Introduction

The declining number of Technology and Engineering (T&E) educators and teacher preparation programs across the country has been identified as a critical issue plaguing the field for many years (Daugherty, 1998; Volk, 1993). Unfortunately, this issue continues to progress and has raised concerns. Why should middle and high school T&E educators be concerned? The answer is simple: teachers have been identified as the most influential factor in encouraging students to pursue T&E education as a career. Without current educators helping universities to recruit future T&E teachers, many programs face the grim reality of closure for enrollment and budgetary reasons. This article presents 14 strategies supported by research and recent recruitment efforts that teachers should use to encourage students to become T&E educators.

Declining Program and Graduation Trends

Numerous researchers have examined issues surrounding T&E educator shortages. The number of universities offering degrees in industrial arts (IA), technology education (TE), or T&E education has plummeted from 203 in 1970 to its current status of 43 institutions (Rogers, 2015; Volk, 1993; Warner, Erli, Johnson, & Greiner, 2007) (Figure 1).

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As a result of declining programs, the number of IA/TE/T&E education graduates has decreased significantly, from 6,368 in 1970 to 245 in 2015 (Rogers, 2015; Soboloski, 2003; Volk, 1993) (Figure 2).

The significantly decreasing number of programs and graduates is alarming given the trends regarding increasing demands for T&E educators and decreasing supply of qualified teachers (Moye, 2009). Daugherty (1998) cautioned the field about this issue almost 20 years ago:

The urgent need to recruit, prepare, and retain significantly more teachers in technology education is clear. At the same time the population of teachers entering the field is decreasing, the number of teaching opportunities and number of secondary students enrolling in technology education programs is increasing. The low number of individuals entering technology education teacher preparation institutions threatens not only post-secondary programs, but the very fabric of the profession through the closing and consolidation of programs (p. 22).

Previous Recruitment Strategy Studies

Over the past 50 years various studies have surveyed teachers, undergraduate students, alumni, department chairs, professors, and state supervisors, examining the factors that influence students to become T&E educators. Consistent throughout the literature, many studies have found classroom teachers to have a strong influence on recruiting students to enroll in undergraduate T&E education programs. The latest study on T&E education recruitment factors examined traditional methods as well as newer social media sources. Love’s (2014) study found that even with technological advances in recruitment resources, undergraduate T&E education students reported their middle or high school T&E educator as the most influential factor regarding their decision to become a T&E teacher (Table 1). More than 86.2% of the students in this study expressed that personal interactions with teachers, recruiters, alumni, and family members significantly influenced their decision to enroll in a T&E teacher education program.

Also consistent with previous research findings, Love (2014) found that high school counselors had very little influence on persuading students to enter T&E education programs. This may suggest that T&E education teachers need to work more closely with counselors at their high school to inform them of what T&E education is and how critical it is for enhancing STEM literacy.

Table 1
Factors Influencing Students to Enroll in a T&E Education Program (Love, 2014)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Avg. Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle/High School T&amp;E Education Teachers</td>
<td>5.29</td>
</tr>
<tr>
<td>Hands-On Hobbies</td>
<td>4.76</td>
</tr>
<tr>
<td>Positive Job Characteristics</td>
<td>4.63</td>
</tr>
<tr>
<td>Interactions With Alumni</td>
<td>4.51</td>
</tr>
<tr>
<td>Face-to-Face Interaction With Someone</td>
<td>4.49</td>
</tr>
<tr>
<td>Family Members</td>
<td>3.30</td>
</tr>
<tr>
<td>Current T&amp;E Education Student in the Program</td>
<td>2.94</td>
</tr>
<tr>
<td>Friends and Peers</td>
<td>2.59</td>
</tr>
<tr>
<td>University Website</td>
<td>2.65</td>
</tr>
<tr>
<td>University Open-House Event</td>
<td>2.49</td>
</tr>
<tr>
<td>High School Counselors</td>
<td>2.20</td>
</tr>
<tr>
<td>Technology Student Association (TSA)</td>
<td>2.18</td>
</tr>
<tr>
<td>Program Brochures</td>
<td>2.14</td>
</tr>
<tr>
<td>University Recruiter Visiting High Schools</td>
<td>1.47</td>
</tr>
<tr>
<td>Facebook Page</td>
<td>1.29</td>
</tr>
<tr>
<td>Twitter/Instagram Accounts</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Note: These ratings represent Likert scores ranging from 1 (no influence) to 6 (main influence).
Teachers’ awareness of findings and trends from recruitment studies is important for better informing their efforts.

Two Teachers’ Success Stories

Two teachers shared their recruiting successes using some of the strategies from the aforementioned studies. At last year’s Technology and Engineering Educators Association of Pennsylvania (TEEAP) conference the authors met Allen Androkites and Scott Didra. Allen teaches T&E education at Pennridge High School, and Scott at Emmaus High School, both in Pennsylvania. In 35 years of teaching, Allen has had 28 students become T&E educators, and in Scott’s 34 years of teaching, he said he has had 15 students become T&E teachers, including his daughter. When we asked Allen how he has been able to influence so many students into becoming T&E teachers, he shared this advice: “My teaching philosophy is simple—the more you give, the more you get. T&E teachers need to show that they love their job, and they need to promote it.” Allen believes it is critical for T&E educators to have a positive outlook about teaching on a daily basis and convey that message to students. He also shared some methods that he has found successful:

I look for students in their sophomore and junior year who I believe have the personality to be a teacher, especially in T&E education. I have had great success encouraging student athletes to major in T&E education. I ask them, ‘Do you like what you’re doing in my class? You can get paid to do something fun like this for a career while also coaching high school sports.’

Allen has contacted parents of students who have shown interest in his courses and have done well, encouraging them to have their child sign up for the next level T&E courses. When speaking with parents, Allen informs them of the job opportunities available and describes why their child would be an excellent T&E teacher. From his experience, many parents were thankful for his advice because they did not know much about T&E education as a career. Furthermore, when school counselors asked for course recommendations, Allen provided names of those students who had shown progress in his courses so they would be encouraged to take more T&E classes. This has provided Allen a chance to further develop students’ passion for T&E education and persuade them to pursue it as a career.

Scott Didra provided some similar insight regarding what he has found successful for influencing students to become T&E educators:

After I saw Millersville University at our state conference presenting data about the shortage of T&E teachers, I took that information back to my classroom, displayed it, and discussed it with my students. I asked them ‘Do you like what you do in this class?’ They responded yes, and then I told them that they could continue to do this and get paid for it. They were unaware that was a career option.

One strategy Scott found to be the most successful was allowing his students to teach and learn from each other:

To teach is to learn. We must give our students opportunities to be a leader and a teacher to help change kids’ lives. My students embrace that leadership/teaching role, and they love it. I currently have one high school student who is like a student teacher in my classroom. From that experience he has decided to change his career plans from engineering to T&E education. When students realize they have taught their peers something new, that is when you can see the light-bulb go on, and they gain a sense of satisfaction in helping others.

Scott’s students consistently mention how much they enjoy the family atmosphere and professionalism of his courses, which they refer to as “The Firm.” His inspirational teaching style was featured in a Discovery Education webinar video (East Penn School District, 2016).
Strategies for Teachers to Help Recruit

Ritz (1999) described many useful methods for classroom teachers to encourage students to become T&E educators, and Daugherty (1998) provided an innovative perspective in which he proposed 51 strategies that mimicked the recruiting guidelines set forth by the National Collegiate Athletic Association (NCAA). While the methods from the aforementioned articles can still be effective today, 14 strategies were generated from the review of literature, interviews with Allen and Scott, and our personal recruiting experiences at the secondary and postsecondary levels.

1. **Raise Awareness of Your Program**
   For years T&E educators have had to raise public awareness about their programs to increase enrollment in elective T&E courses. Promoting secondary level T&E programs also raises awareness about the profession and can introduce students to T&E education as a career. Displaying innovative student projects in your school's trophy case and promoting students' exemplary work through your school's newsletter, social media accounts, and local media sources can help raise awareness of T&E education programs. One example of a newer T&E topic of great interest to the public and that should be showcased is 3D printing. There are a number of other methods that can help publicize T&E programs at no cost (Caccavale, 2016). Furthermore, Daugherty (1998) recommended 14 activities that can help T&E teachers enhance the image of their program, and Scarcella (2000) presented strategies for marketing T&E education programs. As T&E educators, we must take responsibility to promote our programs and show we are an integral component of STEM.

2. **Advertise Nearby College Programs**
   There are a number of colleges where students can earn licensure to teach T&E education. As alumni, teachers may already have connections with these college programs. Most students are not aware of where they can obtain a T&E education degree. Teachers should help inform students of their choices by contacting T&E education faculty at nearby universities to send promotional materials to their school. These items should be displayed in T&E classrooms/labs, school hallways, and school counselor offices to reach all students. Some programs have their promotional materials readily available on their website for teachers to print (e.g., UMES, 2016), but most would be more than happy to mail materials if requested. The poster accompanying this article should be displayed to interest individuals in teaching T&E while also informing them where they can earn their degree (see insert or download from [www.iteea.org/BetterPracticesforRecruitingTandETeachers.aspx](http://www.iteea.org/BetterPracticesforRecruitingTandETeachers.aspx)).

3. **Collaborate with Your School Counselors**
   Building on the previous strategy, providing your school counselors (formerly called guidance counselors) with the promotional materials you received from T&E education programs is critical. In many recruitment studies, especially the latest by Love (2014), school counselors were not found to have a significant influence. This may be due to misconceptions counselors have about what T&E educators do. From the authors’ experiences, school counselors have proven supportive of T&E education as a career once they fully understood what T&E education is, the demand for T&E teachers across the country, and where students can earn a degree. One way to start this conversation with your school counselors is to share literature such as this article or Moye’s (2009) article demonstrating the increasing demand but decreasing supply of qualified T&E educators. It is beneficial to have a discussion with school counselors as opposed to simply emailing or dropping off promotional materials.

4. **Notify Parents of Opportunities for Their Child**
   Parallel to working with school counselors is communicating T&E education career opportunities to parents. Back-to-school night and parent-teacher conferences provide perfect opportunities to introduce this topic. Students who show an interest in T&E courses and are undecided on a career path would be prime candidates to recruit. Speaking with parents to reiterate the need for T&E teachers can prove helpful. When emailing or calling parents to notify them of the exemplary work their child has done, teachers should ask if their child had ever considered becoming a T&E teacher because of their interest and success in the course, ample job opportunities, and other benefits of the profession.

5. **Incorporate It In Your Courses Throughout the Year**
   Many courses and textbooks highlight a career connection related to the topic being studied. T&E education is no different; it should be integrated as a career option that students research and present. Infusing T&E education careers into multiple units can be accomplished by asking students to research and demonstrate innovative methods that T&E educators could use to teach unit topics. Simply presenting T&E teaching opportunities as a one-day, drive-by experience is not as effective as incorporating it into the course multiple times throughout the year.
better practices for recruiting T&E teachers

6. **Allow Students to Teach T&E Lessons**
   In many courses, students are taught information presented by the instructor. They are expected to present their research and design solutions to the class, but rarely are students required to teach a T&E topic to the class. Allowing students to teach a lesson to their peers or demonstrate their design solutions to elementary/middle school students within your school district can provide a preview of how rewarding it is to teach T&E education. This also serves as a good recruitment tool to enhance enrollment in elective T&E courses.

7. **Take Students to T&E Conferences/Events**
   Teachers should work with their school system to provide transportation to a state, regional STEM, or ITEEA conference. Many of these events have a significantly reduced registration rate for students to attend. Students should be encouraged to present with the instructor about their best T&E activity. This could be done in a less intimidating atmosphere like the STEM Showcase portion of ITEEA’s conferences. Finding a way for students to attend a T&E education conference or event allows them the opportunity to see all of the innovative things going on at other schools and network with inspiring teachers and students. It serves as a vehicle to rejuvenate their excitement for T&E education, and they will be more inclined to get involved with the organization and attend the event again.

8. **After-School STEM Clubs**
   Students participating in after-school, STEM-related clubs often do so because they enjoy doing hands-on STEM activities. This was the second greatest factor influencing students to become T&E educators in Love’s (2014) study. Serving as a coach/mentor/advisor for TSA, SkillsUSA, 4H, state engineering competitions, or Science Olympiad clubs is a great opportunity to interact with STEM-motivated students and introduce them to the benefits of being a T&E teacher. Even helping or guest-speaking to these clubs periodically provides a valuable opportunity to recruit students for your T&E courses and T&E teacher preparation programs.

9. **Collaborate with Educators Rising Clubs**
   Formerly known as the Future Teachers of America, the Educators Rising club is a nationally sponsored organization rich with opportunities for recruiting students into T&E education. Negative public perceptions about teaching careers have been cited as the cause for decreased enrollment in education programs across the country. However, in this organization students have already identified an interest in becoming educators. The key is to hook them into T&E education by demonstrating the exciting hands-on teaching opportunities in our field. Serving as a faculty sponsor or presenting information about where to obtain a T&E education degree can raise awareness about teaching T&E concepts and collaborating with T&E educators. You can also influence students to refocus their interest from an oversaturated teaching field (e.g., elementary education) to the critical-shortage area of T&E education.

10. **Collaborate With Local Engineering Clubs**
    Local chapters of professional engineers can be beneficial in multiple ways. Establishing connections with members of these organizations provides opportunities for engineers to increase students’ interest in T&E topics while serving as mentors for capstone projects. Also, through these relationships, engineers may develop a passion for teaching T&E content and later pursue a career as a T&E educator. Lastly, these clubs often have scholarship funds for students interested in pursuing an engineering-related degree. This would provide some incentive for students to major in T&E education and offset the cost of higher education.

11. **Collaborate With Professionals From Industry and the Military**
    Similar to the previous strategy involving engineers as mentors, professionals from industry and the military often have a wealth of expertise in STEM. Allowing students to work with these individuals on class projects enhances students’ T&E education experience while also introducing industry and military personnel to the benefits of teaching. There are a number of highly successful T&E teachers who have transitioned into T&E education from a previous career in industry or the armed forces (Ritz, Berry, & Radcliffe, 1999). Companies and various branches of the military also offer ample scholarship opportunities for students interested in pursuing degrees in STEM-related fields.

12. **Collaborate With Career and Technical Education Programs**
    Although career and technical education (CTE) programs are separated from T&E education programs in most school systems, they can still serve as an excellent recruitment area. Students in these programs may often graduate with a technical certification and decide they want to pursue a bachelor’s degree. T&E education can be an easy transition for these students who possess expertise in a technical area and enjoy hands-on hobbies. Establishing a relationship with CTE teachers to collaborate on similar class projects (e.g., construction, manufacturing, transportation) can increase T&E students’ knowledge about a specific topic while also allowing CTE students to teach T&E concepts.

13. **Collaborate With STEM and Education Programs at Nearby Colleges**
    In the same vein as other collaborative efforts, working with nearby community colleges and four-year institutions that offer STEM and engineering programs can be valuable partnerships. They can allow local schools to collaborate with university programs that may have more expertise and funding to facilitate STEM activities. These partnerships also allow high school students to work with college students...
who serve as young role models for T&E fields. Students in these community college and university programs will gain a better understanding of what teaching T&E is like, and in turn may seek out opportunities to teach. Specifically at the community college level, T&E teachers should look to collaborate with Associate of Arts in Teaching (A.A.T.) programs. These students are interested in teaching and plan to transfer to a four-year institution. Showing A.A.T. students from various content areas how much fun T&E education is and where to earn a degree can help persuade them to pursue T&E education as a career.

### 14. Stay in Contact with Former Students

The final strategy suggests that T&E educators stay in contact with students who graduated and enrolled in STEM-related college programs such as engineering. Sometimes these students will discover that their major was not what they had expected and are seeking another career path that is similar in content. T&E teachers could encourage these students to enroll in a T&E education program.

## Conclusion

Given the rapid rate at which the number of T&E education programs is declining, the number of qualified graduates to fill T&E education vacancies is limited. If T&E education programs cannot find a way to recruit more students, they are at risk of closure, and the field of T&E education may slowly become subsumed by other disciplines teaching engineering content and practices (e.g., science education, CTE). The strategies shared by Allen Androkites and Scott Didra reinforce the focus of this article—T&E teachers have the resources and potential to influence many students to become T&E educators, and they are the key to the future of T&E education!

This article only provided an overview of those strategies found to be successful. Teachers should share their personal recruitment stories with colleagues and state T&E supervisors to replicate successful models. Recruitment does not rest solely on the shoulders of practicing teachers. It should be approached as a collaborative effort among classroom teachers who serve as walking billboards for T&E education and university faculty members who prepare future T&E teachers. Together we can improve the declining enrollment trends of T&E teacher preparation programs.

## References


