Integration of Portable, Accessible, and Scalable Classroom Virtual Reality Solutions:
Utilizing the Oculus Rift and Gaming Platforms to Teach Game Design and Information Visualization

1. **Courses(s) or curriculum affected**
   ART09.453 Introduction to Game Media Design
   ART09.364 Advanced Graphic Design VI (Visual Communication)

2. **Name of applicant(s)**
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3. **Objectives of the proposal: How they meet the criteria of innovation, scalability, and adaptability.**
   Virtual Reality as an educational tool in the classroom has historically been unwieldy and inaccessible due to complex installation, implementation, and training. Expensive Virtual Reality Theaters, CAVE's, and complex programmatic peripherals and software installations create barriers to entry for most non-computer science and engineering based faculty and students. Consequently, these barriers have challenged the gaming industry until recently when new technological innovations have allowed for increased accessibility to the masses with the invention of affordable and scalable tools for home and personal entertainment. Harnessing current gaming technology tools, specifically ones that integrate Virtual Reality (the Oculus Rift Headset, the PlayStation 4 with VR kit, Leap Motion wireless and touch-less mouse) can augment students' educational experience, interactions, and engagement through two proposed methods:

   1. Students have the opportunity to experience alternative learning strategies through immersive displays of visual information in the form of: Interface Design, User Experience Design, and Artificial Intelligence Interaction (narrative based with social, cultural and decision based queries) and visualization of qualitative and quantitative information — both aesthetic and artistic.

   2. Students will learn how to visualize design based concepts through the course content of Introduction to Game Media Design and Graphic Design V: Visual Communication. The opportunity for students to critique, discuss, and innovate or "hack" the technology for their visual projects in game design and information design has the potential to provide meaningful learning, tangible, and measurable outcomes of project production. Students' experiential learning experience will engage and mediate the tactile, auditory, visual, and spatial.

It is noted in the recently published article *5 Design Jobs That Won't Exist In The Future* by John Brownlee, that the future of design based careers are ever evolving, transforming, and transcending the current boundaries of design based curriculums. The following quote supports this proposal in the integration of innovate, accessible, and cost effective VR technology into the classroom:

Virtual and augmented reality is set to become a $150 billion industry by 2020, disrupting everything from health care to architecture. UT Austin's Doreen Lorenzo thinks that more user

interface designers will start strapping themselves into Oculus Rifts and becoming VI designers. "As more and more products become completely virtual—from chatbots to 3D projections to immersive environments—we'll look to a new generation of virtual interaction designers to create experiences driven by conversation, gesture, and light," she writes.

Additionally, the article cites that design jobs will transform and specific new career areas will evolve: Visual Interactive Designers, Specialist Material Designers, Algorithmic/AI Design Specialists, Post-Industrial Designers, Design Strategists, and Organizational Designers. The use of VR technology, experiential, and immersive scenarios will be a central objective to evolving the current educational and pedagogical platforms around Graphic Design, Game Design, Biomedical Art and Visualization, and visual based aesthetic careers that depend on the design of information for integration into our daily lives.

The proposal for the *Integration of a Portable, Accessible and Scalable Classroom Virtual Reality Solution* into the classroom experience meets the following criteria of innovation, scalability, and adaptability by the following:

Innovation: Virtual Reality (VR) technology is not a new concept and is currently being utilized at the South Jersey Technology Park with our Rowan University CAVE. However, the current challenge is using this unwieldy technology in a practical, smaller scale environment and within the classroom, where cost and accessibility are not prohibitive to the University and specific course adoption. The innovation in using the VR tools we are recommending to teach students design based subjects is far more economical and accessible and will allow students to achieve educational experience through immersive critiques, interactions, analysis of current aesthetics and visual information trends in both serious (educational simulations in medicine and science) and casual games (entertainment, exercise, and RPG narrative)

Scalability and Adaptability: The VR technology we are recommending is affordable, accessible, and intuitive to the generation of students Rowan University is currently recruiting and admitting. The course curriculum and professor's adoption of VR technology in the classroom can be scaled in terms of:

1. Specific subject expertise and content, allowing for the integration of previously produced VR game software in simulations, narrative and role playing allowing professors to create pedagogical links to learned and tested content in their classes;
2. Allowing students to innovate, re-engineer and "hack" the software to create new visualizations of content and tools, an open-source model and flipped classroom approach to giving students the hardware and software to incubate new ideas.
3. The adaptability factor also includes workshops for interested faculty that will demonstrate how their specific content area can be viewed through VR. Scheduled workshops for Rowan faculty would include how and where a VR based headset and PS4 VR kit can augment their curriculum, through viewing open source content online and engaging students to innovate with the tools in an immersive educational experience. The possibility of a future classroom at Rowan University could entail a VR Headset and haptic mouse or wireless touch less mouse with each PC enabling students to interact with web based content, images, sounds and text.

4. Description of the specific innovation

The specific innovation proposed involves acquiring and using the following technologies (*listed below*) in a classroom environment to create an immersive experience of course content augmenting learning outcomes in aesthetic and design based areas specific to: Introductory Game Design and Graphic Design V: Visual Communications and Information Visualization. The innovation would rely on using the pre-packaged technology of portable and accessible VR into a humanities based classroom, whereby these students are not traditionally programmers or engineers. Allowing the

open source content of software produced, access to game engines, and graphic based design tools (Adobe CS Suite, Autodesk Entertainment Suite, and Unity) will allow students to use technology to create new visualizations, interfaces, and critique current games and simulations to sponsor new ideas.

The specific technology requested for the innovation in teaching with technology would be the following (budget included below):

1. PlayStation VR Bundle
2. PlayStation 4 Console
3. Oculus Rift
4. HP Z Display Z34c 34-inch Ultra Wide Curved Display
5. Leap Motion Controller

The five items above represent commercial grade gaming equipment in home entertainment virtual reality. This equipment can access open source content online and purchased software game titles for students to play and modify, as well as allow the professor to teach their subjects using already produced games.

The Oculus Rift, a head mounted display functions with PC, Mac, and now Sony platform content; and the Sony VR kit (newer generation of head mounted displays) provides a VR Headset, 2 motion controllers, PlayStation camera (for motion tracking) and stereo headphones. The Leap Motion Controller provides for hands free tracking of gestures in mid-air to interact with onscreen content without haptic feedback, and provides for a wireless in-air interface for content viewing and interaction. The HP Z Display is a curved display monitor specifically built for gaming and VR experiences, providing a mirrored visual echo of the headset display and a direct viewing/peripheral vision immersion to non-head mounted VR experiences.

5. Required Academic Technology support.
The only foreseeable Academic Technology Support would be in the form of administrative computer access for installation/security and user account access in the Westby PC 216 Lab, driver installation, and compatibility checks with current hardware and software installed on the Lenovo Think Stations; and assistance with acquisition and recommendation of version and vendor for purchase to ensure compatibility for Rowan University Academic Technology adoption.

6. Plans for evaluating and sustaining the innovation.
Plans for sustaining the innovation would be conducted as a test run in the spring 2017 Introduction to Game Media Design and Graphic Design V: Visual Communication Courses. The technology would be used initially as a teaching tool and documented effectiveness with student surveys. Depending on the student interest in the course and testing the technology to develop projects, there could be additional subject areas and curriculum that could use VR as a teaching tool.

Additionally, an effort to expose faculty to the VR classroom technology as mentioned above, through either a short demo, lecture, and/or inviting faculty to class to interact and see how and why the technology may be beneficial to their specific subject. For example faculty subject areas could include such areas as Art History, where the ability to view virtual paintings; or a walk through of a virtual MET or MOMA exhibition; a reenactment of a historical event; a dissection of virtual anatomy; or role-playing in a social, cultural or political scenarios, would create an innovative immersive learning

environment. There would be efforts to research and locate serious games, and casual games on the market which contain content that can be linked to humanities, science and engineering based concepts. The innovation would be sustained by exposing faculty and students to its benefits in the classroom, however small the seeds are planted, the familiarity of this tool can grow to a bigger presence across campus, with the faculty and student collaboration in research applications, games and grants.

7. Budget. Describe the essential technology and estimated costs. Grant funds are allocated for equipment purchases only.

TECHNOLOGY ITEM REQUESTED	**COST TO IMPLEMENT**
PlayStation VR Bundle	$499.00
PlayStation Pro 1TB Console	$399.00
Oculus Rift 2.0	$599.00
HP Z Display Z34c 34-inch Ultra Wide Curved Display	$799.00
Leap Motion Controller	$79.99
Commercial Game Software (unspecified titles TBD)	$124,01
	TOTAL
	$2,500.00