Light Them Up

Jeffery J. Reed, University of Missouri
Dr. G. Curtis Langley, Tarleton State University

121 Gentry Hall
Columbia, MO 65211
573-882-7451
jjrnk6@mail.missouri.edu

Light Them Up

Introduction/need for innovation or idea

Agricultural educators are tasked with teaching complex electricity competencies (National Council for Agricultural Educators, 2015). However, educators have expressed a lack of depth in teaching rigor regarding electricity (Laird, 1994). Additionally, 98% of states agricultural education curriculum include electricity, yet less than 10% of preservice agricultural educators are required to enroll in a course focusing on electricity (Burris, Robinson & Terry, 2005). Likewise, only six percent of agricultural mechanics courses required within preservice agricultural education programs include any electricity competencies (Hubert & Leising, 2000). Hubert & Leising (2000) also noted the significant time factor educators invest into high school agricultural mechanics instruction. Likewise, Thieman, Henry and Kitchel (2012) synthesized one way agricultural educators can reduce stress is to have adequate teaching materials and facilities. Moreover, McCubbins, Anderson, Paulsen and Stremsterfer (2015) indicated there is a positive and strong correlation between the adequacy of tools and equipment available and a teacher's competence to teach an agricultural mechanics competency. Further, Schumacher and Currence (1989), determined "a higher level of subject matter retention occurs when instructors facilitate the learning process with high quality teaching aids." Although these assertions are positive from a theoretical standpoint, little evidence supports the notion of high quality teaching equipment readily available for agricultural mechanics competencies.

How it works/methodology/program phases/steps

Authors created a trailer wiring model to address the need for cost effective teaching aids in areas where educators need additional assistance in conveying appropriate knowledge to students. To develop skills needed in agricultural machinery, electronics and electrical principles, a curriculum packet was created. The curriculum packet used a problem based learning approach centered on the need to effectively wire a trailer model. The curriculum packet includes a lesson series related to trailer wiring, bill of materials for the actual trailer model, CAD drawings for fabrication of the trailer model, and industry references.

Thus far the curriculum packet has been created and dissemination at the 2016 National FFA Convention as a recruitment tool for ASABE (American Society for Agricultural and Biological Engineers). Additionally, as a means to engage students and teachers, patrons at the 2016 National FFA Convention were encouraged to participate in a "trailer wiring contest" with the six trailer models on hand.

Results to date/implications

The teaching aids were demonstrated at the 2016 National FFA Convention and received overwhelming positive feedback. Six trailer models were built and given away to educators across the nation. Since the Convention the curriculum packet has been requested across the nation by agricultural educators, science teachers, CTE directors, and Universities. In one such

instance a state educator professional development event revolved around the lesson plan with great success. While working with participants at the National FFA Convention a CTE director from California stated, “This is what we need in education.” Further a high school teacher from Minnesota stated she would “teach wiring of equipment if something like this was available”. These are a few examples of the overwhelming positive response received from this particular teaching aid.

Future plans/advise to others

The future of this project will include further dissemination of the lesson plan to agricultural educators for implementation within their programs. Discussion centering on kits available for purchase had happened, however at this time we feel the items required are readily available and easily assembled for this teaching aid. However, the group also understands one of the most valuable assets an agricultural educator has is time. This type of teaching aid ready-made, could reduce some of the stress regarding equipment and materials.

The group is continuing to work with ASABE to provide cost effective teaching aids for various agricultural mechanics areas. As this group develops lesson and teaching aid plans we will continue to offer them to educators and agricultural programs.

Cost/Resources need

The approximate cost for the teaching aid ranges from $64 to $100.00. A bill of materials is defined in Table 1. To construct a trailer model, additional resources such as welding and cutting equipment and general hand tools typically be found within an agricultural mechanic’s laboratory would be needed. Specialty tools such as multi-meters, test stands, wire crimpers, and/or soldering equipment may be beneficial, but are not a necessity. However, with the aforementioned equipment this curriculum packet provides insightful ideas for incorporating additional electrical principals into the agricultural mechanics curriculum.

Table 1. ***Approximate Cost to Build Teaching Aids***

Item	Cost
10’ 1x1x16 gauge square tubing	$12.00
2- Oval rear stop/tail/turn lights	$45.00 (Incandescent $10.00)
2-Amber front clearance Lamps	$12.00
20’ 4 way conductor copper wire	$10.00
1-4 Pin trailer plug	$10.00
30-Alligator Clips	$10.00
Total Approximate Cost	$99.00 (Incandescent lighting $64.00)

References

Burris, S., Robinson, J. S., & Terry, R. (2005). Preparation of pre-service teachers in agricultural mechanics. Journal of Agricultural Education, 46(3), 23.

Hubert, D. J., & Leising, J. (2000). An assessment of agricultural mechanics course requirements in agriculture teacher education programs in the United States. Journal of Southern Agricultural Education Research, 50(1), 24-31.

Laird, S. C., & Kahler, A. A. (1995, December). Present and future emphasis of secondary school agricultural mechanics programs in the United States. Paper presented at the 22”d Journal of Agricultural Education 5 2 Vol. 40, No. 2 1999 Annual National Agricultural Education Research Meeting, Denver, CO.

McCubbins, OP., Anderson, R., Paulsen, T. H., & Stremsterfer, E. (2015). *The Relationship Between Competency and Adequacy of Tools and Equipment Available to Teach Agricultural Mechanics Skills in Secondary Agricultural Mechanics Laboratories.* Paper presented at the North Central Region American Association for Agricultural Education, Minneapolis, MN. Abstract retrieved from http://www. http://aaaeonline.org/North-Central-Conference

Theiman, E. B., Henry, A. L., & Kitchel, T. (2012). Resilient agriculture educators: Taking stress to the next level. Journal of Agricultural Education, 53(1), 81-94. doi: 10.5032/jae.2012.01081

Shultz, M. J., Anderson, R. G., Shultz, A. M., & Paulsen, T. H. (2014). Importance and Capability of Teaching Agricultural Mechanics as Perceived by Secondary Agricultural Educators. *Journal of Agricultural Education*, *55*(2), 48-65. doi: 10.5032/jae.2014.02048

Schumacher, L. G., & Currence, H. D. (1989). A useful workshop model provides university faculty for much needed instruction on electricity in agriculture. *NACTA Journal*, *33*(2), 74-77.