Work-in-Progress: Moving from volunteering to mentoring K12 students: What does it take?

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Abstract

Engaging minority and underrepresented students in STEM fields in high school is not difficult, but providing the student with long-term outlooks in STEM fields in which the students can see themselves is very difficult. Most students do not know anyone who is currently in a STEM career. STEM professionals volunteer at a good rate, but do not serve as mentors as frequently as those in other professions. A definite key to closing the STEM graduate gap is enabling youth to view themselves in a STEM career. Mentoring helps the student bridge the gap between where they are in high school and the where they see themselves in the future. The guidance provided by a mentor through a student’s secondary academic career and transition into a post-secondary setting is critical to minority and underrepresented students due to the lack of this guidance in their social circle.

High impact STEM mentoring is needed for mentors to have a lasting impact on our nation. This paper will focus on converting STEM professional volunteers into roles as mentors. This paper will describe efforts to increase the number of mentors in a mid-sized urban community. The paper will discuss the levels of commitment and the level of intensity of desired by the mentors.

I. Introduction and Motivation

Mentoring is critical to success in any field. Chubin\(^1\) found that mentoring was a strong factor in students desire to study STEM. There is much in the engineering education literature regarding mentoring in the STEM fields. Many of the articles reference individual projects that are made more successful with mentors. Takaghaj\(^2\) described the impact of mentoring girls in STEM. Feldhaus\(^3\) describes a mentoring program, which involves under-represented mentors. Sarder\(^4\) discusses the impact of a mentor in designing K12 curriculum. Rochefort\(^5\) describes a program that used graduate students as mentors. Mentoring has been attempted in many places for a single program. This paper describes an effort, which strives to increase the number of STEM mentors across many programs in a single community.

The Wichita Coalition is comprised of individuals and organizations that are passionate about the future of our community. Wichita has a high concentration of STEM professionals (the 3\(^{rd}\) highest concentration of engineers in the nation, according to Forbes). In order to foster and maintain a healthy economy as well as compete globally, Wichita needs a strong, highly-educated, and competent workforce. Efforts will be made to ensure that mentoring is provided in a culturally and socially proficient manner, and unique STEM activities will support mentoring female students. Every effort will be made to engage with organizations that target or specialize in serving youth that are underrepresented and there will be focused efforts to recruit mentors from the targeted students’ communities. The vision of the Wichita Coalition is to establish the involvement of a documented 20\% of the STEM professionals involved in high impact mentoring by the year 2020.
Our Guiding Coalition (GC) includes leaders from industry, government and mentoring organizations, including our top employers and Big Brothers Big Sisters (BBBS), the 2nd largest BBBS agency in the nation. The GC also includes leaders from the targeted groups (African American, Hispanic and female) who have decades of experience mentoring children. The plan will build on a strong culture of volunteerism. According to the Corporation for National & Community Service, Kansas has an annual volunteer rate of 36.4%, with 807,860 volunteers serving 82.9 million total hours – fourth highest in the nation. Wichita is a center of aviation engineering and corporate partners frequently express a desire to give not just money but employee time. For example, one company provides employees 40 hours a year of paid leave for volunteer efforts and will now encourage its employees to spend those hours on STEM mentoring. As more companies become aware of successful high impact mentoring efforts, we can establish a “new normal” for industry commitment to volunteerism and high impact STEM mentoring. In the pilot year, Academic Year (AY) 2014-2015, we will establish a documented baseline of STEM mentoring (both high impact and volunteerism). The activities are: 1) Promotion of STEM mentoring in terms of adding new corporations and in increasing the number of professionals engaged per company, 2) Coordination with coalition mentoring organizations to increase the STEM mentoring activities in our current coalition partners and to invite additional mentoring organization to join the US2020 initiative, 3) Pilot testing a city-wide mechanism of matching STEM professionals with STEM mentoring opportunities, and 4) Establishment of quality mentoring experience by making high-quality first contact for the mentor (ease of matching experience, positive communication, comprehensive training, seamless logistics) which will lead to a significant “retention rate” of STEM professionals in terms of involvement/willingness to be involved in subsequent years. A key component of our strategy is to offer STEM professionals a wide range of options that run the gamut from best practice mentoring arrangements (one-on-one, over time) to similarly beneficial volunteer opportunities such as participating in after-school tutoring and clubs, coaching and judging academic teams, partnering with teachers on classroom projects, and hosting workplace visits and apprenticeships. Our focus is on increasing the quantity and quality of our STEM professionals’ engagement; therefore, we promote STEM volunteering opportunities as well as provide sessions with a group of STEM mentors that require less time commitment and build trust for future opportunities. This, in effect, mentoring of mentors, will reduce the anxiety of new mentors and expand the acceptance of mentoring into the "new normal" of quality, high impact STEM mentoring. Additionally, to raise the level of ethical responsibility of the mentors, mentors are required to review the article on ethical mentoring by Rhodes⁶.

II. Collective Impact

Kania and Kramer⁷ present the idea of collective impact and they list the five conditions for collective success in organizations like our guiding coalition. The conditions are: 1) Common Agenda, Shared Measurement Systems, Mutually Reinforcing Activities, Continuous Communication, and Backbone Support Organizations. The Wichita GC members have a common agenda, which is made evident by our common understanding of the problem and agreed upon actions. The problem that is addressed is: “STEM professionals are not actively engaged in mentoring local youth in hands-on STEM activities in a sustained relationship targeting underrepresented groups.” Our joint approach to solving this problem is three-fold: 1) Publicize the many varied activities, 2) Promote, train, and support the mentors, and 3)
Encourage corporations to promote mentoring. STEM mentoring is inclusive of the traditional mentoring model and adds the STEM component by encouraging the pair to do STEM activities and through the recruitment of STEM professionals as mentors.

Our GC has two K-12 school districts that have been active in collaborative learning environments with our youth serving organizations in both formal and informal learning environments. These are the basic building blocks that are required of a connected STEM learning ecosystem. Our GC will strive to provide multiple settings for mentoring to occur.

The Wichita coalition has the three conditions that must be in place before launching a collective impact initiative. First, we have an influential champion in the College of Engineering at Wichita State University. We have an established relationship with almost all of the coalition members and have been active in STEM outreach including creating a STEM Mentoring triad with industry professionals, Engineering students and underrepresented middle school students. Secondly, we will have adequate financial resources that are required to provide the ‘backbone’ including the coordinator and the VISTA members to serve as school coordinators. Finally, we also have a new sense of urgency for change that has emerged since the US2020 effort began in our city. Our existing STEM mentoring organizations are doing great work, but believe that to have a serious impact, we must scale our efforts to meet the expanding demand for STEM professionals in our community. This catalyzing effect will transform our city into a "new normal" of quality, high-impact STEM mentoring.

III. Levels of Commitment

STEM mentorship is a collaboration of a broad content area with a timeless, proven way of relationship building with the purpose of creating a permanent impact on a person’s life. Considering that the single most effective way of impacting a person’s life is to be a consistent, active part of someone’s life, the idea of encouraging STEM professionals to become mentors is a rewarding and challenging opportunity.

Mentors must ask the questions: How much can I commit to? How much do I want to commit to? How much will your job and/or family allow you to commit to? Figure 1 shows the mentor level of commitment and breaks commitment level into the levels of wet feet, wader, and diver.

Wet feet
Rarely does a person jump in to a long term commitment to a cause without first having basic, one-time experiences doing something related to a cause they have grown to believe in and fight for. These basic, one-time experiences are a great way of getting one’s feet wet with volunteering. As it pertains to being a STEM volunteer, this might include being a classroom speaker for a science class at a local school, or a judge for a community science fair, or even an event volunteer for a STEM night at the local science museum. These types of opportunities test out an experience that may be something one has always wanted to do, but just have not. Sometimes people want to challenge themselves to do something out of the comfort zone but not fully commit. These types of “wet feet” experiences are a low-pressure commitment that allows complete the single event and be done, or it could be the experience that spurs on a desire to pursue more opportunities to be a STEM volunteer.
Wader
Once a person had sufficiently gotten their feet wet with volunteering and had a few successful experiences, they slowly work themselves further into the volunteering water and become a “wader.” They may start to consider committing to a multi-week volunteer opportunity with a science class, or they may see ways they could involve themselves in their former high school and want to work with a robotics club. They may want to be a Girl Scout club leader for 6 weeks. The more successes they have, the easier it becomes to seek deeper ways to make an impact through volunteering.

Diver
After a significant amount of success wading through volunteering opportunities, a volunteer begins to realize that true change only happens through consistent, long-term involvement. When a volunteer reaches this point, they are ready to fully submerge themselves and “Dive” into volunteering. Diver’s are volunteers that commit to being mentors, committing multiple hours a week/month to impacting youth. They are the yearlong volunteer coaches of robotics teams.

Figure 1. Mentor Level of Commitment

IV. Levels of Intensity

STEM mentorship can also cross a broad range of possibilities as to the level of intensity. The waves describe the intensity of the STEM activity the volunteer would like to participate in with their mentee. The intensity preference can be relative to the level of professional knowledge that the mentor may have in the content area. For example, an experienced surgeon will have a better grasp on biology than a college student majoring in biology. The desire of the individual is also a huge factor in the appropriate intensity factor. A STEM professional may not care to do a highly intense STEM activity with a mentee after a long day of work doing the same type of work. The mentee attitude is also a factor in the intensity of the mentoring session. As age increases throughout elementary, middle, high school, and on into college so does the depth of knowledge required in regards to the STEM content. Figure 2 shows the mentor level of intensity and breaks intensity level into the levels of tranquil, ten foot, and storm.

Tranquil mentoring requires less focus on the content and more focus on the relationship.
Tranquil mentoring is for mentors who are new to mentoring and desire to start slow. 10-foot deep mentoring balances equal focus on relationship and STEM content. This type of mentoring is more for those who prefer to do one-time type of mentoring such as a classroom presentation. Storm mentoring utilizes strong STEM content as the starting point for the mentor/mentee relationship, which can lead to a strong personal connection, and ultimately a more well-rounded mentoring relationship with a lasting impact. Examples of storm mentoring include robotics coaching and pre-engineering classes like Project Lead The Way.

Figure 2. Mentor Level of Intensity

V. Conclusion

Mentoring is critical to the future and especially to the desired increase in interest in STEM. This paper has presented a pilot effort to increase the supply of mentors to existing Youth Serving Organizations. The paper presented levels for mentor commitment and intensity. Furthermore, it defined a progression we all experience when individuals begin something new and laid out the simple steps it takes to go from being a basic STEM volunteer making a small, but important impact on a child to becoming a mentor that is highly committed to high intensity mentoring and making a deep and lasting impact on a child.

References
