Utilizing Torchmate EDU Student Software to Introduce Computer-Aided Drafting Technology to Preservice Agricultural Education Teachers

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Introduction

As agricultural mechanics instruction remains a fundamental portion of many school-based agricultural education (SBAE) programs, teachers' experiences and knowledge levels in this content area are paramount (Burris, Robinson, & Terry, 2005; Wells, Perry, Anderson, Shultz, & Paulsen, 2013). Agricultural education teachers are often expected to possess a wide range of skills in a variety of areas, not the least of which is agricultural mechanics and its numerous facets (Phipps, Osborne, Dyer, & Ball, 2008). A particular skill area that has gained greater value within the workforce in recent years is computer-aided drafting (CAD) technology. Shultz, Anderson, Shultz, and Paulsen (2014) found that a majority of agricultural education teachers attached significant importance to this skill area. However, Shultz et al. (2014) also found that teachers regarded themselves as having low self-confidence in teaching CAD-based subject matter. As Wells et al. (2013) discussed, perhaps a prior lack of exposure to CAD technology has created this lack of confidence.

Agricultural education students at Iowa State University are required to successfully complete the Methods of Teaching Agricultural Mechanics (AGEDS 488) course during their preservice training. While the course is primarily designed to prepare preservice teachers to incorporate a variety of pedagogical strategies within their own future classrooms and laboratories, the course also provides introductory-level instruction within several agricultural mechanics content areas, including electricity, metal fabrication, small engines, and CAD technology. Thus, a wide range of basic mechanics-related content is presented within a semester-long course experience, ideally to provide greater strength in content areas of weakness, such as CAD technology.

How it Works

Within the metalworking portion of the course, preservice teachers are granted the opportunity to work with both the Torchmate 4x4 plasma cutting system and the Torchmate EDU software. This software system comes standard with Torchmate products sold to educational institutions, and grants the usage of a master license to be used by the course instructor. In addition, the software also provides unlimited student licenses that are subsequently issued to preservice teachers enrolled in the course. According to Torchmate, "[t]he only difference between the two licenses is in the exporting of files. The master license is the only license allowed to export readable CAD/CAM files. Student licenses are limited to exporting .edu files, which allows the teachers to moderate and approve student-designed artwork, giving them more control of how the table is used in the classroom," (2016, ¶ 2). These licenses allow students to download the EDU software on to their personal computers and use it for course assignments (Torchmate, 2016). The course assignments allow for instruction in the basic uses and operations of CAD technology, and typically include basic design and cutting projects, including wall and door hangers, desk nameplates, FFA emblems, and more. The use of the

student version of the software allows for a great degree of flexibility, as course participants can work on class and personal projects any time that they so wish.

Throughout the coverage of the Torchmate software and its functions, preservice teachers are granted various opportunities to work with CAD technology and learn its role in modern manufacturing and metalworking enterprises, as well as strengthen their confidence and abilities in using this technology. While CAD has been used within industry for several years at this point, allowing teachers to become more familiar with the technology will yield greater benefits for the workforce of the future (Torchmate, 2016).

Implications

As Shultz et al. (2014) illustrated, agricultural education teachers as a whole have very little confidence in teaching CAD technology within their programs, despite their beliefs that this content area is important in the realm of agricultural mechanics. Through the use of the Torchmate cutting system and the Torchmate EDU software in the AGEDS 488 course at Iowa State University, the next generation of agricultural education teachers in Iowa is expected to possess greater skills and knowledge in this valuable content area. To date, over two dozen preservice agricultural education teachers have been exposed to CAD technology through this approach, and it is expected that future sessions of this course will provide the same experience for others. It is expected that as these individuals become the next inservice agricultural education teachers in Iowa, this training in CAD technology will hopefully be utilized to further develop the future workforce population of the state.

Future Plans & Advice to Others

The AGEDS 488 course instructor expects that the topic of CAD technology will remain relevant for years to come, and that this approach will remain in use with course participants for the foreseeable future. The approach discussed here is currently being used in another agricultural mechanics course at Iowa State University as well and has been met with significant positive feedback and acclaim, including increased course enrollment. It is advisable that agricultural education teacher preparation programs with agricultural mechanics instructional components consider the acquisition of a Torchmate cutting and software system to improve and better diversify instruction in both metal fabrication and CAD technology. Such additions to current programs can pay dividends toward advancing the long-term human capital within workforce development and education.

Costs

There were no added costs directly associated with utilizing this teaching method to expand CAD technology instruction to preservice teachers. The student version of the software can be downloaded for free from the Torchmate website allowing the students to create electronic designs. However, it should be noted that if a final product is desired, the Torchmate plasma cutting table and master version of the software is needed. A basic 4x4 table with the Lincoln Electric Tomahawk plasma cutter costs around $19,000.00, depending upon the product package purchased.

References

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