSUrbanSTEM program a unique and effective PD experience.

This MSUrbanSTEM Fellowship program specifically guides the fellows to repurpose technologies (physical and digital) in classroom and educative settings. Additionally, the MSUrbanSTEM program uses the power of experience (Dewey, 1938) to develop the capacity of classroom teachers to design transformative and innovative, multimodal instructional experiences and active learning communities of practice – all as means of enhancing the

quality of instruction in the STEM disciplines. In this article, we situate our work within the context of teacher professional development, describe the theoretical roots that drive the program, describe how our framework is realized in the delivery of the program, and share supporting evidence via reflections from the teacher participants

The Wipro MSUrbanSTEM Leadership Fellowship program was the result of years of ongoing discussion and relationship building between a global IT company (Wipro) and Michigan State University (MSU). Wipro has a strong history of commitment to education, primarily in India, and was seeking to expand its work into the United States due to its large and growing footprint in the USA. Michigan State is a land-grant institution and has a commitment to both public schools and urban education. In time, Chicago Public Schools (CPS), the third leg of this partnership and one of the largest school districts in the country, emerged as a key partner in this process due to existing partnerships with Michigan State University.

In this article we provide:

1. The theoretical frameworks underpinning the MSUrbanSTEM experience
2. Explore Create Share - how the frameworks combine & are experienced by MSUrbanSTEM students
3. How the fellows reflect on the experience

MSUrbanSTEM Theoretical Frameworks

There are four major theoretical frameworks that support the MSUrbanSTEM experience (a) Dewey, (b) transformative learning, (c) communities of practice, and (d) TPACK (technological pedagogical content knowledge).

Dewey's Experience and Education. It is common in education to approach learning with the idea that one thing is the problem, and one thing is the solution, not realizing that we should take all solutions and approaches into mind when addressing any single or many problems. It is easy to focus on one issue or one method and nothing else. John Dewey however, claims that we will not fix our problems until we accept that all of the methods are a part of the larger puzzle (Dewey, 1902). The MSUrbanSTEM curriculum adopts John Dewey's approach, encouraging our fellows to tackle the educative experience and teaching process from different angles and views. Additionally, this program expands teacher skills and knowledge by having

them design innovative experiences and by encouraging them to engage in deep thought and wonder.

According to John Dewey, experience is the essence of learning. Reading informational text, watching “how to” videos, and listening to lectures all can serve as a form of teaching material to a student. John Dewey believed that such approaches are limited in ability to teach content and cannot sufficiently take the place of the actual experience of the student doing the activity for him or herself. The MSUrbanSTEM program wants its fellows to adopt this philosophy and take it into their individual classrooms so the MSUrbanSTEM program does not just teach pedagogical practices, but encourages fellows to employ pedagogical practices using the power of experience (Dewey, 1938).

Dewey’s notion of *proximity to practice* underlines the importance of the knowledge of the learner. In the case of a teacher PD, the learners are the teachers and the knowledge that the teachers bring to the PD program is just as important as the knowledge that the MSUrbanSTEM instructors bring to the program. This is inspired by John Dewey’s views of learning but these ideals encourage the teacher/instructor to respect the learner/student and to always take into mind the culture, practices, prior knowledge, and needs of the learner/students. This framing opposes the idea that the teacher knows all and the idea that students must catch up with teacher.

It is important to note not all experiences are educative in nature. An educative experience needs both the student and the curriculum to interact in a real-life scenario for the student, or child in the words of Dewey, to grow and learn. Moreover, the subject matter must be developed to fit in the range or scope to that of the child’s life and past experiences (Dewey, 1902). Even within the hands-on experience, the student must be able to relate to what they are learning. The MSUrbanSTEM program follows the ideals of Dewey while also embracing the potential failures and adversities that come along with doing the hands-on learning.

Transformative Learning Experiences. A transformative learning experience is the process of making change in one’s frame of reference (Mezirow, 1997). The MSUrbanSTEM program works with teachers to look at content in new ways so that they can teach in new ways. Inspiring a new lens also allows for teachers to look at leadership in a new way, and to look at tools in their environment differently all so it can be used as a resource to support the teaching and learning process.

The MSUrbanSTEM program promotes a PD frame of mind that assumes confusion, uses various theoretical perspectives, is tentative in application, subscribes to a belief in deconstructing and questioning what one

thinks is fact, and is driven more so by the practices of the teacher who is in the trenches of teaching and learning. This approach counters the traditional frame of teacher PD, which assumes that a facilitator knows all and that they are imparting their knowledge of 1 or 2 strategies onto the teacher and then teachers practice the same method with their students. This is a generalization, but rarely does existing teacher knowledge come into play in traditional PD. This counters how we approach teaching and learning and counters the idea that the teacher should have one strategy, which all students should adapt to if they wish to be successful. Such a different frame of mind alters goals and expectations of both students and teachers.

Communities of Practice. Jean Lave and Etienne Wenger coined the term *communities of practice* in their discussion on situated learning and the legitimate peripheral of participation. Communities of practices as perceived by Lave and Wenger (1991) are “groups of people who engage in a process of collective learning in a shared domain” (p. 117). The learning that takes place in this context is not intentional which means that learning can be a reason the community comes together or an incidental outcome of the member’s interactions.

This definition has three embedded components within it: (1) the domain, (2) the community, and (3) the practice. The domain is defined by a shared interest between the members of that domain who have a shared competence that distinguishes them from other people. To become a member of a domain one does not need to be recognized as an expert outside the community or domain. The members value their collective competence and learn from each other, even though few people outside the group may value or even recognize their expertise. When these members build relationships that enable them to engage in critical discussions, help each other, share information, and learn from each other, they are working as a community. Unless people, who share a job title, a job, or work together, interact and learn together, they do not form a community a practice. The members of a community of practice are people who develop a shared “repertoire of... experiences, stories, tools, ways of addressing recurring problems – in short a shared practice” (p. 121). These communities of practice are a “familiar experience”, which escapes our attention unless otherwise brought into perspective (Lave & Wenger, 1991, p. 121). As these communities of practice are brought to focus it helps us understand our world better and allows us to perceive the structures defined by engagement in practice and the informal learning that comes with it.

The MSUrbanSTEM program, through its innovative teaching approach, promotes the teachers to collaboratively work towards developing

shared communities of practices with people who share similar interests in their domain. This is achieved by bringing together teachers that the instructors and the teachers themselves feel share similar interests, experiences, and ideas, to work towards achieving their individual and shared goals. Throughout the program they share their knowledge to form a collective meaning of their shared experiences and knowledge. Hence, over the course of the program and as a result of all these conversations they have developed set of stories and cases that have become a shared repertoire for their practice.

TPACK. TPACK or, Technological Pedagogical Content Knowledge, is a conceptual framework for educational technology (Mishra and Koehler, 2006) that promotes teachers' creative integration of technology into classroom practice, based from Shulman's "pedagogical content knowledge." TPACK focuses on three major components of teaching which are content (subject matter), pedagogy (method of teaching), and technology (tools that enhance learning). While it is important for teachers to have strong knowledge of their content and to know effective pedagogical practices, TPACK invites the importance of teachers' knowledge of technological tools that can be used within the classroom, then focuses on the interaction and affordances of all three components (Mishra & Koehler, 2006). Therefore, content knowledge, pedagogical knowledge, and technological knowledge do not work alone, but teachers' knowledge of technological content (TCK), knowledge of pedagogical content (PCK), and knowledge of technological pedagogies (TPK) all conceptually make up the TPACK of teachers. This framework originated from the rapid development of new technologies that are used in our everyday lives but are not developed specifically for classroom learning (Koehler & Mishra, 2008). TPACK encourages the creative use of these everyday technologies (e.g., blogs, smart boards, Youtube, GPS, etc.) within the classroom, which require teachers' willingness to grow in both technological knowledge and technological pedagogical knowledge.

The MSUrbanSTEM program encourages the use of digital and networked media in teacher pedagogy. Integrating technology into the academic environment requires skills and creativity from the teachers' TPACK (Mishra & Koehler, 2006). With appropriate and effective uses of technology in classroom settings being deemed as an important issue in education (U.S. Department of Education, 2010), the MSUrbanSTEM program addresses this issue by developing the information literacy skills of teachers.

It is crucial to highlight that TPACK does not exist without the sensitivity to the *context*. A teacher's pedagogy should shift depending on the needs of her/his students and circumstances within the learning environment. Be-

ing that our country depends on scientific and technological innovation for the stability of our economy and national security, it is crucial that educators support learning in science, technology, engineering, and mathematics (STEM) disciplines (Espinosa, 2009). Also, CPS is the third largest school district in the nation with 664 schools serving 394,000 students. To support the district's 22,500 teachers, Chicago Public Schools engages partners with proven success records to provide professional development aimed at increasing the student achievement for all learners. An exemplary model of such collaboration is the MSUrbanSTEM program in which CPS and MSU work together to identify, recruit, and support STEM teachers in this one-year graduate certificate program grounded in the context of this large urban district.

MSUrbanSTEM & Chicago public schools. Specifically, the Chicago urban School setting is similar to many large urban districts, and is presented with numerous challenges in the pursuit to offer all types of students with high-quality opportunities to engage in learning. This is especially true when engaging students in STEM related instruction where cultural, racial, economic, and gender divides are ever present. Some of the challenges that exist both outside and inside of the classroom include poverty, transience, socio-political forces, punitive behavior management, poor teacher preparation, and underfunded teacher training and induction. Ultimately, these factors combine into a heavy weight bearing down on our most under-represented students' shoulders, preventing them from learning, opportunity, and success beyond K-12 education.

The MSUrbanSTEM program responds to these divides and challenges by working with CPS to identify successful teachers working in under-served schools to improve their instruction thus breaking down barriers, especially with minorities and girls, and allowing students equal opportunity to explore STEM content in a safe, hands on, learning environment. Increasing the success for racial and ethnic minorities in STEM disciplines is both financially and socially beneficial (Museus, Palmer, Davis, & Maramba, 2011). This would increase Americans' competitiveness in the global market (Brennan, 2006), and would increase greater individual rewards and economic return (Palmer, Davis, Moore, Hilton, 2010).

It is important for MSUrbanSTEM experience to be sensitive to the needs of students and teachers within this urban setting, understanding that a teacher's TPACK and unification of content will be displayed differently in this setting compared to a teacher in a rural or suburban setting. Additionally, how a teacher uses modeling in their pedagogy, the ways in which an educative experience becomes nuanced to empower the learner and endorse

creativity are all specific to content in MSUrbanSTEM. Moreover, the way in which the program endorses the learners to use the MSUrbanSTEM experience is by exploration of content and self as a teacher, creating pedagogical practices and classroom activities that fit their specific classroom environment and learning goals, and by sharing what they do with colleagues and the world.

Combining these Frameworks: Explore, Create, Share

The words, *explore*, *create*, & *share* were communicated to the teachers from the beginning of their one year experience and are the common themes that manifest from MSUrbanSTEM experience into practice. The MSUrbanSTEM program promotes that teachers first explore their content, their environment, and selves. This helps the fellows gain a deep understanding of the lesson they want to teach. After exploration, teachers are stimulated to create activities, create lesson plans, create projects, and create classroom artifacts that will progress the learning process. Finally, sharing is the practice that is most unusual, encouraging teachers to share the work that their students have completed, share the ideas that they have as a teacher, share their practices, and share their pedagogies. This spreads the knowledge and philosophies behind their work and builds communities that can support teaching and learning. Additionally, various venues to share are provided to the MSUrbanSTEM teachers, such as online portfolios, social media, books, district catalogues, etc. This section of the paper will parse the *explore*, *create*, *share* experience and how it is implemented throughout the one year of the MSUrbanSTEM professional development program.

Explore.

Failure is an option. This new lens embraces the idea of failure. Teachers, like any professionals, are not meant to have exceptional inspiring daily lessons and experiences with all 100 plus students that they may teach in one given day. One approach a teacher uses may not be the most effective to every student but work very well for a small group of students. Learning from that experience, being aware that different approaches are needed for a diverse group of students and using this knowledge to strengthen their future pedagogical practice is what the MSUrbanSTEM program accepts as the norm. Every day is growth and learning even for the teacher. In this yearlong professional development program, MSUrbanSTEM instruc-

tors naturally promote this frame of mind throughout the curriculum in efforts to help teachers expand their pedagogical tool kit, develop leadership, and build competence and efficacy in order to facilitate innovative STEM instruction. Moreover, the development of leadership skills plays a key role because it increases the sharing of this teacher PD frame, allowing it to contagiously spread from teachers, to schools, to districts, and beyond.

The MSUrbanSTEM program hosts several activities for the fellows that integrates the philosophy of Dewey and the TPACK framework. One of the activities includes *Quickfire Challenges* (Wolf, 2009). Quickfire Challenges require the participants to meet an open-ended goal within a specific time span and with certain constraints or rules. For example, during the face-to-face summer session, fellows are asked to develop a 6 second looping video that summarized everything that they completed and learned in one day. Though they have limited time to meet this goal, they use the cameras on their phones to record and review all of the activities they experience from that day, and this experience reinforces the lessons they had already learned from the day's activities.

Delving deeper into the theoretical framework which drives the MSUrbanSTEM program it is important consider how the TPACK framework integrates with John Dewey's philosophy on education. Dewey speaks of an educative experience being growth when learning (Dewey, 1902), stressing that true learning happens in the act of doing the authentic work. Since most technologies have not been created for use in a classroom setting (Koehler & Mishra, 2008), the MSUrbanSTEM program encourages its fellows to creatively use technologies in order to help create, understand, or assess the learning experience. Additionally, the teachers are responsible for being pedagogically innovative in order to use the technology and content in a way that the students can understand and relate to. Dewey discusses the importance of teachers having the responsibility to tailor the content and material to the experiences and needs of the student. MSUrbanSTEM believes that technology can assist the teacher in tailoring the material to the students, and Smith & Girod (2003) agree that this Deweyan approach to teaching begins with teacher development and preparation programs.

Create.

Maker Education. President Obama in his first ever address at the Maker Faire announced, "I am calling on people across the country to join us in sparking creativity and encouraging invention in their communities" (White House, 2014). This declaration indicates the wide growing national

recognition of the maker movement's potential to transform how and what people learn in STEM (science, technology, engineering, and mathematics) and arts disciplines. The learning that occurs through the experience of making and the learning that occurs through instruction offer a unique form of collaboration and self-directed learning for learners, both young and adult (Harvard Educational Review, 2014).

A Makerspace is widely being recognized as a place that provides an enriching environment for users to learn, ideate, design, create, and build. The maker movement consists of a growing trend among individuals to design and innovate artifacts in their daily lives and find digital forums to share their designs or products (Halverson & Sheridan, 2014; Pepler & Bender, 2013; Dougherty, 2012). Individuals with a range of expertise who bring their ideas to reality by adapting them to suit local interests drive it. One of the essential purposes of the maker movement is encouraging people to engage in cross-disciplinary genres of making without restricting their creativity around particular disciplines. Makers employ primarily two techniques to create products, do-it-yourself (DIY) and do-it-with-others (DIWO). This emphasis on direct hands-on experience for the learner is based on the notions of constructionist learning.

The idea of constructionist learning is inspired by the Deweyan constructionism that describes learners as constructing mental schemas to understand the world around them (Kurti, Kurti, & Fleming, 2014). Papert & Harel (1991) define constructionism as the act of understanding by construction. In other words, learners construct knowledge inside their heads through the act of making something shareable outside of their heads.

Constructionism advocates a student-centered, hands-on learning environment where students use information they already know to acquire more knowledge (Papert & Harel, 1991). In this process, the student is intricately involved in the process of learning as compared to the traditional learning environment that involves the teacher to guide the learning process. The teacher bolsters the learning process of the students when they interact with the learning environment. Theoretically this may sound like an easy distinction, however, in application the distinction becomes blurred. In this process, the students are actively engaged in collaboratively working with each other on a problem aiming at overcoming the obstacles together. As the students work together through the problem, they are actively absorbed in learning and teaching new ideas to each other.

MSUrbanSTEM adapts this idea of flexible, student-centered, hands-on learning in how we teach our fellows. We make sure that our fellows have access to online resources that will enable them to implement these

approaches in their classrooms. The idea of working with limited resources that you have access to is also made apparent to the fellows. Over the years, this has been one of the nurturing elements for bringing out creativity within our fellows. Being cognizant of the fact that within the context of urban education teachers are faced with challenges of working with limited available resources, maker education emerged as an essential part of our pedagogical approach.

Deep play. This element of the MSUrbanSTEM program encourages teachers to be creative in their pedagogy. The program attempts: to inspire teachers to repurpose everyday items to use as teaching and learning tools in the classroom, to be active teachers and create active classrooms for the students, to teach with hands on activities that allow the learner to use various senses and various intelligence types, to be reflective of their practices for the sake of always being a better teacher, and to use artifacts and metaphors to demonstrate understanding and profound thought. Similar to proximity of practice, the deep play element is deeply influenced by John Dewey's philosophy on the power of experience.

Share

The MSUrbanSTEM program embeds proximity to practice by modeling and providing opportunities for fellows to share their work in public and social spaces. These opportunities to share allow the fellows to build community and a support system that encourages them and provides new ideas for classroom practice. The program employs digital and analog technologies to model sharing.

For example, twice a year, the fellows publish a book. Everything about the process of the books' conception and publication is about building community and sharing, which makes it an especially powerful innovation. The fellows share a snapshot of their favorite lesson plans and their personal experiences of being an urban STEM educator. This creates a community of collaboration within our fellows and allows them the opportunity to inspire other STEM educators by sharing their experiences and stories. We wanted to provide students with a space to learn from and with each other and to reflect on their practice. In order to share personal teaching moments and be open to critical response, a positive community must be in progress.

When students are first told that they are going to share their most powerful lesson with peers and then publish it in a book, there is hesitation. You can see students asking themselves, "Is what I do book worthy?" Our immediate answer is, "YES!" In order to affect greater change in STEM edu-

cation, our students need to see themselves as credible and knowledgeable resources. The books provide them with tangible evidence of this. The experience of publishing the books is designed so that students individually reflect on their ideas and beliefs, collaborate with peers and instructors to revise and solidify their beliefs, and interact with other educators beyond the fellowship to gain perspective and amplify their message. By exposing students to new tools which support their leadership, connection, and providing them a platform for sharing, we encourage them to take their leadership to the next level.

MSURBANSTEM AS EXPERIENCED BY THE FELLOWS

Within this special issue article on the framework and makings of this innovative MSUrbanSTEM teacher development project, it is important to highlight some of the reactions that students have concerning the approach during their MSUrbanSTEM experience. The succeeding articles of this special issue will go more in depth on the work of the fellows, highlighting what they do in their classrooms, but in this article, we would briefly like to highlight the value of the whole experience some of the fellows' reactions to their MSUrbanSTEM experience.

A noticeable point of reflection is by Steven M. where he lists his three major takeaways from the F2F summer session of MSUrbanSTEM,

“The key ideas I got from F2F (face to face) is 1.) Looking at the world from a new lens, 2.) Make authentic and relevant connections and 3.) Developing grit in our students... I also gained an appreciation for focusing on the cloud.”

The cloud is a concept that was covered at the F2F, which represents focusing on the process instead of focusing on the outcome. Several fellows gained a greater appreciation for the process (aka the cloud) and this reminded them to allow their students to dive deep into and appreciate the process and to not be so focused on the destination. A lack of appreciation for the process can lead to frustration for the teacher and student. Roberto L. said, *“That was a lesson for me to never lose my temper, and to not give up in finding another way to demonstrate the concepts to the students.”*

The MSUrbanSTEM program was purposeful in providing multiple methods in teaching new information to students. As previously discussed, *Quickfire* activities were completed and examined as challenging practices that develop curiosity and expertise in students, through failures and success, in a safe environment. Additionally, various F2F sessions spawned creativity in teaching methods. Angelica T. said,

“Spending half the day with Second City and learning improvisational exercises made me see how this can be used to encourage creativity in students. Not only were we being creative, but we were having tons of fun in the process! My thinking that this was going to be a “fluff filler” activity, was challenged and made me see the usefulness in teaching!”

The use of nontraditional teaching tools was also a common theme that was discussed across the reflections from the first-year fellows. While some fellows learned how to tweet and use social media as a teaching tool, other fellows reflected on how they learned how to use weebly.com, gapminder.org, and instant videos as tools. Rosalind A. said,

The ideas about integrating technology into the curriculum were presented in ways that seem doable, and I don’t have that usual overwhelming/information-overload feeling that I normally have after such a long PD. I’m so looking forward to meeting with my instructional leadership team and planning lessons for the upcoming school year.

Rosalind not only was excited about the use of technology in her teaching, but she also was energized to share her knowledge with her colleagues back at the school she teaches. Additionally, the MSUrbanSTEM program seemed to have made a strong impact on the fellows and this showed through their reflections.

Fellows not only discussed concrete practices that they learned and plan to put to use in their teaching, but many made comments that reflected their passion for teaching being reignited. Jennifer L. said, *“My experience through the 11 days in the summer institute reinvigorated my pedagogical senses. Having come from such a structured way of looking at education, I suddenly remembered how to think creatively again.”* It is imperative that teachers not only learn methods to teach, but also it is important that teachers have the grit to continue teaching despite adversity in the same way that teachers want their students to have the grit to continue to learn. Teaching and learning is a very complex process that is composed of many of the elements that have been referenced by other fellows. Moreover, the F2F program was strong in providing guidance and support for the teachers so that they can approach their work with resources, passion, know how, and creativity. Ashley K. said,

“As I look forward into the year ahead I would like to mirror as many elements of our two weeks of class that I can with my students. I believe that we as educators have had excellent scaffolding with particular technologies and concepts. I look forward

to allowing my students to explore their curiosities with a number of new tools and approaches to their education. If I have learned anything in the first two weeks, it is that these explorations don't come without many questions, trials and errors and embraces of small successes to propel motivation."

CONCLUSION

The MSUrbanSTEM program partners with Dewey's concept of an educative experience in order to create a yearlong program. This practice not only changes fellows' approach to teaching, but it also increases teachers' abilities and skills within and beyond the classroom. Much like the award-winning Masters of Arts in Educational Technology program at MSU, the MSUrbanSTEM program uses a similar frame that creatively integrates technology into pedagogical practices and endorses teacher creativity while empowering the learner by purposefully building from prior knowledge (Terry, Mishra, Henriksen, Wolf, & Kereluik, 2013).

Teachers' abilities to creatively integrate technology into their pedagogies and the teachers' sense of competence as educators can make a great impact on student learning and engagement (Goldhaber, 2002; Ashton & Webb, 1986; Harris & Sass, 2011). Such a difference in teaching performance can then also influence other dynamics (i.e. racial or economic achievement gaps) that play a crucial role in urban settings across the country. Further, the MSUrbanSTEM program's focus on leadership encourages and prepares its fellows to share their knowledge and thinking in their schools, districts, and to the public (via social media) thus creating more than a classroom: a community that endorses innovative technological teaching practices.

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