A Closer Look at the Agriculture Teacher Shortage: Examination by Pathway

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Introduction

Secondary agricultural education positions continue to outnumber qualified applicants (Foster et al., 2014, 2015; Smith, et al., 2017). In some cases, programs are closed due to inability to secure a teacher. In 2016, a loss of program or position(s) was reported in 27 states (Smith, et al., 2017). The National FFA Organization describes the agriculture teacher shortage as the greatest challenge facing agricultural education and the FFA organization (National FFA, 2018). Nearly one-half of the replacements needed in 2009 were filled with individuals holding an emergency certification (Kantrovich, 2010). Are educational preparation programs preparing students with the skill sets that are and will be needed in school-based agriculture education programs across the nation?

Conceptual Framework

Kirkpatrick's (1976) four levels of evaluation was used as the conceptual framework for this study. Kirkpatrick's levels include reaction to criteria, learning criteria, behavior criteria, and results criteria. The former two are consider internal to the organization and the latter two external to the organization. This study focuses upon the external criterion of results.
Limited literature exists to determine shortages in specific pathway areas. Easterly et.al., (2018), in a study of baccalaureate agriculture teacher education programs, found that plant science, animal science, and power structural and technical systems were the top three technical knowledge content areas required by secondary programs across the United States. A lack of empirical evidence remains in identifying the need for agriculture teachers with preparation in specific pathways across secondary agriculture education.

Methods

The population of interest for this study comprised California agricultural education teachers (N = 944) identified using the 2018 -2019 California Agriculture Teachers Association membership directory. A simple random sample of 600 teachers was drawn Those drawn received the researcher-developed instrument. The instrument was designed to assess California agricultural education teachers' perceptions of growth of the seven pathways defined by the California department of education (California DOE, 2013). Respondents were asked to rank the seven pathways in respect to their local school districts in order, from fastest growing to slowest growing. The survey instrument was evaluated by a panel of experts for face and content validity. The usable response rate was 44% (n = 264) with a total response rate of 48% (n = 288). Data were analyzed using descriptive statistics and ANOVA to determine if differences between gender were present in perceived pathway growth at the program level. Perceived growth data were organized in a ranking fashion using calculated mean values for each of the individual pathways.

Results

Objective 1 described the typical respondent based upon California FFA Region membership, years of teaching experience, and gender. The typical respondent in this study was a female

teacher (n = 151) from the Central region (n = 77) with 12.57 years of teaching experience. Objective 2 described perceptions of pathway growth. The pathway with the greatest perceived growth was the agri-science pathway with a mean score of 2.61 (SD = 1.60). The pathway with the least amount of growth was the forestry and natural resources pathway, with a mean score of 6.21 (SD = 1.25). Effect size, using Cohen's d, was used to describe the practical differences between these pathway rankings. Cohen's d was calculated using a pooled standard deviation (SD = 1.64) across means. A negligible effect size (d = .018) was found between the agri-science and agricultural mechanics pathways. A medium effect size (d = 0.713) was found between the animal science and agricultural mechanics pathways indicating a practical difference in rankings. Negligible effect sizes were found between animal science and ornamental horticulture (d = .177), ornamental horticulture and agribusiness (d = .122), and the agribusiness and plant and soil science pathways (d = .018). A large effect size (d = 1.15) was found between the plant and soil science and forestry and natural resources pathways. Practically, the teachers perceived three groups, agri-science and agricultural mechanics are growing rapidly, while animal science, ornamental horticulture, agribusiness, and plant and soil science are moderate, and the forestry and natural resources pathways is low, in growth.

Objective 3 compared perceived pathway growth by gender. Seven pathways were evaluated by mean score. Perceived pathway growth rankings were different, within the three groupings, by gender. Female respondent rankings matched overall rankings, while male respondents differed in their mean score rankings. Responses from males indicated that they believed the agricultural mechanics pathway to be the fastest growing pathway with a mean score of 2.34 (SD = 1.47). The other difference between male and female respondents was in the ornamental horticulture pathway, where male responses indicated a ranking of 6th with a mean score of 4.42 (SD = 1.72). A one-way ANOVA was used to determine if differences existed in the perception of pathway growth among the seven different pathways when respondents were grouped by gender. There was a significant difference in perceived pathway growth for Agricultural Mechanics [$F(1, 262) = 6.57$, $p = .011$] when grouped by gender. Additionally, there was a significant difference in perceived pathway growth for Ornamental Horticulture [$F(1, 262) = 6.92$, $p = .01$] when grouped by gender.

Implications, Conclusions, and Recommendations

Pathway growth is arguably driven by student interest leading to student enrollment. The agri-science and agricultural mechanics pathways are perceived by California agriculture teachers to be experiencing significant growth. These pathways differed in ranking between genders within the top grouping, but both male and female teachers believe them to be the top two pathways for growth. The pathways comprising the middle four remained consistent between genders, although males and females differ in their ranking of the ornamental horticulture pathway. Both males and females ranked the forestry and natural resource pathway low in perceived growth. This study supports the limited research that exists on pathway demands in the secondary setting (Easterly et al., 2018). Additional research should be conducted to expand the scope of this study. Information secured in the area of pathway growth and demand should be used to guide teacher preparation programs to prepare teachers with skills and knowledge in high demand pathways.

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