

Contextualized STEM Education through Advanced Visualization: Applications for Workforce Development in Off-site Construction

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From 2011–2013, 765,000 workers were displaced from manufacturing jobs they had held for at least 3 years. Of those displaced, fewer than 60 percent were reemployed by 2014, and many in industries other than traditional manufacturing. One such industry, offsite construction, is a new and emerging alternative to site-built construction, as contractors are increasingly turning to prefabrication to offset a skilled worker shortage expected to exceed 2-million by 2017. Building components pre-fabricated in a controlled, offsite environment may dramatically reduce entry-level training requirements as well as accelerate speed to market, reduce site logistics and cost, and improve productivity, quality and safety. Workers in a manufacturing environment can quickly learn entry-level job skills, reinforced by repetition, while gaining more advanced training, and nationally-recognized credentialing. Although growing use of off-site construction would create job opportunities for manufacturing workers, many lack basic foundational and employability skills, transferable occupational skills and English literacy necessary to train and 'retool' for careers in construction manufacturing. Many other workers, particularly younger workers, are not attracted to an industry they perceive as low tech, low pay, dangerous and dirty. In this research project funded by a U.S. Department of Labor Trade Adjustment Assistance (TAA) grant, the University of Nebraska Lincoln (UNL) partnered with five Nebraska Community Colleges to expand and improve the ability of this institutional Consortium to deliver technology-enabled education and career training programs in different levels that can be completed in two years or less for individuals including displaced construction or manufacturing workers, young adults, semi-skilled workers, low-skilled workers, under-represented groups such as women, minorities, veterans, and workers in STEM related jobs who face unemployment and underemployment. Basic skills training was integrated or 'contextualized' within the framework of occupational skills training. Techniques in advanced online visualization were used to not only provide a blended learning environment as an alternative to traditional classroom training but also to enable self-paced, distance learning necessary to accommodate work-life issues and attract 'tech savvy' younger workers. Tooling U is the online, contextualized training software and the learning management system (LMS) is a part of Tooling U that stores participants' outcome data. In addition to the effect of the contextualized content, outcome data is correlated to participant demographics (e.g. age, gender, race/ethnicity, employment, veteran, disability, financial need, TAA status) to determine if contextualized content is more or less effective relative to various demographic groups. Individual interviews are planned following the analysis of the effect of the training system on student outcomes. The results are expected to show a significant improvement in student outcomes when contextualized advanced visualization is used in the training system. Also, the displaced workers are expected to show more willingness to participate in the online advanced training programs that are offered through Community Colleges in comparison to traditional in-class training due to work life issues. Off-site construction is predicted to increasingly hire manufacturing and other STEM related displaced workers in coming years. The goal of this research is to use distance and blended learning to help workers develop the basic STEM and occupational skills they need to enter high-growth, high-demand manufactured construction occupations as quickly as possible. This research highlights the use of advanced visualization to not only provide skills training and credentialing, but to recruit workers and develop sustainable workforce pipelines through continuous education and career advancement.