The Modular Smart Classroom: Anchoring Communities with Interactive Learning Spaces
Proposal Summary
Fort Hays State University (FHSU) Forsyth Library, FHSU Institute for New Media Studies, and their partners request $49,839 to prototype and develop programming for a replicable, modular smart classroom kit as a Community Anchor project. Smart classrooms help academic libraries provide access to new technology, teach data literacy, and demonstrate their status as early adopters of new technologies. The idea of smart classrooms is not new, but their cost can be prohibitively expensive, especially for smaller and rural libraries. The kit's modularity will make it significantly less expensive to install than existing smart classroom options.

Statement of National Need
Providing students with access to new technologies is critical to preparing them for rapid technological change in the workplace (Mark Warschauer & Tina Matuchniak, 2010). Moreover, it gives students new reasons to visit libraries and enables them to interact with libraries in new ways, which is a priority for the field (Boateng & Liu, 2014). The need for new technologies in libraries is nationally significant as teaching data literacy is important in the era of big data to improve students' understanding of statistics, graphs, data-driven arguments, personal data management, research, and ethical data use (Calzada Prado & Angel Marzal, 2013; Carlson, Nelson, Johnston, & Koshoffer, 2015; Fontichiaro & Oehrli, 2016). The smart classroom incorporates off-the-shelf, short-throw projectors and projection fabric panels that turn any size wall into an interactive display, thus providing a space for academic libraries to teach students about data visualization and literacy.

Aside from instruction, smart classrooms benefit academic library events and exhibits. For instance, smart classrooms can provide access to interactive 3D models of archival artifacts and documents too fragile for physical interaction. Using smart classrooms for events and exhibits provides an opportunity to dispel the widespread myth that libraries are obsolete (Herring, 2014), where in reality, libraries are frequently early adopters of new technologies. The Center for the Future of Libraries (2016) confirms that the smart classroom is a timely project by identifying four relevant trends: "Connected Learning," emphasizing that students need access to new technologies to level the playing field and facilitate hands-on, collaborative learning; "Data Everywhere," as data collection is on the rise and students must know how to work with it, especially since managing data has become a valuable job skill; "Digital Natives," emphasizing that the current generation of students sees the world in a new way requiring instructors to investigate new teaching styles; and "Gamification," which promotes spatial reasoning, math, and logic.

Project Design
We will conduct the project in three phases: first, the planning phase, scheduled from October through December; followed by the development phase, from January through May; and then the documentation phase, from June through September.

Although we believe the smart classroom kit could also be impactful in school and public libraries, given the limited time frame, we want to start by investigating academic applications. We will begin the planning phase by bringing together a cohort of potential smart classroom users, including librarians at FHSU, the University of Nebraska at Kearney, University of Kansas, Pittsburgh State University, Dodge City Community College, Johnson County Community College, and Labette Community College. This cohort covers a broad range of academic library types, including research universities, regional comprehensives, and community colleges. The participants will meet in virtual focus groups to discuss desirable design features and functionalities for the smart classroom kit. We will provide them with background information about similar projects and potential technology that could be incorporated into the prototype.

In the development phase, we will build a low-cost modular smart classroom kit. The kit will be designed based on the cohort's feedback and consultations from Laurel Zhang, Director of Special Projects for the nationally recognized Exploration Place (Wichita, KS) and Kristin Fontichiaro, Clinical Associate Professor at the University of Michigan's School of Information. To keep costs down, we will use open source software and

components that are easy to purchase in bulk or at wholesale prices, such as rolls of projection fabric instead of traditional screens. Implementing the kit will be an iterative sequence: design, implement, test with stakeholders, repeat. By having stakeholders available at all stages, the process will be purposeful yet efficient. Once the kit is complete, we will work with the cohort to develop and demonstrate use cases in data visualization and virtual reality. Since the kit will be portable, we can easily test its effectiveness in multiple library locations.

Based on our iterative design and testing, we will provide user-tested documentation to be disseminated with the kit and assembly instructions. The documentation will contain suggestions for possible programs and events as well as a pedagogical and technical training manual based on the challenges and successes the cohort encounters while testing the prototype.

National Impact
The project deliverables will consist of the documentation needed to deploy the smart classroom effectively, including a list of required and recommended kit components, assembly instructions, the training manual, and a report on how the smart classroom can be used to advance practice in promoting data literacy and contribute to library events, including detailed instructions for suggested programs. We will post this documentation in the FHSU Scholars Repository under a Creative Commons license, where it will be easily accessible to other academic libraries that seek a more affordable smart classroom. We will advertise the kit by publishing a summary of the project in a journal devoted to academic libraries and by giving presentations at national library conferences. We will also post it to the listserv for the ALA's Association of College and Research Libraries.

FHSU and Key Staff Members
FHSU is an ideal place to build the smart classroom prototype. FHSU is average in size, has students at all levels from associates to graduate, and exemplifies the type of institution where the smart classroom would be most useful. FHSU is located in rural Hays, Kansas, an underserved community regarding access to new technology, so the smart classroom would promote digital inclusion. The library itself was built in 1967, so it would be difficult to install a traditional smart classroom space without significant investment.

The principal investigator will be Claire Nickerson, Learning Initiatives Librarian, who holds an MLIS and a Digital Humanities Certificate from UCLA and is familiar with technologies for data visualization and digital collaboration. The Co-PI, Gordon Carlson, Assistant Professor of Communication Studies and Director of the Institute for New Media Studies, holds a PhD in New Media Communication from the University of Illinois at Chicago, where he served in the Electronic Visualization Lab. He has researched and published on pedagogy, formal and casual learning, and virtual/augmented reality approaches to learning.

Budget
Personnel costs include salary and fringe for a single course release for the Co-PI and a student employee ($4,959). Increased community participation through a board of rural learning community representatives, incentivized focus groups, expert consultations, and stakeholder feedback activities involve travel and materials production costs ($10,710). Technology to create, test, and implement platform prototypes includes projection, interactive smart technologies, and computer equipment ($32,265). Other expenses include cost of publishing research, presenting the ongoing project to public stakeholders, and disseminating results to scholarly community ($2,023). Indirect costs are based on the federally negotiated rate of 38.72% of salary and fringe ($1,920) and total expenses stay below the planning grant maximum through a cost share with partner organizations ($2,038).

Total Direct Costs: $47,919 (Grant) & $2,038 (Cost Share) **Total Indirect Costs**: $1920
Grand Total: $51,877 ($49,839 from IMLS)

References: see http://fhsu.edu/technology/newmedia/Research/imls_grant_references