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Fab Fridays: Fostering Elementary Teacher Candidate Preparation Through Informal STEM Events

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ABSTRACT

Informal STEM learning opportunities offered outside of the structured school day have been gaining popularity in today's STEM-oriented culture. These are venues where children and their families gather to engage and explore in science, technology, engineering, and math —together. For a number of years, faculty from the College of Education at Tennessee Tech University have been promoting these events for the local community, free of charge, to encourage and foster a love for STEM Education. Methods professors recognize these events as golden opportunities for teacher candidates enrolled to learn about STEM content while aiding in the development of their pedagogy. In addition to the experience gained from working with the materials at various STEM stations, teacher candidates have the opportunity to interact with children and families. Furthermore, teacher candidates interact with faculty and students from other academic areas such as nursing, engineering, biology and physics, as well as content specialists from the community. These interactions help to bolster preservice teachers' skills and feelings of self-efficacy toward communicating with families and teaching STEM concepts. The informal STEM learning events offer a variety of experiences often unavailable during the school day and promote the social, emotional, and intellectual skills of our teacher candidates, as well as, those of the children and families who attend.

Keywords: Teacher Preparation; Service Learning; STEM Education; Communication Skills; Pedagogical Content Knowledge; Informal STEM Learning; Reflection; Self-efficacy

Informal STEM learning opportunities taking place in settings such as libraries, museums, parks, STEM centers, and other out-of-school locations offer children and families freedom to explore science, technology, engineering, and math activities together. These events promote inquiry-based STEM experiences commonly unavailable in schools (National Research Council, 2015). By engaging children intellectually, socially, and emotionally, informal STEM learning opportunities support understanding as well as inspire further study for future careers (Heath & McLaughlin, 1994). Informal STEM learning experiences provide invaluable opportunities for teacher candidates to develop their teaching and communication skills prior to entering the classroom (National Research Council, 2015).

The essential skill of communicating with children and families should not be overlooked when preparing teacher candidates, however, opportunities for doing so can be limited. Informal STEM learning experiences provide the perfect venue for this to be accomplished. These authentic experiences build the confidence in the teacher candidates to develop a comfortable rapport with students and families. Ratcliff and Hunt (2009) found that, "Although strong evidence supports quality partnerships between teachers and their students' families, many teachers enter the profession with inadequate dispositions, skills, and knowledge needed to promote the partnerships that support students in the achievement of their educational potential" (p. 495). All too often the opportunity to engage with children and their families is lacking from teacher preparation (Brown, Harris, Jacobson, & Trotti, 2014).

Reflection is another vital skill needed for future educators. For most teacher candidates, traditional academic learning by way of reading, listening, and practicing is a comfortable and reliable set of strategies for acquiring knowledge. Learning to teach, however, should include constant reflections by way of analyzing and evaluating all teaching experiences. The practice of reflection provides teachers with the opportunity to develop their individual pedagogical beliefs and practices (Rodman, 2010). Reflecting on one's personal teaching pedagogy also facilitates connections of practice to theory. (Calderhead & Gates, 1993; Korthagen, 2017).

The College of Education at Tennessee Tech University prepares approximately 250 undergraduate and 75 graduate students per year. Of this number, 160 are certified to teach elementary education. Other certifications include early childhood education, secondary education, special education, physical education, and fine arts education. All elementary education majors participate in two field placement opportunities during their junior year of coursework. One placement focuses on literacy instruction, while the other concentrates on content area instruction in math, science, and social studies. Both 60-hour field experiences take place in general education public school settings. During their senior year, elementary education teacher candidates are immersed in a residency placement that lasts the entire academic year. Teacher candidates stay in the same classroom to learn about beginning and ending a school year, as well as, the growth and transition that occurs in between.

While these classroom-based experiences help teacher candidates to prepare for their future teaching careers, they often lack diversity of setting and opportunities to communicate with families and caregivers. In an effort to fill those gaps, teacher candidates are also required to participate in informal STEM outreach events at the Millard Oakley STEM Center on the Tennessee Tech University campus. Teacher candidates choose two out of four events during their content block semester. At these events, candidates work alongside volunteers including engineering majors, nursing majors, local business and community members, and university faculty. Approximately 20 stations are set up in a space that includes four classrooms, a large lobby, an auditorium, and a virtual theater. The stations are planned by graduate students, university faculty, STEM center employees, and community groups. The free events are open to the public and average 200 attendees, which include children and their families.

At the Millard Oakley STEM center at Tennessee Tech University, we host eight informal STEM learning events per year. Fab Fridays are geared toward third through eighth grade students, while Safari Saturdays focus on activities appropriate for students in preschool through third grade. These events serve two purposes. First, we seek to benefit both elementary and middle school-aged students and their families participating in the events, as well as, the teacher candidates leading the activities. Secondly, our informal STEM learning events provide opportunity to

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research the impact on teacher candidates' content knowledge, pedagogical knowledge, and communication skills. Our research questions were specific to the teacher candidates as students enrolled in elementary education math and science courses. These research questions included:

1. How does required participation in informal STEM learning opportunities increase STEM pedagogical knowledge in elementary education teacher candidates?
2. How does required participation in informal STEM learning opportunities impact the content knowledge of elementary education teacher candidates?
3. How does required participation in informal STEM learning opportunities impact elementary education teacher candidates' abilities to communicate with students and their families?

STEM Content and Pedagogical Content Knowledge

Both subject matter knowledge and an understanding of how to convey that knowledge in a meaningful way are essential for effective teaching (Darling-Hammond, 1999; Eckman, Williams, & Silver-Thorn, 2016; Grossman, Hammerness, & McDonald, 2009; Shulman, 1986; Shulman, 1987). Teacher candidates' STEM content and pedagogical content knowledge are enhanced through participation in our informal STEM learning events. Conceptual understanding of the content and practical application are concurrently achieved in a manner that allows teacher candidates to experience teaching while also learning from content and educational experts.

Shulman (1986) clearly defined both content knowledge and pedagogical content knowledge (PCK). Content knowledge is "the amount and organization of knowledge" (p. 9), while PCK refers to "the ways of representing and formulating the subject that make it comprehensible to others" (p. 9). Hill, Ball, and Schilling (2008) further developed our understanding of PCK by breaking it down into three distinct parts: knowledge of content and students (KCS), knowledge of content and teaching (KCT), and knowledge of curriculum (p. 377). The informal STEM learning events discussed in this article support all three components of PCK for teacher candidates, while KCS is particularly addressed. Teacher candidates practice KCS by relating to the way students interact with the content (Hill et al, 2008). This is evident in the questioning techniques practiced by teacher candidates as they discuss STEM content at their assigned stations. As the evening progressed, candidates revised their interactions based on what they noticed in common participant misunderstandings, individual participant responses, developmental levels of the participants (based primarily on age/grade level), as well as participant strategies in problem solving (Hill et al, 2008).

Communication Skills with Students and Families

Our informal STEM family events provide safe opportunities for preservice elementary education teachers to practice communicating meaningfully with both students and families. They must think on their feet and communicate in ways that engage, instruct, even entertain. While interacting with the students, the preservice teachers adapt their language and use kid-friendly definitions to introduce complex content vocabulary. They listen to the students, ask purposeful questions, connect to what the students know, and encourage ideas.

Preservice teachers regularly express concerns and feel ill-prepared to communicate with families (Brown, Harris, Jacobson, & Trotti, 2014; Hampshire, Havercraft, Luy, & Call, 2015). The STEM family events provide opportunities for our preservice teachers to confront their fears,

reflect on their communication moves, and connect with parents and family members. Graham-Clay (2005) explained, "Every communication exchange, regardless of format, should reflect a thoughtful, planned approach and should be viewed as an opportunity for teachers to promote parent partnerships and, ultimately, to support student learning" (p. 127).

Service Learning and Teacher Preparation

Jacoby (2015) described several models of service learning in higher education, including field work as service learning. But Jacoby clarified for field work to be considered service learning, it is essential that "reciprocal partnerships, critical reflection, and intentional integration with academic content" be addressed (p. 93). At the informal STEM events, our preservice teachers develop reciprocal partnerships with university students and faculty in other fields, and STEM professionals from the community. The teacher candidates work alongside and learn from students and faculty from other colleges including Arts and Sciences, Engineering, and Business. Occasionally, our teacher candidates also learn from and work alongside STEM professionals from the community, such as optometrists and a local anti-drug coalition. The teacher candidates participate in critical reflection as they engage in class discussions with their peers and write about their experiences after the Fab Fridays. Lastly, each Fab Friday event is themed on an area of academic content covered in the school-aged children's state standards, so teacher candidates learn in-depth knowledge about academic topics they will be expected to teach in their classrooms.

There are several more benefits of field work as service learning. For example, the Fab Friday outreach events allow teacher candidates to work with populations (families) to which they may not otherwise be exposed. Teacher candidates have the opportunity to test the waters by communicating with school-aged children and their families. For many of our preservice teachers, this is a first. Fab Fridays are required field experiences in our methods courses. Because all candidates participate in the Fab Friday field experiences, there is common ground for reflection and discussion. Sometimes candidates have legitimate obstacles to participating in the outreach events (work, family schedules), but typically this issue is resolved because they can choose from two of four events to attend during the semester.

Fab Fridays

In this article, we discuss the findings from one of the four informal STEM family events provided during the spring 2018 semester. A total of 12 teacher candidates participated from the elementary math and science methods courses, along with university faculty, community members, and several undergraduate and graduate students from various majors with connections to STEM education, such as engineering and nursing. Teacher candidates arrived at the STEM center approximately one hour before the *Fab Friday Human Body* event to learn about the stations, and practice the activities before students and families arrived. During the event, teacher candidates guided students and families at each station. Possible questions for discussion at each station were provided to our teacher candidates. University faculty mingled and supervised during the event, checking in with teacher candidates at stations, and with students and families throughout the evening. After the event, teacher candidates reflected on their experiences in two formats, written and oral. Within one week of the event, teacher candidates completed a written reflection that required, at a minimum, to address the following prompts:

- What was your overall impression of the event?
- What was the name and description of your station?

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DOI: https://doi.org/10.30707/JSTE54.1/WNSH4279

- Thinking as a parent, was this event something that you would attend with your children? Explain.
- Thinking as a teacher, to what extent and how could this event be replicated in a classroom?

In addition to the written reflection, teacher candidates discussed the event in their following content methods class. During the discussion, candidates shared details of the event with the class, an audience that included peers who were not present at the *Fab Friday Human Body* event. They discussed what went well and what they would do differently at future events. During post-event discussions, candidates often shared their excitement about using ideas from the event in their classroom field experiences. Even though teacher candidates are only required to attend two events during the semester, they frequently request to volunteer at all four events due to the benefits they perceive from volunteering.

Each teacher candidate volunteering at the event was also asked three oral interview questions four to six days after the event. Their responses were recorded, transcribed, and analyzed. These questions were:

1. Tell me about your observations at the Fab Friday event. What will you take away from this event?
2. How did the Fab Friday event help to prepare you for future STEM experiences with students?
3. Looking forward, how did this experience help to prepare you for working with parents/families?

Human Body STEM Stations

In the following discussion, we address several of the stations that were at the *Fab Friday Human Body* event. We explain the organization and purpose of each station and highlight some of the insightful quotes we obtained from our teacher candidates who manned the stations during the event. This is a full list of the station titles:

- A Healthy Heart: Nothing Beats It!
- Brain Hat
- Build a Bone
- Build a Skeleton
- Can you Conduct?
- Get to the Heart of the Matter
- Healthy Choices Obstacle Course
- Heart-Rate Marshmallow!
- Hop 'Till You Drop
- Mind Your Back
- My Heart is in Your Hands
- Race Through the Body!
- Robotic Hands
- The EYES have it!
- Virtual Reality Tour of the Human Body
- Weight, I'm an Astronaut?
- What's Up With Those Lungs?
- You Make My Heart Skip a Beat
- You Take My Breath Away!
- You're Somebody's Type
- Your Brain Always Sees Straight

Your Brain Always Sees Straight

The physics club participated in the *Fab Friday Human Body* event with a station called *Your Brain Always Sees Straight*. Participants experienced strange optical effects that resulted from the brain's faulty assumptions about how light rays behave. Using convex and concave mirrors,

participants moved backwards and forwards to determine at what point their image would be inverted. See Table 1 for connections to the Next Generation Science Standards. Initially, the teacher candidates were timid about working at this station. After talking with members of the physics club and their advisor (a professor in the physics department), one teacher candidate got so excited by what she learned that she wanted to learn more:

> The concave refracts light so that, from a distance, objects look upside down—creating a real image. When the object is close to the mirror, it looks right side up, and enlarged—creating a virtual image. What we see in everyday mirrors in bathrooms and other places show us right side up, and we see our perfect reflection; this is also a virtual image. The upside-down version of the object from a distance reflected in the mirror, as well as movie projectors, and even our own eyes show real images. The actual concept of real versus virtual images is really cool, and leading this activity made me do my own research about it.

Table 1.
Station connections to Next Generation Science Standards

Fab Friday Station	NGSS Performance Expectation
Your Brain Always Sees Straight	**1-PS4-3** Waves and their Application in Technologies for Information Transfer: Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. **2-PS1-2** Matter and Its Interactions: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. **5-PS1-3** Matter and Its Interactions: Make observations and measurements to identify materials based on their properties.
Brain Hat	**4-LS1-2** From Molecules to Organisms: Structures and Processes: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
The Eyes Have It!	**1-LS1-1** From Molecules to Organisms: Structures and Processes Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. **4-LS1-2** From Molecules to Organisms: Structures and Processes Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
What's Up With Those Lungs?	**K-LS1-1** From Molecules to Organisms: Structures and Processes: Use observations to describe patterns of what plants and animals (including humans) need to survive. **2-PS1-1** Matter and Its Interactions: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
You're Somebody's Type	**MS-LS1-1** From Molecules to Organisms: Structures and Processes: Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. **MS-LS1-2** From Molecules to Organisms: Structures and Processes: Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. **MS-LS1-3** From Molecules to Organisms: Structures and Processes: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

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Brain Hat

A station built upon a visual model, the *Brain Hat* station was one of the most popular. At this station, participants assembled the two hemispheres of the brain from black and white paper templates (See Figure 1). They could wear their new "Brain Hats" around all night! This activity relates well to NGSS 4-LS1-2. This visual model included labels for the parts of the brain as well as phrases that highlighted function examples associated with these different parts. For example, the logic section of the brain located in the frontal lobe is responsible for sequencing. The teacher candidates saw great benefit to this activity for future use in their classrooms. One of them stated the following during her interview:

> I was just thinking about my event, a brain hat. I would definitely use this. If my students were really young, I would just have them color each section of each hemisphere a different color. If the students were older, we would talk about each section, like the temporal lobe, and go into detail about each. This would be a really fun and interactive activity, and it is better than a worksheet on the same topic.

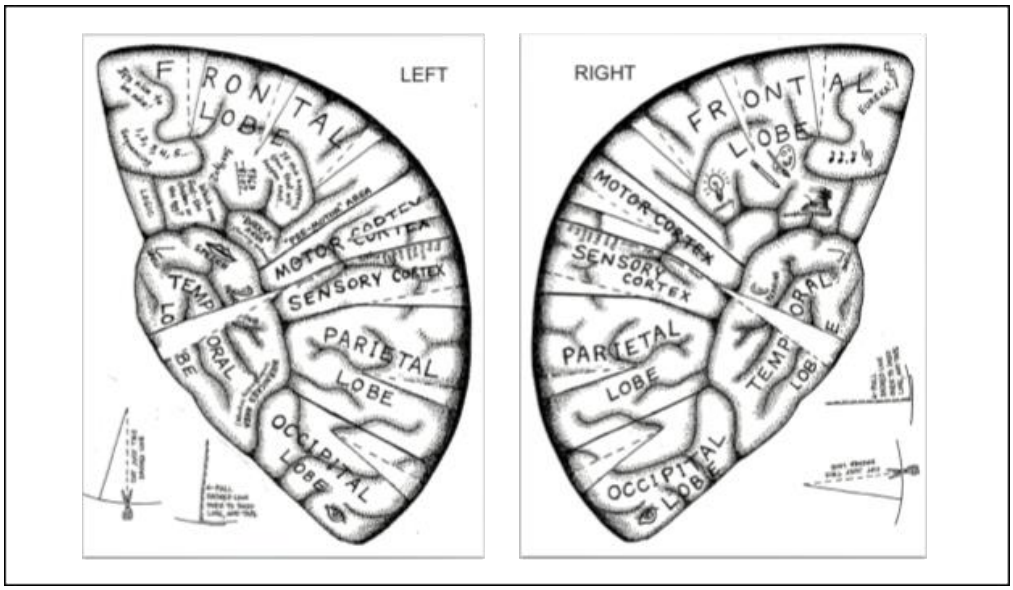

Figure 1. "Brain Hat" templates retrieved from http://www.ellenjmchenry.com/homeschool-freedownloads/lifesciences-games/documents/BrainHatBW.pdf

The EYES have it!

An optometrist group located near campus volunteered to share information about eye health. Besides providing information, they also brought fun and interactive activities for participants. One of the activities tricked the eye to see something that was not there using Benham's disks. They used circles with various patterns to make spinning tops (See Figure 2). A slit was cut in the middle of the circle with a penny inserted to provide the spinning base. As the top was spun, participants observed patterns and colors different from the designs on the resting circles. Participants also experimented with blind spots by moving a paper strip with a symbol at end (See Figure 2) through their field of vision to determine at which position one of the symbols disappears. As this occurred, the participants identified their blind spots. This station connects to NGSS 1-LS1-1 and 4-LS1-2 (see Table

1). Teacher candidates learned how the eyes work by volunteering at this station and talking with the optometrist. One teacher candidate shared:

> The purpose of this station was to demonstrate the powerful effects that the brain can have on vision and how people perceive images. The activities involved with this station established the presence of the strong relationship between the brain and the eyes.

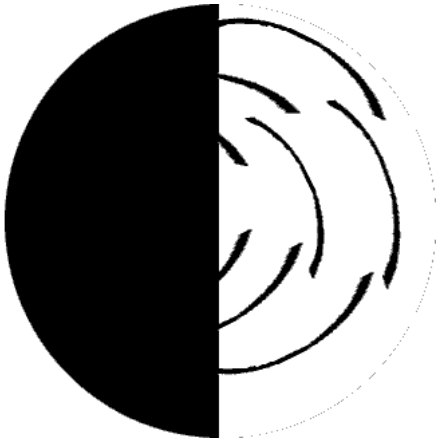

Figure 2. Example of Beckham's Disk retrieved from http://faculty.washington.edu/chudler/benham.html

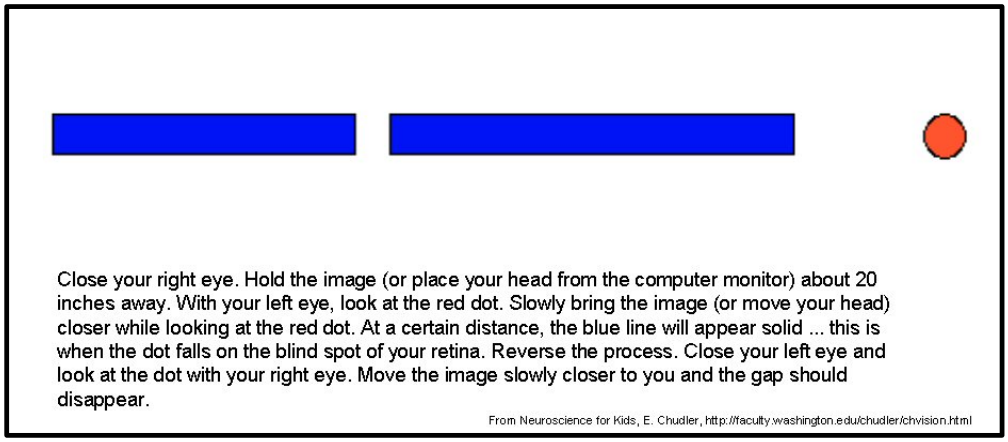

Figure 3. Blind Spot Test Strip retrieved from: http://brainu.org/sites/brainu.org/files/lessons/es_blindspot_teststrip.jpg

What's Up with Those Lungs?

A local anti-drug coalition brought two sets of pig lungs to demonstrate the harmful effects of smoking. One set of the lungs was healthy, as seen by its bright pink coloration. The other set was diseased with a grayish appearance (See Image X). Both sets of lungs were attached to a pumping system made of PVC pipes. As air was pumped through the lungs, participants observed the diseased lungs inflated slowly and did not return to normal size between pumps. Observers were able to make strong, memorable connections to smoking and diminished lung function. This

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demonstration supported NGSS K-LS1-1 and 2-PS1-1 (see Table 1). The teacher candidates quickly learned from the anti-drug coalition volunteers and were able to share their knowledge with participants. A member of the anti-drug coalition who worked the station shared his perspective of the event as a community stakeholder:

> [Students] seemed to really enjoy almost all of the stations, especially the ones where they got to be interactive with things. I really enjoyed being able to explain things to them, and feeling like they really understood. I also really liked how the parents were involved and got to come be a part of the event. This makes for a successful learning experience.

You're Somebody's Type

Children and families identified the components of blood and their functions while participating in two blood simulations. First, participants created their own blood samples in small portion cups to take home. Cheerios pre-soaked in red food coloring served as the red blood cells. Water with yellow food coloring represented plasma. A few marshmallows were added as white blood cells and tiny purple pom-poms represented platelets. After creating small blood cups to take home, participants sank their hands into dish tubs filled with another blood simulation. In the tubs, red water beads were the red blood cells, white ping-pong balls were the white blood cells, and small strips of red foam paper represented the platelets. While children (and families) enjoyed feeling the slippery fake blood, the teacher candidates guided and asked them to recall the names and functions of the blood components. One teacher candidate commented on the practicality of the "You're Somebody's Type" activity:

There was a station focusing on blood where students learned about red blood cells, white blood cells, and platelets. Students were able to see, manipulate, and feel the "blood". ... The students loved putting their hands in the box and observing the differences between the three materials. This would be an easy and cheap way to teach blood in the classroom and would definitely be more beneficial than giving students a worksheet.

Research Findings and Project Evaluation

The responses from the teacher candidates were positive and showed meaningful critical reflections. Candidates made comments indicating increases in their pedagogical content knowledge, STEM content knowledge, and confidence for communicating with students and their families. Responses indicated that teacher candidates saw the benefit of designing fun and interactive activities to teach STEM concepts.

- I have found that any activity that students can put their hands on, manipulate, or experience in some way is the best way to form a concrete connection between content knowledge and real-world applications.
- In my future classroom, I would try to implement some of these more hands-on activities when teaching my students. I think that some science concepts are harder to understand when just reading about them in a book. Showing a video can be helpful sometimes, but is still only a semi-concrete example of something.
- The whole event was a perfect way to use the resources that are more easily accessible to the school and share it with the community.

Many teacher candidates commented about learning STEM content. Some thought about their previous understanding or partial understanding gained in elementary and middle school.

- I feel like I learned a lot more than I did as a kid about the human body.
- Of each of the branches of science, I would say that I know the least about physics, so I learned some really great things to show my class about physics to get them [students] engaged.

Communicating with participants, both students and parents, was frequently mentioned in the teacher candidate reflections, interviews, and in class discussions. They expressed initial anxiety in working with families and a desire for more practice.

- I saw a lot of people who don't normally work with children figuring out how to talk to the children in a way that the children would understand and I did notice how it adapted from the beginning where it was way too complex and they were losing kids to where it turned into them making it a lot simpler and they were able to keep the children's attention about it.
- Being able to communicate with the parents effectively, as to why you are doing these things, and what the purpose is, I think is something that I was able to learn from this experience.
- I have been in a practicum class but I haven't really talked to the parents, so I think that talking with the parents really helped.
- I believe this is one of the best ways to get a child's interest sparked in STEM. All of these activities were super intriguing for the kids and even the parents. It got the students thinking outside of the required classroom curriculum and possibly opened their learning interests to new things.

Challenges noted by teacher candidates included difficulty engaging with reluctant students and families and anxiety about what to expect. Drawing on their own experiences as school-aged children, teacher candidates expected all participants and family members to react to the activities and respond to their communication in similar ways. These preconceptions were quickly disproven as a diverse group of participants visited their stations. Teacher candidates also expressed initial anxiety about the event due to inexperience working with students in informal settings as well as lack of opportunities to work with families prior to this event.

Future Plans and Conclusion

With almost 50 STEM family outreach events so far, each and every one provides new opportunities for insight into possible improvements. The research focus of teacher candidate preparation and intentional reflection has definitely illuminated the need for future modifications to the Fab Friday events. Actions for future informal STEM learning opportunities include:

- Boost parent engagement
- Include teacher candidates more in station planning
- Design explicit content training for teacher candidates
- Consider station budget with teacher candidates
- Work towards accommodating diverse learners and their families (English learners & students with disabilities)

Teacher candidates noticed that some parents were eager to be involved with their children, while others were more timid and stood back as observers. One way to encourage more parental involvement would be to give parents written station guides. These guides would include questions

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parents could ask their children, as well as, explanations of the content and links to further activities they could do at home. These guides (created by the teacher candidates) could be referenced at each station.

Currently, Fab Friday stations are prepared by university faculty, graduate students, and community members who are experts on various topics. By pairing the teacher candidates with content experts in the planning process, teacher candidates may better understand the specific station directions and content. This collaboration in planning would require time, but would offer greater learning for the teacher candidates. In reflections, several candidates made suggestions for general event logistics and modifications for station activities. By being involved in the planning, the teacher candidates could see why decisions are made (often due to budget restrictions), and offer their perspectives as well. Some candidates commented that they would have liked to have had more time to learn about the content specifics at their assigned stations. This could be achieved by meeting with the content expert and also by reading/viewing related online resources prior to the event. Preparing a training manual, role-play opportunities, and training videos are also areas of interest for our team.

Another concern of the teacher candidates that came up multiple times was lack of preparation to work with diverse groups of students and families. The informal STEM learning opportunities are open to the public. Participants come from the local schools, surrounding districts, homeschool groups, and more. Teacher candidates noticed that some participants were accustomed to the STEM Center and the format of the activities, while others reacted differently. There were students with varying needs: some that spoke different languages, and some that needed special accommodations. In the planning, these differences should be considered and prepared for with appropriate accommodations for all participants to benefit fully from the event. This would be a great way to collaborate with the special education department and to help the teacher candidates to prepare for their future classrooms of diverse learners.

For future research in improving teacher candidate preparation, the reflection and interview questions will be modified to more closely align with our research questions. These new questions will include:

- What specifically did you learn about how to teach STEM concepts? Give examples.
- In what ways did your STEM content knowledge increase? What from the event impacted your knowledge?
- How did you interact/communicate with students? Give examples.
- How did you interact/communicate with family members? Give examples.

These reflection questions will be kept to a minimum. Teacher candidates will be encouraged to share as much specific detail from the event as possible along with any improvement suggestions for both participants and for their own learning.

Along with a focus on elementary education teacher candidate preparation, this type of informal STEM learning opportunity is rich in potential for research. Future research projects may focus on:

- Student learning
- Family perspectives
- Communication with families
- Similar events for the disability community (Kahn & Samblanet, 2018)

- How participation in informal STEM teaching transfers to formal STEM classroom teaching

Informal STEM learning events such as the one discussed in this article provide valuable opportunities for participants to be actively involved in inquiry-based learning (National Research Council, 2015). Students interact with community members and teacher candidates with activities that boost their understanding about STEM concepts and increases awareness of STEM careers (Heath & McLaughlin, 1994). In addition to the benefits to STEM learning for the participants, teacher candidates are able to practice communication skills with students and families often lacking in teacher preparation programs (Brown, Harris, Jacobson, & Trotti, 2014).

Final Thoughts

The Fab Friday events held at our university's STEM Center have provided us with an opportunity to immerse our teacher candidates in informal STEM learning. During the events, candidates interact with school-age children and their families, university faculty and students from other academic areas, and content specialists. These experiences provide a rich learning environment for our teacher candidates, wherein, they can practice the essential skills of communication while learning about specific content and the best practices for teaching the content. It is often said that experience is the best teacher. We feel confident that this preparation will help them hit the ground running in an age when STEM is so important in K-12 education.

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