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PI/PD Name: Frank Vivirito

Gender: ☒ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☒ Not Hispanic or Latino

Race: (Select one or more)
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☒ White

Disability Status: (Select one or more)
- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☒ None

Citizenship: (Choose one) ☒ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☐

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project ☐

Ethnicity Definition:
Hispanic or Latino. A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.
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Black or African American. A person having origins in any of the black racial groups of Africa.
Native Hawaiian or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
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PI/PD Name: Bridget M Blodgett

Gender: ☐ Male ☒ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☒ Not Hispanic or Latino

Race: (Select one or more)
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☒ White

Disability Status: (Select one or more)
- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☒ None

Citizenship: (Choose one) ☒ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☐

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PI/PD Name: Ira D Greene

Gender: ☐ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☐ Not Hispanic or Latino

Race:
(Select one or more)
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White

Disability Status:
(Select one or more)
- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☐ None

Citizenship: (Choose one) ☐ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☒

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PI/PD Name: Anastasia Salter

Gender: ☐ Male ☒ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☒ Not Hispanic or Latino

Race: (Select one or more)
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☒ White

Disability Status: (Select one or more)
- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☐ None

Citizenship: (Choose one) ☒ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☒

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PI/PD Name: Deborah A Tillett

Gender: ☐ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☐ Not Hispanic or Latino

Race:
(Select one or more)
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☒ White

Disability Status:
(Select one or more)
- ☐ Hearing Impairment
- ☐ Visual Impairment
- ☐ Mobility/Orthopedic Impairment
- ☐ Other
- ☐ None

Citizenship: (Choose one) ☒ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

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List of Suggested Reviewers or Reviewers Not To Include (optional)

SUGGESTED REVIEWERS:
Not Listed

REVIEWERS NOT TO INCLUDE:
Not Listed

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 11-1

NSF 10-602 **03/09/12**

FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)

DRL - DRL - Research & Evaluation on Education in Science Engineering

FOR NSF USE ONLY

NSF PROPOSAL NUMBER

1238571

DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION
03/09/2012	2	11090000 DRL	7625	967982260	03/09/2012 2:44pm

EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)

273766712

SHOW PREVIOUS AWARD NO. IF THIS IS
☐ A RENEWAL
☐ AN ACCOMPLISHMENT-BASED RENEWAL

IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES ☐ NO ☒ IF YES, LIST ACRONYM(S)

NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE

Immersive 3D LLC

AWARDEE ORGANIZATION CODE (IF KNOWN)

6250024603

ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE

14 Midvale Road
Baltimore, MD 21210-2114

NAME OF PRIMARY PLACE OF PERF

Immersive 3D LLC

ADDRESS OF PRIMARY PLACE OF PERF, INCLUDING 9 DIGIT ZIP CODE

Immersive 3D LLC
7125 Suite 100 Ambassador Road
Windsor Mill ,MD ,212442751 ,US.

IS AWARDEE ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)
☒ SMALL BUSINESS ☐ MINORITY BUSINESS
☒ FOR-PROFIT ORGANIZATION ☐ WOMAN-OWNED BUSINESS

☐ IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE

TITLE OF PROPOSED PROJECT **SBIR Phase I: Cyber School: Assessing STEM Learning Through Virtual Worlds and Gaming**

REQUESTED AMOUNT	PROPOSED DURATION (1-60 MONTHS)	REQUESTED STARTING DATE	SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE
$ **1,715,370**	**24** months	**01/14/13**	

CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW

☐ BEGINNING INVESTIGATOR (GPG I.G.2)
☐ DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C.1.e)
☐ PROPRIETARY & PRIVILEGED INFORMATION (GPG I.D, II.C.1.d)
☐ HISTORIC PLACES (GPG II.C.2.j)
☐ EAGER* (GPG II.D.2) ☐ RAPID** (GPG II.D.1)
☐ VERTEBRATE ANIMALS (GPG II.D.6) IACUC App. Date _____
PHS Animal Welfare Assurance Number _____

☒ HUMAN SUBJECTS (GPG II.D.7) Human Subjects Assurance Number **FWA00000634**
Exemption Subsection **pending** or IRB App. Date _____
☐ INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.2.j)
_____
☐ HIGH RESOLUTION GRAPHICS/OTHER GRAPHICS WHERE EXACT COLOR REPRESENTATION IS REQUIRED FOR PROPER INTERPRETATION (GPG I.G.1)

PI/PD DEPARTMENT

PI/PD POSTAL ADDRESS
14 Midvale Road
Baltimore, MD 212102114
United States

PI/PD FAX NUMBER
443-927-7247

NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address
PI/PD NAME **Frank Vivirito**	**BA**	**1998**	**443-910-1787**	**frank@immersive-3d.com**
CO-PI/PD **Bridget M Blodgett**	**PhD**	**2011**	**410-837-6191**	**bblodgett@ubalt.edu**
CO-PI/PD **Ira D Greene**	**BA**	**1974**	**443-709-0029**	**ira.greene@winning-step.com**
CO-PI/PD **Anastasia Salter**	**DCommu**	**2010**	**410-837-6191**	**asalter@ubalt.edu**
CO-PI/PD **Deborah A Tillett**	**MA**	**2000**	**202-494-4028**	**deb@immersive-3d.com**

Electronic Signature

CERTIFICATION PAGE

Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the Authorized Organizational Representative or Individual Applicant is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding debarment and suspension, drug-free workplace, lobbying activities (see below), responsible conduct of research, nondiscrimination, and flood hazard insurance (when applicable) as set forth in the NSF Proposal & Award Policies & Procedures Guide, Part I: the Grant Proposal Guide (GPG) (NSF 11-1). Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, Section 1001).

Conflict of Interest Certification

In addition, if the applicant institution employs more than fifty persons, by electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.A; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Drug Free Work Place Certification

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Drug Free Work Place Certification contained in Exhibit II-3 of the Grant Proposal Guide.

Debarment and Suspension Certification

(If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency? Yes ☐ No ☒

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Debarment and Suspension Certification contained in Exhibit II-4 of the Grant Proposal Guide.

Certification Regarding Lobbying

The following certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding $100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding $150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:
(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, ''Disclosure of Lobbying Activities,'' in accordance with its instructions.
(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Certification Regarding Nondiscrimination

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative is providing the Certification Regarding Nondiscrimination contained in Exhibit II-6 of the Grant Proposal Guide.

Certification Regarding Flood Hazard Insurance

Two sections of the National Flood Insurance Act of 1968 (42 USC §4012a and §4106) bar Federal agencies from giving financial assistance for acquisition or construction purposes in any area identified by the Federal Emergency Management Agency (FEMA) as having special flood hazards unless the:
(1) community in which that area is located participates in the national flood insurance program; and
(2) building (and any related equipment) is covered by adequate flood insurance.

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant located in FEMA-designated special flood hazard areas is certifying that adequate flood insurance has been or will be obtained in the following situations:
(1) for NSF grants for the construction of a building or facility, regardless of the dollar amount of the grant; and
(2) for other NSF Grants when more than $25,000 has been budgeted in the proposal for repair, alteration or improvement (construction) of a building or facility.

Certification Regarding Responsible Conduct of Research (RCR)
(This certification is not applicable to proposals for conferences, symposia, and workshops.)

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative of the applicant institution is certifying that, in accordance with the NSF Proposal & Award Policies & Procedures Guide, Part II, Award & Administration Guide (AAG) Chapter IV.B., the institution has a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students and postdoctoral researchers who will be supported by NSF to conduct research.
The undersigned shall require that the language of this certification be included in any award documents for all subawards at all tiers.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE	SIGNATURE	DATE
NAME **Frank Vivirito**	**Electronic Signature**	**Mar 9 2012 2:28PM**

TELEPHONE NUMBER	ELECTRONIC MAIL ADDRESS	FAX NUMBER
443-910-1787	**frank@immersive-3d.com**	**443-927-7247**

* EAGER - EArly-concept Grants for Exploratory Research
** RAPID - Grants for Rapid Response Research

PROJECT SUMMARY

Drawing on previous work on the application of games for education, virtual worlds offer opportunities for integrated learning and problem-solving as assessable learning sites both within and outside the classroom environment (Hickey, Ingram-Goble, Jameson, 2009). However, virtual world education is different from offline educational settings for three reasons. First, students and teachers are no longer limited by the physical, monetary and geographical boundaries of their location and educational setting. Second, the open platform setting and free-form module based curriculum allows students and teachers to integrate learning activities with few restrictions, supporting education and learning in a personalized basis. Lastly, the students and educators exist in a world in which rights and responsibilities are fluid and under negotiation allowing them to actively engage not only in learning but in the formation of the environment and rules for learning.

Our research will gather data from several high school classes which engage in STEM learning through the Cyber School environment, a tool for games-based exploratory and integrated STEM learning designed to provide meaningful feedback for both students and teachers, with the intent of generating theories of online, virtual environment enabled STEM learning. The results of our research can be applied to reaching underserved and marginalized students typically lost at each phase of advancement in the STEM curriculum, and to developing and understanding the potential for these new learning tools as part of a STEM initiative.

Intellectual Merits. Through this research we will,

1. Develop a evaluative model for assessing game-based STEM learning for high school students
2. Explore how a dynamic "Cyber School" platform that integrates college preparatory and STEM curriculum might enable student learning
3. Understand the role of game-based educational software in improving high school STEM education for both students and educators who employ the software
4. Create connections between high school STEM educators, universities, and commercial businesses to enable quality educational software to support learning in Maryland high schools

Broader Impacts

1. Provide society with new and/or deeper understandings about the impacts of cyber-enabled learning in the education of high school students within the STEM disciplines
2. Shape the future of games-based virtual education environments as commercial and educational projects through innovations that leverage these understandings.
3. Enhance the STEM and college preparatory curriculum at Maryland high schools by incorporating virtual environments and social interactions into existing and new courses.
4. Ultimately, the proposed study can establish the foundation for improving the quality of life for students, by leveraging positive effects of cyber-enabled education as well as reducing their negative impacts.
5. Increase participation, retention and interest in STEM education among under-served and minority populations within the field.

While video games are typically associated with play, they are already sites for meaningful learning and collaboration. By leveraging these nontraditional educational opportunities, high school teachers may better reach out to at-risk students to bolster their STEM knowledge. The Cyber School model could allow teachers to create a varied and dynamic educational setting which employs multi-modal activities to engage students in the topic. Additionally, the low cost and easy integration of this tool into the classroom enables many schools to deploy technologically enhanced curriculum without requiring expensive grant applications or reduction in other parts of the budget, supporting broad educational goals at the institutional level. It is essential that we scientists build on the solid research exploring education in an offline or other technologically mediated setting and note the changes and implications of moving those behaviors into a virtual setting.

As the background of the PI and Co-PIs reflects, this is an inherently interdisciplinary proposal. The research draws from education, media, communications, and informatics theories and methods. The primary researchers from the University of Baltimore are also housed in an interdisciplinary college of art and sciences which promotes cross fertilization between the social sciences and technical and professional scholars.

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Cyber School: Assessing STEM Learning through Virtual Worlds and Gaming

MOTIVATION, OBJECTIVES, EXPECTED SIGNIFICANCE

STEM education at the high school level is one of the deciding factors in the retention of students' interest in STEM fields through college and the early career. The graduation and placement of college students in STEM related careers has been shown to be an important factor in developing and sustaining a healthy economy in a post-industrial society (PCAST, 2012). A solid educational grasp of STEM material has been shown to aid college students in the completion of their educational goals and eventual job placement (Committee on Underrepresented Groups, 2011). Every year potential students are lost to STEM careers through failure to retain and support their educational goals at both the college and high school levels. The loss of these students provides a limited selection of potential employees to STEM-related industries and diminishes that value that these industries provide to the larger national economy (PCAST, 2012). This is a particular challenge for the US, as President Obama confirmed in the announcement for his "Educate to Innovate" campaign: "Reaffirming and strengthening America's role as the world's engine of scientific discovery and technological innovation is essential to meeting the challenges of this century," said President Obama. "That's why I am committed to making the improvement of STEM education over the next decade a national priority" (Office of the Press Secretary, 2009).

Alongside the role of STEM education in the nation economy, there is a growing interest in virtual worlds and their roles in education. A virtual world is a computer-based simulated environment intended for its users to inhabit and interact via avatars. This is because virtual worlds appear similar to the real world, with real world rules such as gravity, topography, locomotion, real-time actions, and communication. Virtual worlds have experienced some integration into educational settings in support of both technology learning and general curriculum. This is important due to the fact that virtual worlds have seen increasing popularity and acceptance in wider society. However, the primary focus of virtual worlds is still entertainment, with games such as World of Warcraft and Star Wars: The Old Republic achieving notoriety for their immersive multiplayer experiences. Yet with the rise in broadband Internet access throughout the United States and the growing popularity of virtual worlds, it becomes necessary to break beyond these views of the role of the Internet, virtualization and education and apply our understanding of these entertainment-branded technologies to other uses.

Education already carries the hallmarks of gameplay: "Seth Priebatsch noted that education is "one of the most perfect game ecosystems that's out there," complete with obstacles, rewards, incentives and even achievements, and yet 'it's a poorly designed game; it's kind of broken' (2010). The rise of gamification and the application of game principles to redesigning educational structures is an acknowledgement both of the similarities and the potential power within the points of divergence. One trend in classroom game design is the outright "gamification" of assessment, as Lee Sheldon pioneered in his massive-multiplayer game inspired classroom, where students were rewarded for completion of assignments with experience points, joined guilds for cooperative learning, and ultimately "leveled" their way to a final grade (2011). As Doug Thomas and John Seely Brown explored in their recent book *A New Culture of Learning*, this type of play is essential to learning, and embracing play is one way learners prepare for an environment with continually changing expectations and challenges (2011).

Drawing on previous work on the application of games for education, virtual worlds offer opportunities for integrated learning and problem-solving as assessable learning sites both within and outside the classroom environment (Hickey, Ingram-Goble, Jameson, 2009). However, virtual world education is different from offline educational settings for three reasons. First, students and teachers are no longer limited by the physical, monetary and geographical boundaries of their location and educational setting. Second, the open platform setting and free-form module based curriculum allows students and teachers to integrate learning activities with few restrictions, supporting education and learning in a personalized basis. Lastly, the students and educators exist in a world in which rights and responsibilities are fluid and under negotiation allowing them to actively engage not only in learning but in the formation of the environment and rules for learning.

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RESEARCH CONTEXT

Virtual Worlds

A virtual world is a computer-based environment that allows a user to interact with other users and the general environment in a persistent setting that continues to change and evolve without any specific user involvement (Ives & Junglas, 2008; Kumar, et al., 2008). Virtual worlds, developed from video games, have evolved to be complex software that mimics the offline world. They often have similar physical laws, like gravity. They also have large populations that develop social structures and norms that members of the society are expected to follow. Players within virtual worlds represent themselves through a small character that is visible to others in the world, their avatar. It is through these avatars that the players speak and interact with one another and the larger environment.

Virtual worlds can often act as a mirror to be held up to the offline world. This mirror provides a complex but limited view of human behavior and interaction that can be examined to find the underlying structure that makes individuals and groups act the way that they do both online and offline (Whang & Chang, 2003; Yee, Bailenson, Urbanek, Chang, & Merget, 2007). Virtual worlds provide several advantages to overcome methodological and ethical limitations in many areas of social research. First, virtual worlds allow for large numbers of experiments and participants, incur no harm to humans, and make longitudinal and panel studies possible. Second, virtual worlds open up new possibilities for gathering

social data both because they provide non-intrusive methods for gathering a vast trove of diverse but standardized data about social and economic interactions (Bainbridge, 2007). Third, virtual worlds provide environments and tools that facilitate the creation of online laboratories that can automatically recruit potentially thousands of research subjects at minimal cost. Fourth, virtual worlds offer a persuasive sense of personal, social, and environmental presence for participants (Heeter, 1992; Witmer & Singer, 1998).

Cyber School

In his recent book *Video Games and Learning: Teaching and Participatory Culture in the Digital Age*, Kurt Squire (2011) points out that "good games find 'the game in the content.'" Traditionally, edutainment has operated as a veil of playfulness over a core of textbook lessons and repetitive drills, but these environments have the potential to transcend those expectations. Content as game is the guiding design principle of the STEM education game Cyber School, a virtual experiential learning space with an interactive and expandable classroom interface. The goal of "Cyber School" is to create a scalable, self-administering system that rewards individualized learning while allowing for repetition and reinforcement of important lesson and science concepts. Cyber School is designed to help teachers incorporate learning programs in their real-world classrooms. It can also be used for learning enhancement and extra-curricular activities. Its design is flexible so that teachers and school systems can use it to make best use of ever-evolving learning technologies and expand on their existing curricula. Cyber School creates an intuitive framework for the introduction of new and constantly developing learning games into the everyday lesson plan.

Cyber School organizes learning software alongside other aspects of the teacher's complete lesson plan. The Cyber School architecture is a three dimensional immersive environment complete with classrooms, learning pods, and research laboratories. A typical classroom is complete with virtual peripherals such as white boards, laptops, assessment PCs, and LCD screens. In this virtual classroom, lesson plans and learning objectives are posted on the whiteboards. Additional research links and Flash-like programs are made available on the Laptops. The LCD screens play associated videos and the PCs are used for testing and final assessments.

Learning pods are multi-purpose environments designed for specialized learning experiences. They are one-person chambers that provide an Omni-directional sense of immersion. These pods provide a logical space for unique programs and areas of study that may not be directly associated with the base curriculum in that particular instance of the Cyber School. For example, they afford the opportunity for educators to include learning modules created by students and extracurricular projects and programs. One of the pods features a robust college and career entry and transition readiness interactive curriculum to help students achieve the goal of being college and career ready at high school graduation.

Immersive 3D, LLC ("i3d") has developed a program and tool to convert existing paper based curriculum to stand-alone web based interactive programs. This system offers an opportunity for third party curriculum developers to be a part of the Cyber School program. Cyber School can be agnostic to the formats of learning programs so as to expand the potential for learning programs developed by third parties to be accessed in the school. Cyber School can read any external media on the Internet. This provides and extends the teacher's ability to use information, video, and other web-based programs within their school. Additionally, an integrated game management program called Lesson Builder will be provided to allow educators to further customize their virtual classrooms.

Students and teachers inhabit the Cyber School as 3-D avatars, not unlike avatars in Second Life or World of Warcraft. These characters will serve as their surrogates in the virtual world. The choices for avatars are age and school appropriate. Users can choose between male and female and different ethnicities. Cyber School includes a character customization module that provides an interface for the user to personalize their character. They can change hair color, styles, clothes, etc. within parameters defined by the teacher. School uniforms or school insignia could be added as custom options. Images of the Cyber School flowchart and sample spaces follow.

Cyber School Game Flowchart

Laboratories

- Robotics
- Energy & Magnets
- Lights & Lasers
- Fluids & Solids

Experiments
2pts on completion of a lab, 2 pt bonus for completion of all four

- Rigid Bodies, Kinematics, Springs, Damping
- Electricity, Resistance, Heat, Magnetism
- Light Travel, Refraction, Color
- Waves, Ripples, Viscosity

1pt on completion of each pod, 1 pt bonus for completion of all pods

Pod 1	Pod 2	Pod 3	Pod 4	Pod 5	Pod 6	Pod 7	Pod 8	Pod 9
Winning STEP Module 1	Winning STEP Module 2	Winning STEP Module 3	Winning STEP Module 4	Winning STEP Module 5	Winning STEP Module 6	Winning STEP Module 7	Winning STEP Module 8	Winning STEP Module 9

Applied Science Pavilion

Megalith Planet Alignment Shadow Casts Unlocks Pods, Labs, Gym and Auditorium

Classrooms Living Science Wing

- Energy & Motion
- Living Systems

1pt on completion of each class,1 pt bonus for completion of all four classes

Concourse Displays Badges & Clues

Classrooms Physical Science Wing

- Nano Scale Systems
- Astronomical Scale Systems

Concourse Displays Badges & Clues

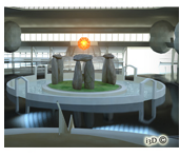
Gym

- Human Apps

Gravity
Mass
Friction
Rag Dolls

Displays & Awards Badges

Science Badge 1 pt
Technology Badge 1 pt
Engineering Badge 1 pt
Math Badge 1 pt
STEM Badge 5 pts
Winning Step College Prep 5 pts
Robotics Badge 7 pts
Energy Badge 7 pts
Laser Badge 7 pts
Fluid Dynamics Badge 7 pts
Cyber Scientist 28 pts
Cyber Physicist 31 pts
Cyber School Master 34 pts



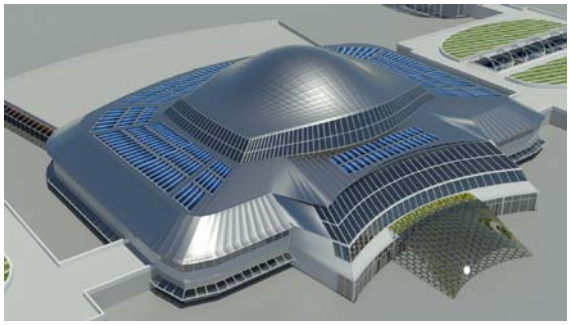
Auditorium

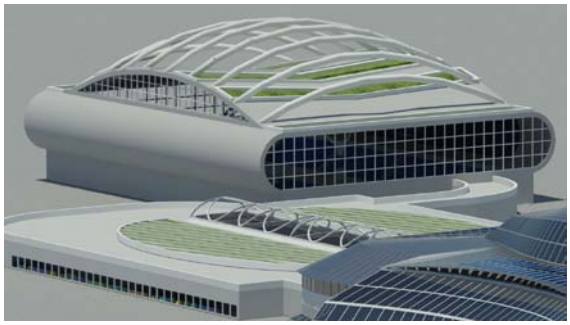
- Sound & Acoustics

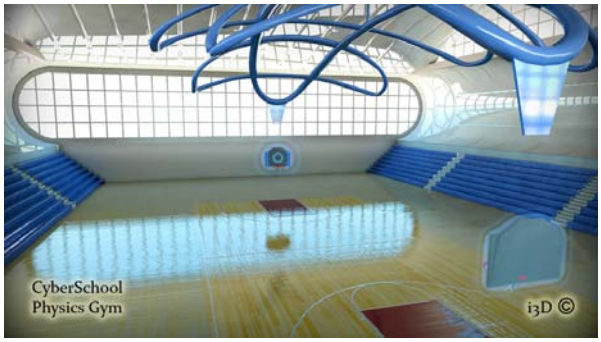
university of baltimore

Winning STEP

immersive3D i3d







Integration of STEM Learning

While Cyber School can be customized and modifiable, each instance of the program will be deployed fully-loaded and ready to use as is with a broad selection of STEM modules. Instances of Cyber School will be created for K-12 students with a range of ready to use and grade appropriate learning programs designed by curriculum developers, academics, and learning game professionals. The Cyber School framework will organize and provide educators with a global level of control over the introduction of these programs rather than single, disparate, and unrelated systems of integration. Each learning program will complement the other and reinforce the lesson materials.

STEM learning is built into the school itself. Cyber School has built-in physics, exposed acoustical properties and laboratories configured for projects on Robotics, Energy, Lights and Optics, and Fluid Dynamics. Additional laboratory configurations for life sciences, nanotechnology and other specialized studies can be added via upgrades. The Cyber School Gymnasium has an interface that allows students to experiment with Physics properties while throwing balls and during other sports related activities. Using simulation, students can observe the effect of changing the values of variables such as gravity, air density, the co-efficient of friction, and the resilience of floors and walls. The auditorium is configured to allow the user to test musical and acoustic properties such as sound travel, vibration, “bounce,” and resonance. Laboratory experiments are designed to address different areas of physics learning. The sophistication of the experiments increases at higher grade levels. For example, K-3 experiments introduce some laws of physics but do not require a mathematical understanding for successful learning.

For the students Cyber School is an immersive 3-D gaming environment that excites and motivates them to learn. In this futuristic school, students are encouraged to explore and unlock levels by the information learned in the environment. The understanding of STEM related curricula is essential to solving the puzzles and mysteries of Cyber School. For example, they must demonstrate the ability to correct electrical circuitry to activate the robot that will assemble the next experiment that must completed to move to another level.

The school is designed to be one of discovery. As the students explore the environment, they will see exotic experiments and games they cannot access at their current skill level. This will provide incentive to them to find ways to unlock access to these areas. They will notice that this strange device, called a Megalith, that seems to animate or morph based on their actions in the school and upon completion of lessons. The Megalith will open entry to the games and experiments and provide clues about how to advance. It will constantly challenge the students’ curiosity as it reveals new clues and puzzles to be solved.

User Accessibility and Cyber School

Navigation through the environment is as simple as using the arrow keys on the keyboard or pointing the mouse. This makes the basic program easy to use for students grades K–12 or even an adult. The difficulty factor of the game play is based on the level of curriculum the teachers decide to activate for their students – not the mechanics and procedures of how to use the program. As users moves their character through the game, options and choices appear on a HUD (Heads Up Display) based on the current situation and location in Cyber School. This context sensitive approach to menus and interfaces makes the learning and game-play in Cyber School an intuitive experience.

Cyber School is built on multi-player code. This will provide students with a social media program that can allow them to discuss academic issues or view notes and lesson plans provided by the teacher. Multi-player allows students to meet and discuss the puzzles and mysteries in Cyber School for collaborative efforts. Multi-player also affords teachers the ability to have guest teachers and speakers join them in Cyber School.

Technically, teachers will log into Cyber School and have the choice of configuring the school for their specific needs or to choose from a menu of fully configured and ready to go schools. They will then be able to invite students to their school. They will assign each student with a login name and password. They can control when the students have access to synchronous lessons or make lessons available to them for homework or extra credit. All Cyber School information and data is read and written to a MySQL database. The data base model for the Cyber School is based on a medical records program in development by Immersive 3d. Access levels and encryption are part of the program so student records will have the same high level of security and privacy in Cyber School, making it compliant with FERPA regulations. The server location can be chosen by the teacher. The ready to use data base technology is portable and can be loaded on the school’s servers or third-party service providers. The administrator of

the instance of Cyber School (teacher or school official) has complete control much like they would using Blackboard or Sakai learning management systems ("LMS's"). It is also possible for school administrators to export Cyber School data into their LMS.

At an even higher level, when curriculum is converted into Cyber School models (as opposed to externally referenced material), data generated by student progress can be sent to a home-school teacher, a tutor, an academic coach, or directly to the curriculum developer for monitoring, online coaching, and other learning activities. There is a robot in the school that can be loaded with help or lesson notes and serve as a mentor or academic coach. The students would still be able to leave their teacher notes and submit their completed work.

Deployment can be asynchronous, resulting in a persistent virtual world akin to Second Life with continuous accessibility, or synchronous as teachers or institutions can start an instance of the school and invite their students for a synchronous lesson during times of their discretion. Students would be able to chat and share some of the experiences of Cyber School in a social media context. These are very simple methods for Cyber School access that only require a hosting website for the game and database. There also is the option for the school to provide a dedicated server for persistent worlds. In this case, their Cyber School is always running similar to other commercial virtual worlds like World of Warcraft or Second Life. There are many companies that supply these server farm services, and many school systems maintain their own servers with IT support.

Assessment and Gamification within Cyber School

Game-based evaluation acts as assessment of students learning of core materials through a method of attrition on a topic line instead of imposing penalties for failing to learn the material. Students who progress faster than their ability to learn the material will reach a puzzle or activity that exceeds their current knowledge and encourages them to explore alternative activities available within the environment, hopefully building the skills and knowledge they need to pass that barrier. This method of assessment avoids the frustration of defeat that penalty based systems often cause and keeps the learner moving to new opportunities, as there's more than one way to approach the situation.

Throughout the Cyber School, the assessment and reward system focuses on creating tiered goals which allow students to pace and measure their learning performance. This measurement occurs through a two tiered system of incremental awards which periodically culminate in the award of a Master badge. The smaller goals will also award particular badges which recognize progress made by the student towards their final goal or Mastery. The goal-based awards focus on smaller applications and skills the students can develop within the program, such as completing a microscope based series of analysis activities. The goal-based achievements also offer immediate feedback and a way to keep track of progress towards the Master badges. The second tier consists of a nonlinear system that encourages exploration of both the system and material. Once a Master badge has been awarded, new material and areas within the system will become available, showing the learner that when something is accomplished it is not a stopping point but instead a launching pad for further advancement. While they may successfully complete one activity, the secondary system will point out related unearned badges, or new areas to explore which may draw on some of the same science skills the student developed (e.g. application of the scientific method).

The flexibility of the badges system is inspired by the principles Jane McGonigal describes in *Reality is Broken*: "Compared to games, reality is too easy. Games challenge us with voluntary obstacles and help us put our personal strengths to better use. (2011)" Ideally, adding game elements means an opportunity to place more voluntary obstacles and allow for collaborative and personal engagement with the material in a different way, and the achievement system rewards that individual learning. It also encourages them to consider applications for their knowledge outside of the Cyber School setting, creating a potential for increased interest in science in the classroom and daily life. Rewards work in harmony to give students a sense of prospective career paths (for instance: earning the Chemistry + Physics + Biology Master badges unlocks a "Future Scientist" badge.) Opportunities within the virtual world will be unlocked by reaching certain levels of mastery. As students progress through the digital course material they will be able to access an increasing number and variety of awards and areas of practice. These awards can range from visual representations of their achievements on their characters to additional privileges within the world, such as the ability to fly. These privileges offer an incentive for others to want to reach that same level of recognition which others have achieved, thereby rewarding and re-entrenching their investment in learning. Also, visible badge rewards indicate a potential mentor, giving students status in the virtual world

and encouraging others to reach out to them for help. This could more effectively build a community which supports learning and engagement in the sciences. Furthermore, the Mozilla open source system for learning badges may eventually be leveraged to allow these awards to be more clearly transferable outside the Cyber School setting.

Target Population

The first phase of testing will recruit participants from Choo Smith Youth Empowerment, a program focused on supporting the educational and personal development of underserved youth through both athletics and learning. During this phase, as the primary goal is to assess usability and potential of the tool, there will be no control group. Data will be sought on the students' prior experience with video games and virtual worlds to assess the effectiveness of the tool in reaching populations with diverse backgrounds.

Students will be recruited from among both the regular and honors physics courses at South Hagerstown High School in the state of Maryland. Half of each population will serve as a control group subject to the same attitudes and skills assessments as the learners experiencing the Cyber School program. This will allow for analysis comparing the experiences of users both within and outside of the traditional curriculum, along with comparisons within the two populations of learners. South Hagerstown High School offers a diverse population that reflects our goal of reaching traditionally underserved STEM learners: 35% of students are minorities, and 70% of all students are on free or reduced-price lunch program.

BACKGROUND

Games and Education

The concept of using virtual worlds to promote learning is not new; however, the primary usage tends to be the adoption of virtual worlds to the purpose of learning rather than the intentional creation of worlds with learning objects in mind. Given the prominence of virtual worlds and other virtual environments within the everyday social, several game platforms have been integrated into educational settings in order to attempt to leverage the unique capabilities of the games. In particular three aspects of virtual worlds or other games have been seen as providing potential benefits to students: their social nature, the technological ubiquity, and their immersive nature (Warburton, 2009). However, these very advantages are often seen as also providing pitfalls to student learning, allowing too much openness or flexibility and overwhelming students with the learning of the tool instead of the material (Warburton, 2009). An example of this problem is familiar through the example of Second Life ("SL"), a popular solution for education and previously at the center of a movement towards developing more interactive educational spaces amount to virtual campuses within the environment. However, Second Life offers vast freedom, and particularly the possibility of straying far from the learning content. More importantly, SL is not designed with the clear intention of education content delivery (Boulos, Hetherington, Wheeler 2007). In fact, there are situations where the environment's construction and complex control system gets in the way of the learning. Cyber School provides transitions from the third person over-the-shoulder view of the player avatar to a first person view of the curriculum or experiment, and intuitive context sensitive menus work based on the student's situation in the environment or lesson. Cyber School also records and saves all of the students' educational and game activities.

Like other learning experiences, games can be used to deliver learning content, such as math, science, or history-related concepts and facts. Games excel at fostering learning mindsets that "are intrinsic to the game while the students are learning the content. Through game playing, students learn how to collaborate, solve problems, collect and analyze data, test hypotheses, and engage in debate" (Klopfer 2008). For STEM learning in particular, the integrative learning experiences that bring these critical skills into the discourse of science and math can be applied rather than left at the purely conceptual level--the game acts as a laboratory for applied learning, and can thus supplement the resources of a physical learning environment (wherein some experiments may be impossible to reproduce). As Shaffer notes in *How Computer Games Help Children Learn*, "In playing games, [students] are doing explicitly, openly and socially what as adults they will do tacitly, privately and personally. They are running simulations of worlds they want to learn about in order to understand the rules, roles and consequences of those worlds" (2006).

The potential for games as assessments is untapped by unintentional environments. James Paul Gee poses a model for games as themselves assessments, potentially unhindered by a connection to

traditional testing environments, where completion of game challenges is itself evidence of learning: ""Assessment should be totally integrated with your learning. If you built the learning right, you should know that the person has mastered the stuff without having to then stop and give them a separate test on Tuesday at 4…You could actually view a game as nothing but a continuous assessment…We find it completely reasonable to give a kid a 12 week algebra course and then to assess them on Tuesday at 4 from a test made in Illinois to see if he learned, but if a player played Halo on hard and finished you would never be tempted to give him a Halo test afterwards because you know the act of finishing Halo is a guarantee and he knows how to play it. It's built to be sure he couldn't have finished it if he didn't master it" (2011). Ideally, this form of assessment through play should be transparent to both the learner and the educator.

Diversity in STEM Education and Careers

The lack of diversity in upper level STEM education and careers has been raised as an issue on a continual basis since the early 1980s. Many issues have been examined as contributing to the lack of diversity within the STEM fields but adequately addressing the issue over the long term has proven difficult. It has been seen as a multi-faceted which embeds itself not only in the culture and structure of STEM fields themselves but also within the broader societal dialogue that surrounds these fields (Blickenstaff, 2005). As the Undergraduate STEM Education Report shows, "Fewer than 40% of students who enter college intending to major in a STEM field complete a STEM degree" (PCAST, 2012). Of these students even a small increase in the number successfully graduating, around 10%, would have dramatic impacts upon meeting the United States needs for STEM trained graduates (PCAST, 2012).

The importance of inclusion in STEM fields is highlighted at every level from grade school into the professional careers. As several federal levels reports have summarized, STEM placed workers are important for maintaining the competitiveness of the US economy in a global market (PCAST, 2012; Committee on Underrepresented Groups, 2011). But the simple inclusion of traditionally marginalized groups in the STEM fields also creates a more welcoming atmosphere of diversity, creating a self rewarding process where diverse positions draw in a more diverse set of people (Pell, 1996). This issue is addressed within the literature as a leaky pipeline, where potential scientists and STEM practitioners are lost during their transition from students to professional or possibly are discouraged from participating before they leave high school (Wickware, 1997; Ford, McDaniel, and Yanik, 2010; Fields, 1988).

Research into supporting and increasing the diversity of the STEM pipeline has shown that many factors are important to address. Including these factors there are different stages at which each should be addressed in order to maximize the benefit to the students passing through the system. These transition points are usually addressed as the transition from grade school to high school, high school to college, college graduation, first employment, and mid-career promotion (Pell, 1996; Akin, Green, & McLaughlin, 2002; Wickware, 1997). After reviewing much of the significant literature, Blickenstaff (2005) addresses several key areas of the educational process in order to keep women from dropping out of STEM programs: 1) equal access to the teacher and classroom resources, 2) assignments that focus on benefit of science for quality of life issues, 3) avoid sex-based segregation and competition, 4) eliminate sexist language and imagery in materials and the classroom, 5) increase depth and reduce breadth in introductory classes and 6) acknowledge the political aspects of the scientific process. While this study addressed the needs of women working within STEM education, at the lower levels of the educational pipeline many of the same factors remain important in the retention of all underrepresented and minority groups (Wickware, 1997; Cole and Espinoza, 2008; Jacobs, 2005). In particular, the high school phase of this pipeline has often been highlighted as one of the key points of intervention in the creation of self-images and goals that align with STEM disciplines (Cole and Espinoza, 2008; Bonous-Hammarth, 2000; Grandy, 1998; Huang et al., 2000; Simpson, 2000).

Gaps

In February 2012, the Presidential Council of Advisors on Science and Technology released a report encouraging the incorporation of active learning, noting the challenges that have been hindering adoption of such strategies: "Studies have shown that classroom approaches that engage students as active participants improve retention of information and critical thinking skills and can significantly increase STEM-major interest and perseverance, compared with conventional lecturing. In one study, for example, students in traditional lecture courses were twice as likely to leave engineering and three times as likely to drop out of college entirely compared with students taught using active learning techniques. In another

study, students in a physics class that used active learning methods learned twice as much as those taught in a traditional class, as measured by test results. These evidence-based teaching methods do not necessarily require more resources than traditional lectures, but most faculty lack experience using these methods and are unfamiliar with the vast body of research indicating their impact on learning" (2012). Virtual programs such as Cyber School offer the opportunity for additional active learning without a huge investment of resources, and furthermore ideally without necessitating additional teacher training.

However, assessment thus far of the ability of these types of tools to provide assessable information for both students and teachers has been limited. Research into the use of software for student assessment has often focused on analysis of answers and other examination-based techniques, as those considered by Haudek et al., but even those tools require additional teacher training: "An important goal is to make these resources available to interested users without making software training necessary. One possible approach for accomplishing this goal would be to develop a web portal where users could upload their own sets of student responses and receive formative feedback in near real-time. This type of timely, powerful feedback would further the development of reformed science teaching" (2011). Real-time feedback is at the heart of Cyber School and game-based learning, as the environment itself becomes the assessment tool, and learning can be more easily communicated to teachers and students. The incorporation of active learning techniques into traditional STEM education, particularly through research and laboratory-based learning, has a long tradition and has been well-documented. As the higher-education based Wabash National Study determined, "Three important college experiences that contribute to improving students' interest in science are: active and collaborative learning settings, faculty interactions, and cooperative learning experiences. These experiences also contribute to student improvement in other areas outside of science" (Elrod 2010). The addition of these same active learning strategies to a virtual school can potentially circumvent challenges of resources and training, but this assumption needs confirmation through quantitative and qualitative assessment of student learning outcomes and attitudes over the course of engagement with the learning tool. This research will allow for an understanding of the potential of game-based solutions to the learning challenges STEM education faces today.

RESEARCH FRAMEWORK

To effectively measure students' engagement and motivation, we will employ modified versions of the Assessment Tools in Informal Science (ATIS) models from the Program in Education, Afterschool & Resiliency (PEAR). The Attitudes Towards Mathematics Inventory (ATMI) and the Science Motivation Questionnare (SMQ) are assessment tools designed to examine attitudes towards different aspects of STEM learning, and are thus ideal for adaptation towards both pre and post Cyber School qualitative assessment of student outcomes (2010). Concerns about the leaky pipeline in STEM education center on the retention of students, as students are lost at each level of learning, and these assessments in part indicate the likelihood of a learner to continue engaging with STEM concepts. These attitudes can also be demonstrated within the environment, through quantitative data such as the number of times a student attempts a game or challenge within the Cyber School.

The traditional frameworks for measuring STEM outcomes must be informed by an understanding of this new environment: "deep conceptual analysis of the knowledge structure of a STEM domain is important for revealing what is required to achieve adaptive and flexible problem solving within that domain...New fundamental research questions arise as this kind of analysis is extended for understanding how STEM learning and scientific practices change when there is change in the interactive properties of the medium in which knowledge is represented, constructed, and communicated" (Borgman 2011). The construction of student knowledge in these domains will be assessed both by the system itself (achievement of learning outcomes and application of knowledge to different types of challenges, both domain-based and integrated) and by formal assessment designed in consultation with the high school teachers directly responsible for the students involved in the different phases of research.

This multi-pronged approach to assessment acknowledges the need for a control group experiencing traditional STEM education, and a group of students working with the Cyber School systems, ideally pulled from as similar instructional environments as possible to control as much as possible variance in educational experience outside the difference in learning tools. Assessments must therefore be transferable to the control group, and take place at least in part outside the virtual world for constructive comparison of both learning outcomes and attitudes. Analysis of the results will also allow for the

application to this research to the fundamental question of learning potential within an environment offering a different form of interactivity than conventional lesson plans provide.

RESEARCH PLAN

While the interest in games-based learning is on the rise, the application of these learning tools to the classroom is still a challenge. The gaps within the literature examined previously bring to light several important questions about the theories for understanding STEM learning in virtual worlds. The purpose of this study is to evaluate the Cyber School tool in addressing these gaps and working towards a reduced "leaky pipeline" in STEM education. This evaluation will be developed through an analytical response to the questions posed by the current theoretical understanding of the role of technological intervention in STEM education and their adaptation to virtual world "realities".

The issues experienced by the different stakeholders involved in the virtual STEM education shape the research questions which will be addressed by the assessment of the Cyber School tool. Since technology use is seen as an important factor in retaining interest and efficacy when it comes to STEM education and careers, understanding the role of new virtual world based tools helps to place the individual Cyber School tool and others of a similar category within a range of effective interventions. Given the ubiquity of technological intervention tools meant to improve education being able to accurately evaluate their contributions to student learning and goals, this area provides one of the richest data sets available to begin researching actual learning outcomes when these tools are deployed within an education setting.

The goal of this research has three parts: 1) to evaluation the Cyber School tool in its ability to advance and support STEM education in a primary education setting, and 2) to develop and employ assessment tools which evaluate technological interventions in primary education for STEM disciplines, and finally 3) to apply traditional and non-traditional methods of social analysis to new areas of study. To achieve these goals this research will answer the following question:

> RQ_1: How does an intentional virtual learning environment contribute to reaching STEM goals for increased participation, retention, and engagement with learning?
> RQ_2: Does the integration of games-based learning environments increase positive learning outcomes for both teachers and students?

This research will be conducted over a two-year period, allowing for comparisons between different learner populations and refinement of the tool based on user research.

YEAR ONE

The goals of this project in the first year of deployment will be two-fold. The first is to do a preliminary assessment of the existing Cyber School tool to understand the usability of the product before large scale testing is implemented and secondly to establish contacts with students and teachers who will be using to tool as a part of the large-scale assessment later in the project.

Phase 1 - Usability Evaluation by Immersive 3D

During spring 2013 a series of think-aloud test sessions will be conducted the Choo Smith Youth Empowerment Center in Windsor Mills, Maryland by administrative staff and colleagues of the research team who have not worked on programming for Cyber School. After 2 hours experience using Cyber School the students will be asked to respond to user research questions including the following:

1. Is the Cyber School easy to use?
2. Are any parts of Cyber School difficult to use?
3. Is it fun to use?
4. Are any parts of Cyber School frustrating or boring to use?
5. Was Cyber School useful for you as a learning tool?
6. Do you enjoy video games?
7. Did Cyber School remind you of any of the games you play at home?
8. Would you like to use Cyber School in the future to complete STEM projects?
9. Are there any changes or improvements that would make Cyber School easier, more fun, more exciting, or more useful for you?
10. Can you connect something you encountered in Cyber School to the rest of your life?

Additionally a preliminary and post-assessment will be completed to gauge student interests using the ATIS models for determining motivation and likelihood of follow through in the pursuit of STEM education. Students' comments about the usability and functionality of the software will be recorded and transcribed for use in refining the prototype. This portion of the study will also provide a baseline of user reactions to the educational environment, and a chance to refine concerns of interface or usability that might otherwise complicate the results of the second phase.

The purpose of selecting these two groups during the initial set up of this project is to ensure that the tool is in a robust state before attempting deployment on the larger school wide scale. Additionally, it will be useful to assess how individuals from the target populations will react to an initial introduction of the tool outside of the educational environment. Choo Smith draws its student base from a typically marginalized population of users when it comes to higher levels of STEM education and advancement. These students will act as a stand in during this early usability testing phase for others of similar backgrounds and technological experiences that will be addressed in the larger school setting.

The Phase 1 timescale allows for a thorough evaluation of the initial Cyber School tool in both a usability and content context. The summer sessions which follows Phase 1 allows for a period of refinement and debugging of the software tool in order to make sure that the larger testing phase will proceed without issue. During Phase 1 we expect to learn whether students enjoy Cyber School and feel motivated to use it for additional learning, allowing us to improve the responsiveness to student needs.

YEAR TWO

Phase 2- Collect and Analyze the Large-Scale Cyber School Data

As the larger user population is incorporated into the study, the Cyber School assessment will switch focus away from usability and accessibility to the target student population. In the second phase, the primary outcomes tested will focus on both motivation (ATIS) assessment and the demonstration of STEM skills gain and transferability of knowledge. This phase will be administered with the cooperation and participation of the high school teachers, whose input will be integral in shaping usable output from the program to allow them to assess student learning even as the students' engage with the software package.

During Phase 2, we will incorporate a formal assessment of learning based on the practices suggested by Cromack and Saveyne, including: a background knowledge probe, minute paper, "muddliest point", and role-playing based questioning (2007). The background knowledge probe will follow the assessment standards to "address information the students will need to know to succeed on course assignments and activities, include both easy and difficult questions, and avoid general knowledge areas" (Cromack and Saveyne, 2007). We will be following the practice of using the survey pre- and post-course to have two comparable data sets.

The data sources in Phase 2 are from several sources. The first is data generated from within the Cyber School itself. This data will include log files that identify the most commonly used programs, the areas where students seem to do well or struggle, average times for completion of activities, etc. The second is qualitative feedback from instructors both during the course of the software testing process and in the form of before and after questionnaires meant to determine teacher expectations and use of the system. The third and final form of data collected during this stage is the pre- and post- intervention user assessment tests, designed to reflect concerns and problems that emerged during Phase 1. The remainder of the year will be spent analyzing and disseminating the results.

PROJECT MANAGEMENT

Frank Vivirito, PI, Immersive 3D is CEO of Immersive 3D, where he has overseen the creation of the Cyber School. His previous work experience involved responsibilities in production and art at various game studios, including Breakaway Games. He brings his experience in virtual worlds and game design to the implementation and refinement of the Cyber School tool, and is collaborating with educational experts on the further development of integrated curriculum within the virtual world. He has taught on game and arts related topics at both the University of Baltimore and Nanjing Summit College of Art and collaborated on an ACM publication in the SpringSim '07 proceedings on "Generating real 3D virtual worlds from imperfect data." The Cyber School project continues his focus on serious and educational uses of game design and technologies.

Dr. Anastasia Salter, Co-PI, Simulation and Digital Entertainment, is an Assistant Professor at the College of Arts and Sciences at the University of Baltimore. She draws on her expertise in media studies, children's literature, and digital narratives, applying digital humanities methods to the study of digital artifacts. She is particularly interested in the new ways of expression and education offered by digital narrative forms, including video games and virtual worlds. Her work in studying new forms of independently-created video games has contributed to an understanding of the potential of interactive media for transforming the future of literature and storytelling, with a focus on marginalized groups in these expressive media. As PI on a Maryland State Department of Education grant to conduct workshops and assist in curriculum development for teachers in the Interactive Media Production program, she works directly with high school teachers to realize the potential of STEM learning and new forms of production in raising student skills.

Dr. Bridget Blodgett, Co-PI, Technology & Media Studies, is an Assistant Professor at the College of Arts and Sciences at the University of Baltimore. She is information scientist with expertise in social research methods and social theory, applying those to the study of information and communication technologies (ICT) and their context of development, implementation and use. She is particularly interested in the advantages to social research offered by large-scale virtual environments, both as subjects of her research and as methodological tools. Her work in virtual worlds and social movements has contributed to the understanding of the patterns, behaviors and barriers to integration of social processes within technologically enhanced or defined settings. Her work has contributed to addressing some of the important questions regarding individuals' adoption of technology for social interaction and communication.

ENGAGE GRADUATE STUDENTS IN RESEARCH

We expect to hire two graduate students for the duration of this project. This graduate student will be involved in all phases of the project. This graduate student will take on gradually increasing levels of responsibility over the duration of the project, including the writing of conference and journal papers and developing and applying skills in research methods such as data collection, experimental design, variable testing and analysis.

RESULTS FROM PREVIOUS NSF SUPPORT

No previous support from the NSF.

DISSEMINATION

Project Data

This project involves primary classroom field research. As the different stages of assessment occur, they will produce both qualitative and quantitative data on student learning and attitudes. The commercial tool Cyber School will be assessed, and after preliminary assessment will undergo a secondary production and revision cycle to reflect initial grounding in user needs and theoretical frameworks. The results of both the primary and secondary assessment will take the form of data and observation on the effectiveness of these revisions and structures in promoting STEM learning.

Standards for Data and Metadata

Notes from official governmental and non-governmental agency reports and movement literature will be transcribed, fully referenced and copyright issues addressed. Interviews will be transcribed, written up in electronic files, and shared amongst the principal investigators, consultants and graduate research assistants.

Policies for Confidentiality

The proposal, if funded, will be subjected to IRB approval. Subjects will be granted anonymity. Interviews will NEITHER be audio taped NOR video recorded. No photographs of the sources will be taken. The investigators will NOT publicly reproduce the subjects/sources legal names, their home address, or where they attend school. The only identifying information that may be publicly revealed as grouped anonymized data (not individual data) as a byproduct of a report, paper, or published communication will be the subject's age range, race/ethnicity, gender and school.

Policies and Provisions for Distribution

We plan to systematically share our assessment tools, our data, and our polished analyses. Once the analyses have been completed, the academic papers produced will be published in academic journals and presented at conferences of high quality and respectability. Because our research team is interdisciplinary, it is likely that we will share our analysis in venues encompassing education, games studies, and information studies. Any assessment tools created during the course of this project would be hosted on a public web server to allow for the download and access by other researchers or members of the public interested in understanding STEM learning outside the traditional classroom. In addition, the raw, anonymized data separated from any individual identifying information gathered during the course of the project will be made available on public servers for download and analysis.

Plans for Archiving and Preservation

In order to protect the confidentiality of students and teachers interviewed and to allow follow-up reference, the data (original documents and transcribed interviews) will be stored and protected in a locked file cabinet and/or password protected computer. All reports and ephemera will be scanned and/or copied (where copyright allows) and archived in a secure physical and/or computer back-up for reference in the future.

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A. Professional Preparation

Undergraduate Institution

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Liberal Arts
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B. Appointments

CEO, Immersive 3D LLC, October 2010 – present
Production Director, BreakAway Ltd, June 2003 – October 2010
Art Director, Vision Video Games December 2000 – June 2003

C. Publications

i. Related Publications:

Don Goddard, Paul H. Mauritz, Frank Vivirito, Generating real 3D virtual worlds from imperfect data, SpringSim '07 Proceedings of the 2007 spring simulation multi conference - Volume 3 pgs. 233 – 237
Online at http://dl.acm.org/citation.cfm?id=1404848

ii. Significant Publications:

The Lord of the Rings: The Battle for Middle-Earth II - The Rise of the Witch-King (2006), Electronic Arts, Inc., Managing Art Director

SpaceStationSim (2005), Vision Videogames, LLC, Art Director

Sid Meier's Civilization II (1996), MicroProse Software, Inc., Technical Art Director

F-15 Strike Eagle III (1992), MicroProse Software, Inc., Technical Art Director

Task Force 1942 (1992), MicroProse Software, Inc., Technical Art Director

D. Synergistic Activities

Taught game art classes and lectured about the history of computer gaming and outlooks for the future at the Nanjing Summit College of Art

Taught NATO officers in Portsmouth, England how to use satellite information for 3D simulations

Conducted training for the Swedish Defense Ministry and Applied Physics Laboratories

Taught at the Hwa Hsia Institute of Technology in Taipei, Taiwan

Teaches 3D Computer Graphics at the University of Baltimore

E. Collaborators & Co-Authors

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Information Sciences and Technology
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C. Publications

i. Related Publications:

Blodgett, B. Xu, H. Trauth, E. (2007). Lesbian, gay, bisexual and transgender (LGBT) issues in virtual worlds. ACM SIGMIS Database: 38(4), pgs. 97 – 99. Online at :http://portal.acm.org/citation.cfm?id=1314234.1314252&coll=ACM&dl=ACM&CFID=22163528&CFTOKEN=81711618

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ii. Significant Publications:

Blodgett, B., Tapia, A. (2011). "Do Avatars Dream of Electronic Project Meetings?: The Blurring of Work and Play in Virtual Environments" Information, Technology and People, Special Issue on Digital Culture, 24(1): pgs. 26 – 45.

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A Generational Lens on ICTs in the Changing Workplace" Submitted to The American Society for Information Science & Technology (ASIS&T), to be held in Pittsburgh, Pennsylvania, October 22 – 27, 2010.

Tapia, A., Ocker, R., Rosson, M. B., and Blodgett, B. (2010) "Two Layered Structure in Scientific Collaborations" Computer Supported Cooperative Work. Workshop on Scientific Collaboration. Savannah, Georgia, February 6-10, 2010.

Blodgett, B., Tapia, A. (2010). "When Protests go Virtual: How Organizing Social Protest in Virtual Worlds Changes the Nature of Organizing" Submitted to the 16th Americas Conference on Information Systems (AMCIS), Lima, Peru, August 14-17, 2010.

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D. Synergistic Activities

None

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A. Professional Preparation

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C. Publications

i. Related Publications:

Whitney, L. Sarangoulis, W. Luca, F. (2010). *Comprehensive College Entry Preparation Guide.* Winning Way System, LLC, Baltimore, MD.

Whitney, L. Luca, F. (2010). *College Entry Organizer & Journal.* Winning Way System, LLC, Baltimore, MD.

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ii. Significant Publications:

Whitney, L. Luca, F.(2010). *Career Entry Organizer & Journal.* Winning Way System, LLC, Baltimore, MD.

D. Synergistic Activities

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E. Collaborators & Co-Authors

i. Collaborator during the last 48 months

Anastasia Salter (University of Baltimore), Bridget Blodgett (University of Baltimore), Frank Vivirito, Deborah Tillett, Frank A. Luca

ii. Graduate and Postdoctoral Advisors

iii. Students (research assistants)

Co-Principal Investigator
Anastasia Salter
410.837.5223
asalter@ubalt.edu

University of Baltimore
1420 N. Charles Street
Baltimore, MD 21201

Professional Preparation

University of Maryland, College Park	IVSP (Digital Narrative Studies)	Bachelor of Arts, 2005
Georgetown University	Communication, Culture and Technology	Master of Arts, 2007
University of Baltimore	Interaction Design and Information Architecture	Doctorate of Communications Design, 2010
Hollins University	Children's Literature	Master of Fine Arts, 2011

Appointments

Assistant Professor
Information Arts and Technologies
University of Baltimore, August 2011 to present

Visiting Assistant Professor
Information Arts and Technologies
University of Baltimore, September 2010 to June 2011

Publications Closely Related to the Project

Salter, A. (2012). "Writing Under Constraint" and "Mobile Entertainment." *The Johns Hopkins Guide to Digital Media and Textuality*. Co-editors: Lori Emerson, Marie-Laure Ryan, Benjamin Robertson (under contract with Johns Hopkins University Press, forthcoming).

Salter, A. (2012). "Hacking the Dissertation." Pending in *Hacking the Academy*, edited by D. Cohen and T. Scheinfeldt. (under contract with University of Michigan Press, forthcoming).

Bonsignore, E.; Hansen, D.; Troups, Z., Nacke, L.; Salter, A.; Lutters, W. "Mixed Reality Games."(2012). Workshop paper. ACM Computer Supported Collaborative Work Conference Proceedings. < doi.10.1145/2141512.2141517>

Salter, A. (2011). "Adventurers turned Tale-Tellers: The Emergence of an On-line Folk Art Community." *Rhizomes.* Winter Special Issue: Hives, Tribes, Assemblages: New Collectivities. <http://rhizomes.net>

Salter, A. (2009). "Once More a Kingly Quest." *Journal of Transformative Works and Cultures*. Special Issue: Games. <http://journal.transformativeworks.org/>

Other Significant Publications
Salter, A. (2011). "Virtually Yours: Desire and Fulfillment in Virtual Worlds." *The Journal of Popular Culture*, 44: 1120–1137. doi: 10.1111/j.1540-5931.2011.00891.x

Salter, A. (2011). "Closed Minds: Tamora Pierce's Teenagers and the Problem of Desire." A Dragon Wrecked My Prom. Ed. J. Battis. Lexington Press.

Salter, A. (2011). "Learning by gaming in a high-tech world." Baltimore Sun. April 11. <http://www.baltimoresun.com/news/opinion/oped/bs-ed-video-games20110411,0,2388042.story>

Synergistic Activities

1. Contributor (three posts a month since July 2011) to the technology and pedagogy blog ProfHacker (profhacker.com), part of the Chronicle of Higher Education.
   (2012, February) Building Books for Mobile
   (2012, February) Building Programming Tutorials with Codecademy
   (2012, January) Keeping Up With Your Records
   (2012, January) Returning to Play at THATCamp
   (2012, January) New Year's Resolutions: Learning to Program

2. Principal Investigator, "Interactive Media Production Professional Development." from the Maryland State Department of Education supporting teaching workshops and curriculum development for high-school game design and interactive media teachers, 2011 and 2012. $25,000 per year.

3. Co-organizer with Amanda Viscoti of THATCamp Games, January 2012, which brought together nearly 100 participants for workshops and conversations about the role games can play in learning and scholarship.

4. Pedagogical approach to game-design as educational tool, as presented at conferences:
   Salter, A. (2012). "Unlocking the Power of Storytelling in Games-based Learning." Learning and Entertainment Evolution Forum, Harrisburg University, May 3-4.
   Salter, A. (2011). "Thinking Beyond 'Gamification' for Learning." North American Simulation and Gaming Association, Pennsylvania, October 5-8.
   Salter, A. (2011). "Leveling up in the Classroom." Computers & Writing Conference: Writing in Motion, Traversing Public/Private Spaces, Ann Arbor, MI, May 19-22.

Collaborators & Other Affiliations

- **Collaborators and Co-Editors**.
  - **Blodgett, Bridget.** University of Baltimore, Assistant Professor.
  - **Bonsignore, Elizabeth.** University of Maryland, College Park, graduate student.
  - **Hansen, Derek.** Brigham Young University, Assistant Professor.
  - **Livermore, Jeffrey.** Henry Ford Community College, Associate Dean.
  - **Lutters, Wayne.** University of Maryland, Baltimore County, Associate Professor.
  - **Murray, John Thomas.** University of California, Santa Cruz, graduate student.
  - **Nacke, Lennart.** University of Ontario Institute of Technology, Assistant Professor.
  - **Nix, Betsy.** University of Baltimore, Assistant Professor.
  - **Toups, Zachary.** Texas A&M University, Research Engineer.
  - **Visconti, Amanda.** University of Maryland, College Park, graduate student.

- **Graduate Advisors and Postdoctoral Sponsors**.
  - **Fraustino, Lisa Rowe.** Eastern CT State University, faculty; Hollins University, faculty.
  - **Irvine, Martin.** Georgetown University, faculty.
  - **La Faye, Alexandria**. Hamline University, faculty; Hollins University, faculty.
  - **Kirschenbaum, Matt.** University of Maryland, College Park, associate professor.
  - **Kaplan, Nancy.** University of Baltimore, affiliated.
  - **Macovski, Michael.** Georgetown University, faculty.
  - **Moulthrop, Stuart.** University of Wisconsin, Milwaukee, professor.

- **Thesis Advisor and Postgraduate-Scholar Sponsor**.
  - **Kabel, Margo**. University of Baltimore, graduate student.
  - **Chin, Michelle**. University of Baltimore, M.A. (2011)
  - **Poliseo, Stacy**. University of Baltimore, graduate student.
  - **Gilliam, Julie**. University of Baltimore, doctoral student.
  - **Gillespie, Laura**. University of Baltimore, doctoral student.

Co-Principal Investigator
Deborah Tillett
Immersive 3D,LLC
14 Midvale Road
Baltimore, MD 21210
(202) 494-4028
deb@immersive-3d.com

A. Professional Preparation

Undergraduate Institution:
Towson University
Communications/Journalism
Bachelor of Sciences 1976

Graduate Institution:
Loyola University/Sellinger School of Business
Masters of Business Administration 2000

B. Appointments

Adjunct Professor, Towson University School of Business and Economics
Fall 2008 – Spring 2011
President and COO, Immersive 3D LL, October 2010 – present
President, BreakAway Games, 2001 – 2008
President, OT Sports Computer Games (ABC/Walt Disney Co.), 1995 – 1998
Vice President Marketing, MicroProse Software, 1989 – 1995

C. Publications

None

D. **Synergistic Activities**

Chair, Board of Advisors for College of Business and Economics (CBE) Towson, University; Board member for the Julie Center (A non-profit community organization run by the Sisters of Notre Dame de Namur); Chair, Fundraising Committee YWCA Leader Lunch 2008.
Awards:
2004 Innovator of the Year, Daily Record; 2005 Bravo Award, Smart Woman Magazine; 2006 Dean's Recognition Award Distinguished Alumni, Towson, University; Keynote speaker, Women in Games Conference 2006; named one of the 100 Most Influential Women in Gaming -2006; Keynote Speaker Delta Sigma Theta Sorority, Inc. March 2008.

E. Collaborators & Co-Authors

None

Co-Principal Investigator
Frank A. Luca, Chief Operating Officer
Winning Way System, LLC
5205 East Drive Suite J
Baltimore, MD 21201
(410) 837-5301
frank.luca@Winning-STEP.com

A. Professional Preparation

Undergraduate Institution:
Towson State College (now Towson University), Towson, Maryland
Bachelor of Science 1973

Certified to teach K12 Science, 9th grade Introduction to Physical Science, 10th grade Introduction to Biology & Lab, 11th & 12th grade Anatomy and Physiology, 11th & 12th grade Kinesiology, and middle school Health.

Graduate Institution:
College of Notre Dame

22 credits (18 required) for certification in Special Education and Advanced Professional Certificate in Educational Administration.

B. Appointments

Managing Member and Chief Operating Officer
Winning Way System, LLC
Baltimore, MD 21227
2006 – current

Director of Independent Living
Mentor Maryland
Catonsville, MD 21228
2004 - 2008

Director of Career Services
Family Advocacy Services (bought by Mentor Maryland 2003)
Catonsville, MD 21228
1998 - 2004

Senior Director for Community Based Mental Health
Family Advocacy Services
Catonsville, MD 21228
1996 -1998

C. Publications

i. Related Publications:

Whitney, L. Greene, Z. (2010). *STEP Student Transition and Entry Preparation Resource Guide*. Winning Way System, LLC, Baltimore, MD.

Whitney, L. Sarangoulis, W. Greene, I. (2010). *Comprehensive College Entry Preparation Guide.* Winning Way System, LLC, Baltimore, MD.

Whitney, L. Greene, I. (2010). *College Entry Organizer & Journal.* Winning Way System, LLC, Baltimore, MD.

ii. Significant Publications:

Whitney, L. (2010). *Comprehensive Career Entry Preparation Guide.* Winning Way System, LLC, Baltimore, MD.

Whitney, L. (2010). *Comprehensive Career Entry Preparation Independent Study Workbook.* Winning Way System, LLC, Baltimore, MD.

Whitney, L. Greene, I. (2010). *Career Entry Organizer & Journal.* Winning Way System, LLC, Baltimore, MD.

D. Synergistic Activities

Coach, Tutor, and Instructor
Winning Way System, LLC
Baltimore, MD 21227
2007 - current

Coaching, tutoring, and instruction related to college entry preparation, transitioning from middle school to high school, and career entry preparation for middle and high school students in Winning STEP programs.

E. Collaborators & Co-Authors

i. Collaborator during the last 48 months

Anastasia Salter (University of Baltimore), Bridget Blodgett (University of Baltimore), Frank Vivirito, Deborah Tillett, Ira D. Greene

ii. Graduate and Postdoctoral Advisors

iii. Students (research assistants)

SUMMARY PROPOSAL BUDGET

YEAR 1

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Immersive 3D LLC

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Frank Vivirito

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Frank Vivirito - PI**	6.00	0.00	0.00	**46,800**	
2. **Deborah A Tillett - Co-PI**	1.50	0.00	0.00	**9,100**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	7.50	0.00	0.00	**55,900**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**14**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	9.00	3.00	**536,640**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**592,540**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**178,651**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**771,191**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**0**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**45,297**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**300,057**	
6. OTHER				**3,600**	
TOTAL OTHER DIRECT COSTS				**348,954**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**1,120,145**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **F&A (Rate: 5.0000, Base: 820088)**					
TOTAL INDIRECT COSTS (F&A)				**41,004**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**1,161,149**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**1,161,149**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Frank Vivirito

ORG. REP. NAME*
Frank Vivirito

FOR NSF USE ONLY		
INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 2

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Immersive 3D LLC

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Frank Vivirito

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Frank Vivirito - Co-PI**	6.00	0.00	0.00	**46,800**	
2. **Deborah A Tillett - Co-PI**	1.50	0.00	0.00	**9,100**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	7.50	0.00	0.00	**55,900**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**14**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	12.00	9.00	3.00	**165,880**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**221,780**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**66,867**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**288,647**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**0**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**400**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**246,942**	
6. OTHER				**3,600**	
TOTAL OTHER DIRECT COSTS				**250,942**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**539,589**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **F&A (Rate: 5.0000, Base: 292647)**					
TOTAL INDIRECT COSTS (F&A)				**14,632**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**554,221**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**554,221**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Frank Vivirito

ORG. REP. NAME*
Frank Vivirito

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INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

Cumulative

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Immersive 3D LLC

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Frank Vivirito

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Frank Vivirito - PI**	12.00	0.00	0.00	**93,600**	
2. **Deborah A Tillett - Co-PI**	3.00	0.00	0.00	**18,200**	
3.					
4.					
5.					
6. ( ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	15.00	0.00	0.00	**111,800**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**28**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	24.00	18.00	6.00	**702,520**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**814,320**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**245,518**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**1,059,838**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**0**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**45,297**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**400**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**546,999**	
6. OTHER				**7,200**	
TOTAL OTHER DIRECT COSTS				**599,896**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**1,659,734**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)					
TOTAL INDIRECT COSTS (F&A)				**55,636**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**1,715,370**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**1,715,370**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Frank Vivirito

ORG. REP. NAME*
Frank Vivirito

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INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

C ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

BUDGET JUSTIFICATION

Immersive 3D, LLC

Salaries & Wages

Senior Personnel:
Frank Vivirito, PI, will commit an average of 50% of the work week to the project for Years 1 and 2. He will direct and manage the project and will closely manage the software revisions and improvements to Cyber School based on usability findings and user feedback, and he will also closely manage the integration of additional interactive STEM modules and college and career entry and transition readiness preparation curriculum into Cyber School.

Deborah Tillett, Co-PI, will commit an average of 12.5% of the work week to the project for Years 1 and 2. She will provide a marketing and future commercialization perspective to every phase of the project including usability, student and teacher enthusiasm, effectiveness, upgrade and improvement priorities, and dissemination of results.

Fringe Benefits

Fringe benefits are calculated at 30.15% to cover FICA at 7.65%, FUTA at 0.80%, SUTA at 2.70%, Worker Compensation Insurance at 4.00%, and health insurance at 15%.

Other Costs

Year 1 request is for $14,000 for 6 laptop computers and 1 server for programmers and artists to complete improvements to Cyber School based on usability study and user feedback, $30,597 for 3-D and graphic design software for the new laptops and server, $700 for office productivity software for 2 of the new laptops, and $3,600 to pay an office sharing fee of $300 per month to Choo Smith Youth Empowerment Learning Program, a Maryland 501(c)(3) non-profit corporation.

Year 2 request is for $400 for publication costs and $3,600 to pay an office sharing fee of $300 per month to Choo Smith Youth Empowerment Learning Program, a Maryland 501(c)(3) non-profit corporation.

Facilities and Administrative Costs

F&A costs are requested in the amount of 5% of total direct costs.

SUMMARY PROPOSAL BUDGET

YEAR 1

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
University of Baltimore

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Anastasia Salter

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Anastasia Salter - Co-PI**	0.00	0.95	2.00	**22,235**	
2. **Bridget M Blodgett - Co-PI**	0.00	0.95	2.00	**21,571**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	1.90	4.00	**43,806**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**2**) GRADUATE STUDENTS				**24,960**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**68,766**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**8,084**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**76,850**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**0**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**22,052**	
TOTAL OTHER DIRECT COSTS				**22,052**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**98,902**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **Salaries & Wages Only (Rate: 55.0000, Base: 68766)**					
TOTAL INDIRECT COSTS (F&A)				**37,821**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**136,723**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**136,723**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Anastasia Salter

ORG. REP. NAME*
Frank Vivirito

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INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 2

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
University of Baltimore

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Anastasia Salter

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Anastasia Salter - Co-PI**	0.00	0.95	2.00	**22,902**	
2. **Bridget M Blodgett - Co-PI**	0.00	0.95	2.00	**22,219**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	1.90	4.00	**45,121**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**2**) GRADUATE STUDENTS				**25,708**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**70,829**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**8,327**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**79,156**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**2,452**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**22,714**	
TOTAL OTHER DIRECT COSTS				**22,714**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**104,322**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **Salaries & Wages Only (Rate: 55.0000, Base: 70829)**					
TOTAL INDIRECT COSTS (F&A)				**38,956**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**143,278**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**143,278**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Anastasia Salter

ORG. REP. NAME*
Frank Vivirito

FOR NSF USE ONLY		
INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

Cumulative

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **University of Baltimore**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Anastasia Salter**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Anastasia Salter - Co-PI**	0.00	1.90	4.00	**45,137**	
2. **Bridget M Blodgett - Co-PI**	0.00	1.90	4.00	**43,790**	
3.					
4.					
5.					
6. ( ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	3.80	8.00	**88,927**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**4**) GRADUATE STUDENTS				**50,668**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**0**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**0**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**139,595**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**16,411**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**156,006**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**2,452**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**0**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**44,766**	
TOTAL OTHER DIRECT COSTS				**44,766**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**203,224**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)					
TOTAL INDIRECT COSTS (F&A)				**76,777**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**280,001**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**280,001**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Anastasia Salter**

ORG. REP. NAME*: **Frank Vivirito**

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INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

C ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

BUDGET JUSTIFICATION

University of Baltimore

Salaries & Wages

Senior Personnel:
Dr. Anastasia Salter [Co-PI] will commit 0.95 academic months and 2 summer months to the project for Years 1 and 2. Along with Bridget Blodgett, she will assist in both the construction and analysis of the Cyber School testing, and contribute to the structure and analysis of game design elements informed by her study of games-based learning. As her current work involves working with high school teachers, she will also focus on making the outcomes accessible to that audience.

Dr. Bridget Blodgett [Co-PI] will commit 0.95 academic months and 2 summer months to the project for Years 1 and 2. Along with Anastasia Salter, she will assist in both the construction and analysis of the Cyber School testing, and contribute her experience and research in working with underserved populations in STEM education to assess the success of Cyber School in reaching these important audiences.

Other Personnel:
To Be Named [Graduate Assistants] – A total of $24,960 is requested in Year 1 and $25,708 is requested in Year 2 for compensation for 2 graduate assistants to work on the project. The graduate assistants will assist in data analysis, usability, and testing.

Fringe Benefits

Fringe benefits for faculty [Co-PIs] are calculated at 27% in the academic months and 8% in the summer months.

Fringe benefits for contractual employees [Graduate Assistants] are calculated at 8%.

Travel

Conference - Funds are requested for the Co-PIs to attend a conference in Year 2 in order to disseminate results of the project.

Registration, 2 people
Airfare, 2 people @ $250/flight
Hotel, 2 people, 3 nights @ $200night
Per Diem, 2 people, 3 days @ $42day

Other Costs

$22,052 is requested in Year 1 and $22,714 is requested in Year 2 for tuition for the Graduate Assistants.

Facilities and Administrative Costs

The University of Baltimore's federally negotiated rate is 55% of Salary and Wages.

SUMMARY PROPOSAL BUDGET

YEAR 1

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Winning Way System, LLC

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Ira D Greene

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Ira D Greene - Co-PI**	4.20	0.00	0.00	**29,120**	
2. **Frank A Luca - Co-PI**	4.20	0.00	0.00	**26,390**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	8.40	0.00	0.00	**55,510**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**1**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**20,800**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**76,310**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**23,008**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**99,318**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**11,218**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**33,147**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**0**	
TOTAL OTHER DIRECT COSTS				**33,147**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**143,683**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **F&A (Rate: 5.0000, Base: 393025)**					
TOTAL INDIRECT COSTS (F&A)				**19,651**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**163,334**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**163,334**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Ira D Greene

ORG. REP. NAME*
Frank Vivirito

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INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 2

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Winning Way System, LLC

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Ira D Greene

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Ira D Greene - Co-PI**	4.20	0.00	0.00	**21,840**	
2. **Frank A Luca - Co-PI**	4.20	0.00	0.00	**24,570**	
3.					
4.					
5.					
6. (**0**) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	8.40	0.00	0.00	**46,410**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**1**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**20,800**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**67,210**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**20,264**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**87,474**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**5,609**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**1,400**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**0**	
TOTAL OTHER DIRECT COSTS				**1,400**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**94,483**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **F&A (Rate: 5.0000, Base: 183623)**					
TOTAL INDIRECT COSTS (F&A)				**9,181**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**103,664**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**103,664**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Ira D Greene

ORG. REP. NAME*
Frank Vivirito

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Date Checked	Date Of Rate Sheet	Initials - ORG

 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

Cumulative

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Winning Way System, LLC

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Ira D Greene

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Ira D Greene - Co-PI**	8.40	0.00	0.00	**50,960**	
2. **Frank A Luca - Co-PI**	8.40	0.00	0.00	**50,960**	
3.					
4.					
5.					
6. ( ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	**0**	
7. (**2**) TOTAL SENIOR PERSONNEL (1 - 6)	16.80	0.00	0.00	**101,920**	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (**0**) POST DOCTORAL SCHOLARS	0.00	0.00	0.00	**0**	
2. (**0**) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	**0**	
3. (**0**) GRADUATE STUDENTS				**0**	
4. (**0**) UNDERGRADUATE STUDENTS				**0**	
5. (**2**) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				**41,600**	
6. (**0**) OTHER				**0**	
TOTAL SALARIES AND WAGES (A + B)				**143,520**	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				**43,272**	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				**186,792**	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				**0**	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				**16,827**	
2. FOREIGN				**0**	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ **0**					
2. TRAVEL **0**					
3. SUBSISTENCE **0**					
4. OTHER **0**					
TOTAL NUMBER OF PARTICIPANTS (**0**) TOTAL PARTICIPANT COSTS				**0**	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				**34,547**	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				**0**	
3. CONSULTANT SERVICES				**0**	
4. COMPUTER SERVICES				**0**	
5. SUBAWARDS				**0**	
6. OTHER				**0**	
TOTAL OTHER DIRECT COSTS				**34,547**	
H. TOTAL DIRECT COSTS (A THROUGH G)				**238,166**	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)					
TOTAL INDIRECT COSTS (F&A)				**28,832**	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				**266,998**	
K. RESIDUAL FUNDS				**0**	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				**266,998**	

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Ira D Greene

ORG. REP. NAME*
Frank Vivirito

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INDIRECT COST RATE VERIFICATION		
Date Checked	Date Of Rate Sheet	Initials - ORG

C ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

BUDGET JUSTIFICATION

Winning Way System, LLC

Salaries & Wages

Senior Personnel:
Ira D. Greene [Co-PI] will commit an average of 35% of his work week to the project for Years 1 and 2. He will direct the conversion of STEM lessons and college and career entry and transition readiness preparation curriculum to the interactive format appropriate for use in the Cyber School. He will coordinate the work of Winning Way System, LLC with Immersive 3D, LLC and the University of Baltimore researchers.

Frank A. Luca [Co-PI] will commit an average of 35% of his work week to the project for Years 1 and 2. He will be the direct liaison with the supporting entities, South Hagerstown High School and Choo Smith Youth Empowerment Learning Program. He is expected to be on-site at South Hagerstown High School 3 times a week until the end of the school year in June, 2014. He is expected to be on-site at the Choo Smith Youth Empowerment Learning Program weekly from January through May, 2013.

Other Personnel:
The Secretary will provide administrative support for the research project working from the office of Winning Way System, LLC, including bookkeeping, AP/AR/PR management, tax form preparation and submission, health insurance administration, reception, filing, and correspondence.

Fringe Benefits

Fringe benefits are calculated at 30.15% to cover FICA at 7.65%, FUTA at 0.80%, SUTA at 2.70%, Worker Compensation Insurance at 4.00%, and health insurance at 15%.

Travel

Funds are requested for the Co-PI to travel to South Hagerstown High School 3 times a week for liaison with faculty, administration, and Washington County Public Schools staff.

Round trip mileage from office of 141 miles at $0.51 per mile for 52 weeks in Year 1 totaling $11,218 and 26 weeks in Year 2 totaling $5,609.

Other Costs

Year 1 request is for $5,797 for software for conversion of curriculum to interactive format for use in Cyber School, $4,400 for 5 computers for Winning Way System staff to complete curriculum conversion and support functions, $19,400 for 30 laptop computers so students can access and use Cyber School along with 1 server and 1 wireless router for the classroom, $2,150 for 5 copies of office productivity software and 1 copy of bookkeeping and payroll software, and $1,400 for office and payroll supplies.

Year 2 request is for $1,400 for bookkeeping and payroll supplies.

Facilities and Administrative Costs

F&A costs are requested in the amount of 5% of total direct costs.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Frank Vivirito

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Cyber School: Assessing STEM Learning Through Virtual Worlds and Gaming

Source of Support: NSF
Total Award Amount: $ 1,715,370 Total Award Period Covered: 01/14/13 - 01/14/15
Location of Project: Immersive 3D
Person-Months Per Year Committed to the Project. Cal:6.00 Acad: 0.00 Sumr: 0.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Bridget Blodgett

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Cyber School: Assessing STEM Learning Through Virtual Worlds and Gaming

Source of Support: NSF
Total Award Amount: $ 1,715,370 Total Award Period Covered: 01/14/13 - 01/14/15
Location of Project: University of Baltimore
Person-Months Per Year Committed to the Project. Cal:0.00 Acad: 0.95 Sumr: 2.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

 USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Ira Greene

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Cyber School: Assessing STEM Learning Through Virtual Worlds and Gaming

Source of Support: NSF

Total Award Amount: $ 1,715,370 Total Award Period Covered: 01/14/13 - 01/14/15

Location of Project: Immersive 3D

Person-Months Per Year Committed to the Project. Cal:4.20 Acad: 0.00 Sumr: 0.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

 USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Anastasia Salter	Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Interactive Media Production Program FY12

Source of Support: Maryland State Department of Education
Total Award Amount: $ 25,000 Total Award Period Covered: 07/01/11 - 06/30/12
Location of Project: University of Baltimore
Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 0.25

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Interactive Media Production Program FY13

Source of Support: Maryland State Department of Education
Total Award Amount: $ 25,000 Total Award Period Covered: 07/01/12 - 06/30/13
Location of Project: University of Baltimore
Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 0.25

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Cyber School: Assessing STEM Learning Through Virtual Worlds and Gaming

Source of Support: NSF
Total Award Amount: $ 1,715,370 Total Award Period Covered: 01/14/13 - 01/14/15
Location of Project: University of Baltimore
Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.95 Sumr: 2.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:

Source of Support:
Total Award Amount: $ Total Award Period Covered:
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Deborah Tillett

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Cyber School: Assessing STEM Learning Through Virtual Worlds and Gaming

Source of Support: NSF

Total Award Amount: $ 1,715,370 Total Award Period Covered: 01/14/13 - 01/14/15

Location of Project: Immersive 3D

Person-Months Per Year Committed to the Project. Cal: 1.50 Acad: 0.00 Sumr: 0.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.C.2.h for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Frank Luca

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Cyber School: Assessing STEM Learning Through Virtual Worlds and Gaming

Source of Support: NSF

Total Award Amount: $ 1,715,370 Total Award Period Covered: 01/14/13 - 01/14/15

Location of Project: Winning Step

Person-Months Per Year Committed to the Project. Cal:4.20 Acad: 0.00 Sumr: 0.00

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: $ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

 USE ADDITIONAL SHEETS AS NECESSARY

FACILITIES, EQUIPMENT & OTHER RESOURCES

FACILITIES: Identify the facilities to be used at each performance site listed and, as appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Use "Other" to describe the facilities at any other performance sites listed and at sites for field studies. USE additional pages as necessary.

Laboratory: UB/SIAT - We support 4 teaching and development labs, each with 20-24 networked computers and T-3 Internet connections. These labs will be used to support the work of the development teams. In addition, we have a user research lab that includes eye-tracking facilities, focus groups

Clinical:

Animal:

Computer: UB/SIAT - The school operates several Web servers, at least one of which will be used to support sofwtare development and testing.

Office: Winning Way System, LLC maintains a fully equipped business office in Baltimore, Maryland with standard office equipment, 3 private offices, furnishings, and conference facility with video projection.

Other:

MAJOR EQUIPMENT: List the most important items available for this project and, as appropriate identifying the location and pertinent capabilities of each.

OTHER RESOURCES: Provide any information describing the other resources available for the project. Identify support services such as consultant, secretarial, machine shop, and electronics shop, and the extent to which they will be available for the project. Include an explanation of any consortium/contractual arrangements with other organizations.

Immersive 3D, LLC and Winning Way System, LLC have been granted use of office space and a conference room at the Choo Smith Youth Empowerment Learning Program in Windsor Mill, Maryland, for group work sessions on Cyber School improvements, meetings, and Cyber School usability trials. South Hagerstown High School has agreed to be the testing site for implementation of Cyber School in their Physics classrooms.

LABORATORY FACILITIES (continued):

facilities and usability testing facilities. This lab will be used for extensive usability testing of the software.

DATA MANAGEMENT PLAN

1. Types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project

This project involves primary classroom field research. As the different stages of assessment occur, they will produce both qualitative and quantitative data on student learning and attitudes. The commercial tool Cyber School will be assessed, and after preliminary assessment will undergo a secondary production and revision cycle to reflect initial grounding in user needs and theoretical frameworks. The results of both the primary and secondary assessment will take the form of data and observation on the effectiveness of these revisions and structures in promoting STEM learning.

2. Standards to be used for data and metadata format and content

Notes from official governmental and non-governmental agency reports and movement literature will be transcribed, fully referenced and copyright issues addressed. Interviews will be transcribed, written up in electronic files, and shared amongst the principal investigators, consultants and graduate research assistants.

3. Policies for access and sharing including provisions for confidentiality

The proposal, if funded, will be subjected to IRB approval. Subjects will be granted anonymity. Interviews will NEITHER be audio taped NOR video recorded. No photographs of the sources will be taken. The investigators will NOT publicly reproduce the subjects/sources legal names, their home address, or where they attend school. The only identifying information that may be publicly revealed as grouped anonymous data (not individual data) as a byproduct of a report, paper, or published communication will be the subject's age range, race/ethnicity, gender and school.

4. Policies and provisions for re-distribution

We plan to systematically share our assessment tools, our data, and our polished analyses. Once the analysis has been completed, the academic papers produced will be published in academic journals and presented at conferences of high quality and respectability. Because our research team is interdisciplinary, it is likely that we will share our analysis in venues encompassing education, games studies, and information studies. Any assessment tools created during the course of this project would be hosted on a public web server to allow for the download and access by other researchers or members of the public interested in understanding STEM learning outside the traditional classroom. In addition, the raw, anonymous data separated from any individual identifying information gathered during the course of the project will be made available on public servers for download and analysis.

5. Plans for archiving data, samples, and other research product, and for preservation of access

In order to protect the confidentiality of students and teachers interviewed and to allow follow-up reference, the data (original documents and transcribed interviews) will be stored and protected in a locked file cabinet and/or password protected computer. All reports and ephemera will be scanned and/or copied (where copyright allows) and archived in a secure physical and/or computer back-up for reference in the future.

South Hagerstown High School
1101 South Potomac Street—Hagerstown, Maryland 21740—Phone 301-766-8371, Fax 301-766-8474

Office of the Principal

March 7, 2012

Mr. Frank A. Luca, Chief Operating Officer
Winning Way System, LLC t/a Winning STEP
5205 East Drive, Suite J
Baltimore, Maryland 21227

Dear Mr. Luca:

This letter confirms that South Hagerstown High School, located in Hagerstown, Maryland, is interested in participating and being a pilot and host site for research on the effectiveness of the Cyber School Program for Transforming STEM Learning. Our participation will be contingent upon receiving a letter of approval from the University of Baltimore's IRB, a description of the study, and final approval from the Washington County Board of Education. I understand that this will be conducted during the 2013-2014 school year and will be contingent upon you receiving funding for the research.

I look forward to working with you and Winning Way System, LLC t/a Winning Step to advance this exciting project. I believe that the Cyber School Software, which combines computer gaming dynamics with STEM modules, and a robust college and career entry and transition readiness preparation program, holds great promise for engaging more students in STEM college and career tracks. It is our hope that this project will improve the academic performance, retention, and graduation rates of our students.

Please contact me if I can be of assistance to you or your team.

Sincerely yours,

Dr. Timothy Dawson
Principal

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February 21, 2012

Frank Vivirito, Principal Investigator
Immersive 3D, LLC
3402 Crosswood Drive
Aberdeen, MD 21001

Dear Mr. Vivirito,

Choo Smith Youth Empowerment is a Maryland non-profit corporation located at 7125 Ambassador Road, Suite 100, Windsor Mill, Maryland 21244. At our location we provide an after-school program for middle school and high school students focused on math, writing, and reading tutorials and college and career entry preparation programs.

We would welcome Immersive 3D to test the prototype Cyber School with our students for two of our regularly scheduled 90 minute daily sessions. We understand that our students would be introduced to the Cyber School and observed while using the Cyber School and working through the lessons they choose to work on. We understand that the students will not be identified by name or Social Security Number, but will be assigned pseudonyms for tracking for the purpose of initial testing of the Cyber School's usability and functionality.

We look forward to working with you and advancing the completion of Cyber School. We are excited by the potential for your project.

Sincerely yours,

Karyn D. Bullock

Karyn D. Bullock
Sr. Vice President – Operations