Making the Connection: Integrating the RealCareer™ Electrical Wiring Kit into Agricultural Teacher Education

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Introduction

Providing students with instruction in technical agriculture subject matter is a fundamental component of a school-based agricultural education (SBAE) teacher's daily work. Technical agriculture subject matter includes a wide range of areas, such as plant science, animal science, agribusiness, and agricultural mechanics (Albritton & Roberts, 2020; Phipps et al., 2008). As a technical agriculture subject matter area, agricultural mechanics itself is quite broad, encompassing topics such as metal fabrication, power mechanics, and electricity (Wells & Hainline, 2021; Wells et al., 2021). This assortment of topics likewise requires SBAE teachers to have diverse knowledge and skill sets in agricultural mechanics, which can often present considerable challenges regarding teacher competence (Wells & Hainline, 2021).

SBAE teachers frequently report that they have recently taught agricultural mechanics courses in their programs (Wells & Hainline, 2021). Eck et al. (2019) indicated agricultural subject matter knowledge is a characteristic of an effective SBAE teacher. Thus, it stands to reason that pre-service teachers should be prepared to competently teach agricultural mechanics. Teachers who are competent in their subject matter are better able to positively impact the learning experience for their students (Wells & Hainline, 2021), which creates better opportunities to prepare students for their future endeavors.

Effectively teaching agricultural mechanics requires specialized training and resources (McCubbins et al., 2016), particularly regarding consumable and non-consumable materials and their uses. In the context of teaching students about electricity, these resources include, but are not limited to: (1) electrical tools, (2) electrical wire, and (3) switches and outlets. Acquiring the proper resources can be challenging due to a range of factors (McCubbins et al., 2016), thus creating additional barriers to delivering quality instruction in agricultural mechanics. Moreover, teaching agricultural mechanics often induces feelings of anxiety and hesitation for pre-service teachers (Tummons et al., 2017). Positive experiences with agricultural mechanics can help pre-service teachers to overcome negative feelings and prepare them to approach teaching agricultural mechanics with optimism (Whitehair et al., 2020). Considering these factors, it is imperative that agricultural teacher educators embrace new methods and opportunities to teach agricultural mechanics subject to pre-service teachers (Wells et al., 2021). Perhaps integrating the resource-inclusive RealCareer™ Electrical Wiring Kit into agricultural teacher education coursework would serve this purpose well through facilitating safe, hands-on instruction in technical agricultural mechanics subject matter.

How it Works

Prior to implementing the RealCareer™ Electrical Wiring Kit into our agricultural teacher education coursework, we used homemade wiring boards to teach electrical wiring skills to our pre-service teachers. These types of boards are commonly used by agricultural teacher educators to teach electrical wiring skills in their courses. Such boards typically consist of various junction boxes fastened to a piece of lumber. As part of our former instructional

approach, we provided our pre-service teachers with electrical schematics and wiring components. We then required our pre-service teachers to properly wire each electrical circuit assigned to them. To test each electrical circuit, we connected their completed circuit to a breaker box plugged directly into a wall outlet. This process was time-consuming and was potentially dangerous if an electrical circuit was wired incorrectly. We also used valuable class time when troubleshooting each electrical circuit.

To help overcome these issues, we procured several RealCareer™ Electrical Wiring Kits. Designed as a safer alternative to our prior approach, each kit included an electrical wiring assessment tool to test electrical circuits without requiring direct connection to a wall outlet. This alternative approach provided immediate feedback to the pre-service teachers as they worked to properly wire their electrical circuits. Each kit included a curriculum guide, a wall panel, and all the wiring components (e.g., switches, etc.) needed to complete various electrical circuits.

Results to Date and Implications

We used grant funds to purchase 10 RealCareer™ Electrical Wiring Kits during the Spring 2021 semester. To date, 22 pre-service teachers have used the kits in our agricultural teacher education coursework. Using these kits has resulted in a significant decline in safety issues during electrical circuit wiring activities. Anecdotally, our pre-service teachers have reported both: (1) reduced anxiety when working with electricity and (2) improved self-efficacy in their ability to properly wire electrical circuits. During a recent on-campus professional development activity, we demonstrated the use of these kits with over 40 in-service SBAE teachers. Several teachers subsequently reported that they have since acquired these kits to use with their own students.

Future Plans and Advice to Others

We are working to acquire two additional RealCareer™ Electrical Wiring Kits so all pre-service teachers in an agricultural teacher education course can use their own individual kit when wiring electrical circuits. If possible, we recommend having one RealCareer™ Electrical Wiring Kit available for each pre-service teacher in a course. We plan to continue using these kits in our agricultural teacher education program. We also intend to integrate these kits into agricultural mechanics-focused professional development workshops for in-service teachers.

Costs and Resources Needed

One complete RealCareer™ Electrical Wiring Kit costs approximately $750.00. The kit includes the wall panel demonstrator, electrical circuit components (e.g., wire, switches, outlets, etc.), the electrical circuit assessment kit, a downloadable electrical wiring curriculum, and a student exercise workbook. Additional electrical wiring panels and wiring component kits containing everything except the electrical wiring assessment kit can be purchased for $350.00 each. Electrical tools, such as pliers and screwdrivers, are not included in a kit. The necessary tools can be purchased at a local hardware store for approximately $100.00. We recommend that pre-service teachers work in pairs and share an electrical tool set to complete the electrical circuit wiring exercises found in the student exercise workbook.

References

Albritton, M. C., & Roberts, T. G. (2020). Agricultural technical skills needed by entry level agriculture teachers: A modified Delphi study. *Journal of Agricultural Education, 61*(1), 140-151. https://doi.org/10.5032/jae.2020.01140

Eck, C. J., Robinson, J. S., Ramsey, J. W., & Cole, K. L. (2019). Identifying the characteristics of an effective agricultural education teacher: A national study. *Journal of Agricultural Education, 60*(4), 1-18. https://doi.org/10.5032/jae.2019.04001

McCubbins, O. P., Anderson, R. G., Paulsen, T. H., & Wells, T. (2016). Teacher-perceived adequacy of tools and equipment available to teach agricultural mechanics. *Journal of Agricultural Education, 57*(3), 223-236. https://doi.org10.5032/jae.2016.03223

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. (2008). *Handbook on agricultural education in public schools* (6th ed.). Thomson Delmar Learning.

Tummons, J. D., Langley, G. C., Reed, J. J., & Paul, E. E. (2017). Concerns of female preservice teachers in teaching and supervising the agricultural mechanics laboratory. *Journal of Agricultural Education, 58*(3), 19-36. https://doi.org/10.5032/jae.2017.03019

Wells, T., & Hainline, M. S. (2021). Examining teachers' agricultural mechanics professional development needs: A national study. *Journal of Agricultural Education, 62*(2), 217-238. https://doi.org/10.5032/jae.2021.02217

Wells, T., Hainline, M. S., Rank, B. D., Sanders, K. W., & Chumbley, S. B. (2021). A regional study of the agricultural mechanics knowledge and skills needed by school-based agricultural education teachers. *Journal of Agricultural Education, 62*(2), 148-166. https://doi.org/10.5032/jae.2021.02148

Whitehair, R. L., Schramm, K. R. S., Wells, T., & Hainline, M. S. (2020). Preservice teachers' conceptualizations of agricultural mechanics. *Journal of Agricultural Education, 61*(3), 60-74. https://doi.org/10.5032/jae.2020.03060