Examination of the Engineering Technology Career-Related Interest and Choices

Impacting Career Pathways in a Rapidly Changing Marketplace: A Qualitative Case Study

Kristin Frady[1], Daniel Stockwell[1], Claretha Hughes[2], & Karen High[1]

[1]Clemson University, Clemson, SC USA

[2]University of Arkansas, Fayetteville, AR USA

Abstract

Technology in the workplace is disrupting the world of work in unprecedented ways including displacing entire occupations and creating new sets of skills (World Economic Forum [WEF], 2018). Employment growth and wages of middle-skill and engineering technology (ET) professionals, a large sector of the American workforce educated in two-year colleges, are particularly vulnerable to and have declined as a result of the advances of workplace technology and automation (Autor, 2015). Yet, research and the role that ET plays in the skilled technical workforce and supporting the nation's technical infrastructure and capacity for innovation has been absent from discussions of the future of the workforce (National Academy of Engineering, 2016). Recruiting and retaining highly qualified engineering technicians, engineering technologists, and skilled technical workers is a major challenge which impacts the productivity and the future growth of many firms (WEF, 2018). Despite the fact that there are 17 million workers in the skilled technical workforce, there is still a predicted shortage of nearly 3.4 million workers by 2022 (National Science Board, 2019). This current and future skills gap results in a labor shortage exacerbated by technology advancements and globalization.

As the workforce is changing, a lack of understanding of career pathways is contributing to workforce shortages and adversely affecting recruitment and retention (Moffatt, 2016). Career pathways are series of latticed authentic experiences, educational programs, activities, strategies, and systems enabling individuals to build and advance career opportunities (citation omitted). As careers have become more flexible, transitional, and multidirectional; insight into career perceptions and expectations of the emerging workforce is critical for shaping talent management strategies (Moffatt, 2016). The effect of the 4th Industrial Revolution on contemporary talent management practices emphasizes the need for more effective approaches

including a focus on talent attraction and recruitment, creating supportive internal networks, and development (including career development) of individual employees (Whysall et al., 2019). Thus, there is a need to develop a greater understanding of the career pathway formation of ET students who are prepared at two-year colleges.

The purpose of this study is to examine student perceptions and understanding of career pathways in ET. Using social cognitive career theory (SCCT) as a theoretical framework to guide analysis, 45 ET student essays on future education and career plans were analyzed using a stacked matrix approach. Students were prompted to write about (1) past educational and career experiences, interests, and influences; (2) educational plans including future courses and degree plans; and (3) career plans five, fifteen, and forty-five years in the future. The research question guiding this study was:

RQ: What is the effect of educational and career experiences on ET pathway development and professional formation?

SCCT focuses on how educational and career interests develop, how educational and career choices are made, and how educational and career success is obtained (Lent & Brown, 1996). In the model, person inputs and background environmental influences impact learning experiences which influence the primary variables of self-efficacy, outcome expectations, and personal goals (Lent & Brown, 2000). Using SCCT as a lens for analysis, student responses were categorized into areas of prior experiences (learning and workplace), challenges and needs, interests and influences, workplace/workforce knowledge, career outcome expectations and goals, and educational plans. This analysis helped to provide a simplified view of how ET career-related interests and choices develop and impact career pathways.

Findings revealed that students wrote very little about prior learning and workplace experiences perceived to support their career development. Overwhelmingly the greatest challenge was concern about hard future coursework. Students' interests were most often related to lifestyle and family where students reported making decisions based on current and future family connections with many other mentions of interests in innovation and creativity. The greatest professional influence on the students was from having a family member work in the field or specific company of interest. Students demonstrated little workplace and workforce knowledge reporting mostly on average salary ranges. The most common outcome expectations and goals were making lots of money, working for a large organization, career advancement (typically related to holding an executive title), and a little over 10% reported an interest in entrepreneurship. Throughout the essays, the students wrote the most about their educational plans. Over 70% had identified a specific engineering discipline with the most common being civil and mechanical engineering. Nearly the same percent also report future plans to engage in an internship or co-op. Finally, almost half of the students mentioned plans to earn a graduate degree as a way to increase future salary.

This analysis contributes to research showing that student knowledge of and information pertaining to ET career pathways is limited and vague. The disconnect between little mention of prior experiences and superfluous workplace knowledge suggests that students need guidance on development of specific, personalized ET career pathways that connect these concepts with rapidly evolving industry demand in the field of ET. Developing strategies and systems supporting personalized ET career pathway development can support formation of more specific and measurable career outcome expectations and goals. More specific and measurable career goals will be better able to support greater early career success, future career sustainability, and a

clearer understanding of professional formation of ET professionals (Moffatt, 2016). Ongoing

research being conducted by this group of researchers is focused on using this insight to guide

quantitative analysis of a career survey distributed to over 500 ET students. These findings will

help build a more empirically based ET career pathway system for use in education and career

counseling.

The outcomes of this study help provide information to ET programs and curricula,

explore new learning and career opportunities linking two-year colleges and industry, and

support recommendations for creation of a more sustainable ET workforce capable of fueling

regional economic growth.

Keywords: career development, engineering technology, social cognitive career theory

References

Autor, D. H. (2015). Why are there still so many jobs? The history and future of workplace

   automation. *Journal of Economic Perspectives, 29*(3), 3-30.

   http://dx.doi.org/10.1257/jep.29.3.3

Lent, R.W., & Brown, S.B. (1996). Social cognitive approach to career development: An

   overivew. *Career Development Quarterly, 44*, 310-321. https://doi.org/10.1002/j.2161-

   0045.1996.tb00448.x

Lent, R.W., & Brown, S.B. (2000). Contextual supports and barriers to career choice: A social

   cognitive analysis. *Journal of Counseling Psychology, 47*(1), 36-49.

   https://doi.org/10.1037/0022-0167.47.1.36

Moffatt, J. (2016). Understanding career pathways in agriculture: Theorising the farmhand

   career. *Australian Journal of Career Development, 25*(3), 129-138.

   https://doi.org/10.1177/1038416216676605

National Academy of Engineering. (2016). *Engineering technology education in the United

   States.* Washington, DC: The National Academies Press.

   https://www.nap.edu/catalog/23402/engineering-technology-education-in-the-united-

   states

National Science Board. (2019). *The skilled technical workforce: Crafting America's science &

   engineering enterprise.* https://www.nsf.gov/nsb/publications/2019/nsb201923.pdf

Whysall, Z., Owtram, M., & Brittain, S. (2019). The new talent management challenges of

   Industry 4.0. *Journal of Management Development, 38*(2), 118-129.

   https://doi.org/10.1108/JMD-06-2018-0181

World Economic Forum (WEF). (2018). *Towards a reskilling revolution: A future of jobs for all*.

Geneva, Switzerland.

http://www3.weforum.org/docs/WEF_FOW_Reskilling_Revolution.pdf