

Middle Tennessee State University (MTSU) seeks \$750,000 IMLS National Leadership Grants for Libraries (NLGL) funding for a three-year applied research project (July 1, 2023 - June 30, 2026) titled **An Investigation of Virtual Reality Initiatives and Workforce Development Outcomes in Libraries** to investigate virtual reality career exploration and training initiatives in libraries and their role in yielding positive workforce outcomes (i.e. entry, re-entry or career transitions in the workforce) for users. This project is aligned with NLGL Goal 1, objectives 1.1 and 1.3; and Goal 2, objective 2.1. Alignment with goals and objectives is indicated in the proposal by (*bold italics in parenthesis*).

Project Justification. Multiple counties in the Tennessee Regional Library System (TRLS) service area are classified as economically distressed or at risk for becoming economically distressed (TN Dpt. Econ Dev., 2022). TRLS employees have observed job-seeking patrons accessing a distinctive feature of libraries which we hypothesize is critically essential to workforce development in economically depressed areas – technology access. Public libraries are an ideal place for expanding access to technology and skills training through non-formal learning given their potential for reaching a large group of jobs seekers because of their reputation as trusted information sources, high volume of use and geographic distribution of facilities (Colegrove & Douglass-Westergard, 2021; Holcomb et al., 2019). Virtual reality (VR) has proven to be an effective and affordable non-formal learning solution for exposing job seekers to career opportunities and training aligned with industry credentials often required for employment (Kim et al., 2020; Le et al., 2015).

Identifying factors and strategies that motivate a diverse population of job-seekers in a community (*Goal 2*) to utilize library-based employment-related services is essential to training a skilled workforce and creating a pipeline for diverse populations to careers (Holcomb et al., 2019). Libraries have (a) provided workforce development programs for residents to access jobs (Mt. Auburn Associates, 2021); and (b) in recent years, incorporated VR as part of *smart library* technologies (Enis, 2018; Greene & Groenendyk, 2018). Interestingly, the incorporation of VR into library-based workforce development initiatives lacks wide-spread adoption and supporting empirical research (Suen et al., 2020). This project intends to fill voids in the literature by conducting a short-term longitudinal study of VR as an informal (*Obj. 1.1*), continuous learning (*Obj. 1.3*) approach for exposing job-seeking library patrons to training and career opportunities (*Goal 1*). A review of studies investigating usage of virtual reality for workforce development in libraries yielded zero results. Further, no previous studies have looked at employment-related outcomes of workforce development programs and services (Mt. Auburn Associates, 2021). Therefore, this effort represents the first known investigation of virtual reality workforce training in libraries as well as the first known study to assess the actual employment-related outcomes of workforce development (*Obj. 1.1 & 2.1*) services provided by libraries.

The simple graphic in Figure 1 illustrates the learner (under-skilled job-seeking library patron), the learning outcome (up-skilled job-seeking library patron), and the approach that informs change (VR workforce training associated with industry credentials and career exploration). Many more details can be added (e.g. age, race/ethnicity, socioeconomic status, prior/current work experience, ability/disability, veteran status, and education level of patrons, for example). We hypothesize the association between under-skilled job-seeking library patrons and employment-related outcomes is moderated by library service quality (illustrated by the arrows at the top of the figure). This graphic is a useful starting place for understanding our approach. While keeping the learner at the center, we will also consider the contextual factors (eg. county economic status, existing employment-related library services, learner motivation, and library promotion/outreach efforts, among others). We illustrate the change with an upward slope because we hypothesize the outcome is an improvement.

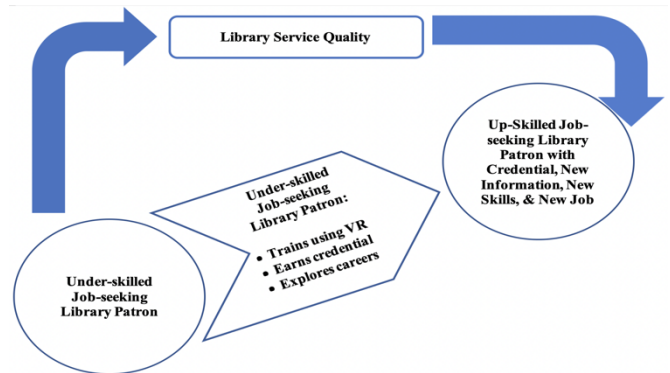


Figure 1. Theory of change illustrating how VR can support the upskilling of library patrons.

Findings will directly inform future work of TRLS libraries, and indirectly inform the work of libraries across the country, enabling them to design future workforce development programming and implement structures that support library patrons in job-seeking efforts. To that end, identifying salient features of VR training that yield positive workforce outcomes will specifically benefit underrepresented populations by focusing efforts on those activities.

Project Work Plan. We will work across six counties in Middle TN - two economically distressed (Clay & Grundy), two at-risk (Warren & Wayne), and two neither at risk nor distressed (Davidson & Rutherford), and equip six libraries, including MTSU’s library, with VR technology associated with four in-demand career sectors (Figure 2) in those

Figure 2. In-demand occupations requiring OSHA-10 overlapping w/ Transfr’s VR Simulations

Automotive & Diesel Tech	Healthcare	Hospitality & Tourism	Mfg. & Construction
-Mechanics -Automotive Technicians -Maintenance/repairers -Diesel Engine Spec. -Heavy Equip. Mechanics	-LPNs -Nurse Assts. -PT Assts. -Resp. Therapists -Home health Aide	-Food Service Mgrs. -Food prep & servers -Cooks	-Construction Site Personnel -Metal (Weld, Cut, Solder, Braze) -Freight & material movers -Supervisors Maintenance Workers -Production & Operating Workers -Machinists -Industrial & HVAC Mechanics -Electricians & Engineering Techs

counties, involving an anticipated 900 users. We will partner with the TRLS and Transfr VR, a workforce development organization focused on training the next generation of workers for in-demand jobs via hands-on, simulated VR training. Libraries will promote VR workforce training opportunities aligned with opportunities in the local area and coupled with industry credentialing (OSHA 10) to patrons, including teens, adults looking to make career transitions or enter/re-enter the workforce, veterans, immigrants and refugees, individuals with disabilities, and senior citizens (*Obj. 1.3*) at no cost to patrons. Transfr will provide technical support and training; library staff and Transfr will support research team data collection. Table 1 connects study objectives with research questions, methods and data sources, anticipated outcomes, and the national impact of results. The project has three phases. Phase 1 (July – Dec, ‘23) involves IRB approval, acquiring VR technology, training library staff, and creating research instruments. Phase 2 (Jan ‘24 – Dec ‘25) involves data collection, analysis, refinement of library-based programming and dissemination. Phase 3 (Jan – June ‘26) involves analysis and dissemination. Throughout the project, work will be guided by an external advisory board (EAB) with national library and workforce representation. Project PIs have library, workforce, and educational research expertise. Table 1. Objectives, research questions, methods and outcomes.

Objective 1: Establish empirical evidence in the effectiveness of the non-formal learning approach in the public library setting (i.e., VR training) on workforce development, especially in the economically depressed areas. RQ 1: What are the associations between VR training at libraries and workforce outcomes?		
Methods and Data Sources	Research Outcomes	National Impact
<u>Quantitative analyses</u> - descriptive - correlation/regression <u>Data source</u> - library service usage data - library staff survey data - patron survey (pre/post) - VR Usage Dashboard	<u>Career preparation outcomes</u> (within 6 months of training) - credentials (in progress) - new careers explored - new information obtained - new employment-related skills obtained <u>Career outcomes</u> (6 months after the training) - credentials earned - new employment as a result of VR training	Provide empirical evidence for wide-spread adoption of VR workforce training in libraries across the nation, especially in economically distressed communities
Objective 2: Identify library features and strategies that enhance workforce outcomes through VR training. Research questions: (RQ2) How does the association between VR training and workforce outcomes vary between libraries? (RQ3) How does library service quality explain the differences in utilization of workforce-related library services?		
Methods and Data Sources	Research Outcomes	National Impact
<u>Quantitative analyses</u> - moderation analyses <u>Qualitative analyses</u> - content/narrative analyses <u>Data source</u> - library staff survey data - library service usage data - patron interview data - employee interview data - VR Usage Dashboard	<u>Library-based outcomes</u> - library features and strategies that enhance workforce development programs and workforce outcomes - library features and strategies that motivate diverse job-seekers to utilize employment-related services <u>Patron outcomes</u> - differential technology training experience based on the varying library service quality - differential workforce outcomes based on the varying library service quality	Provide evidence-based features and replicable strategies for other libraries to implement and create future workforce development programs utilizing VR

Diversity Plan. This project aims to partner with libraries serving a spectrum of patrons in varying socio-economic statuses located in rural, suburban and urban settings in order to recruit a diverse pool of participants. We anticipate a breadth of ages, genders, races, and ethnicities will be reached. We will consider accessibility for library selection.

Project Results. Findings will enhance capacity of libraries (*Goal 1*) to lead and contribute to efforts that improve community well-being (*Goal 2*) with regard to workforce development. An implementation guide will be created for replication of library-based VR workforce development programming across the country (*Obj. 1.1 & 2.1*). Project dissemination will be informed by members of the EAB and shared with practitioners and researchers through social media, a project website, national conference presentations and published articles in the fields of library science and workforce development. Through webinars, we will engage a national audience interested in learning about the work.

Budget Summary. MTSU requests \$750,000 as follows: \$233,764 for salary support (3 PIs, postdoc and grad student support, and EAB stipends) and \$65,448 for fringe benefits; \$278,000 to be dispersed among participating library partners for VR career training (\$218,000) along with participant credentialing and research stipends (\$60,000); \$4,000 for supplies; \$8808 for travel; \$159,980 for indirect costs at MTSU’s federally negotiated rate.