WGG 2016 Annual Report 1422436

What are the major goals of the project?

- Deliver WGG to over 6,600 youth at over 25 B&GCs.
- Develop nine 1-hour and two 6-hour informed engineering design challenges that engage youth in virtual and physical design challenges that require engineering thinking and STEM knowledge and are aligned to the Common Core Math Standards and Next Generation Science Standards.
- Develop and refine WGG training and workshop materials for B&GC staff.
- Adapt the training and workshop materials to create a virtual training delivery system so B&GC staff nationally can use and adapt the materials.
- Provide National Department of Energy Laboratories and informal STEM providers with WGG materials.
- Expand and enhance the *WISEngineering* platform to align with the goals for exemplary informal STEM materials and make it is more engaging and easier to use.
- Study WGG activities, examining evidence in relation to claims about youth outcomes.
- Create a sustainable presence for *WISEngineering* at Hofstra with continued maintenance and support on the Hofstra server even after the completion of the grant period.
- Publish and disseminate models, materials, products, and results.
- Coordinate and collaborate with The Center for Advancement of Informal Science Education (CAISE) for use and dissemination.

What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?

Major Activities: In summer 2015, the BGCs implemented summer activities and the Charlottesville, VA, BGC was added as a member. There was a whole team meeting with all consultants and WGG staff in mid-September where we decided on directions and responsibilities for the year. We reviewed all the activities (five extended, ten shorter) that had been completed and provided editing and refinement of these. Further, the activity Facilitator Guides that were completed were critiqued and formatting for all the guides agreed upon. The Facilitator Guide writing and development team completed all guides during this year. The design of the professional development videotape support material was outlined and work begun on video support material aligned with the Facilitator Guides. In January the PI, evaluator and consultants worked in Charlottesville to create the material for eight videos, followed by a late March meeting in NY where we completed the shooting of material for the final videos. In late October the PI and co-PI Melissa Rhodes presented a workshop on WGG at the annual Northeast Regional BGC meeting. As a result of the workshop, 26 clubs expressed interest in working on the project. The WGG team had monthly meetings where we distributed materials for upcoming club workshops and discussed issues BGCs were confronting. This year there was turnover of 3/10 club executive directors, and 5/10 facilitators. In late February/early March, the PI and evaluator attended the CAISE meeting, presenting a poster

display and meeting with other projects. In mid-March, WGG had its Advisory Board meeting. The results of the meeting were confirmatory of the direction the project is taking—implementing WGG in fall of 2016 as a curriculum project, offered every week; delaying until next year at the earliest consideration of seeking to commercialize WISEngineering; developing a more compelling website; and continuing our efforts, under co-PI Fu's guidance, of the automatic assessment features of WISEngineering.

Specific Objectives: Specific Objective will refer to the Work Plan Activities and Milestones for WGG. Regarding the Work Plan, we have implemented all the activities with the Cohort I BGCs. Some clubs have not met their target numbers and we are providing additional opportunity to do so. We continued the refinement of all activities (12 were promised, 15 delivered), developed and refined the Facilitators Guide and developed with initial refinement of the video professional development. We participated in the CAISE semi-annual meeting and have developed papers for conference presentations and journal articles regarding WISEngineering and WGG. We are in the process of finalizing the five new BGC for Cohort II. Regarding the Milestones: **Activities**—we developed ten, 75 minute activities and five, 2-3 hour activities. **Locations**— we are working with 10 BGCS, recruiting five more; **Professional Development**—the project Liaisons continue to provide in-person PD for BGC Learning Facilitators, some professional development videos have been introduced to clubs for critique; **WISEngineering Technologies**—all the activities have been installed and run within WISEngineering; significant improvements have been made to the WISEngineering architecture, allowing greater access speed; refinement of the environment so it is compatible with tablets has been accomplished; automatic grading features have been enhanced; report templates have been created for project staff and evaluators; **Evaluation and Research**—the project evaluator and her team have been collecting and analyzing data from youth work, assessing club involvement and participation, as well as analyzing the roles of project personnel; **Dissemination**—co-PI Melissa Rhodes is now a regional officer of the Boys & Girls Club of America, so she is able to communicate directly with headquarter staff regarding the project. Further, we have a BGC in Charlottesville, VA as a member club; they are situated in the southeast regional network of BGCA and have made presentations about WGG. The PI and co-PI Rhodes presented a workshop at the Northeast regional conference. Bernadette Uzzi is the co-PI representing Brookhaven National Laboratory, she is a key liaison and co-developer of the Facilitator Guides. She has incorporated project activities at BNL. Conference and journal papers have been presented and will be noted under Key Outcomes.

Significant Results: We have created more than the required 12 activities, 15 have been created and implemented at BGCs, and the activities have been refined based on feedback. All clubs have tablets, a significant amount of programming went into modifying WISEngineering to accommodate the tablet format. Further, the auto-assessment feature has been enhanced and is being tested. The Advisory Board supported the efforts and direction of the project. The project has been using Basecamp for communicating between all parties and has found it to be very effective. We developed and implemented a strategy for testing wifi bandwidth at clubs to assure adequate power for multiple simultaneous users. The clubs have called for us to implement the projects on a weekly basis in fall of 2016, so it takes the form of a curriculum

implementation project, which clubs are familiar with. The video production to accompany the Facilitator Guides is well underway, with all videos slated for final production in June, before the summer activities commence.

Key Outcomes/Other Achievements: The project has several publications promoting WISEngineering and WGG.

Fu, X., Befferman, T., **Chiu, J. L.**, & Burghardt, M. (2015). WISEngineering: Achieving scalability and extensibility in massive online learning. *Proceedings of the 16th International Conference on Web Information System Engineering,* Miami, FL.

WISEngineering: Massive Online Science and Engineering Education by Embracing Social Media: Xiang Fu, M.D. Burghardt, Jennie Chiu, Hofstra University, University of Virginia. 2015 ASE International Conference on Data Science.

Burghardt, M. D. and Chiu, J.L. (2016). Children's Engineering. *NSF 2016 Video Showcase*.

Outcome Analysis of Informal Learning at Scale by Xiang Fu, Tyler Befferman, M. D. Burghardt, Proceedings of Proceedings of the Third (2016) ACM Conference on Learning @ Scale, pages 173-176. April 2016.

What opportunities for training and professional development has the project provided?

The management team, which includes the PIs and the Liaison consultants, has been meeting on a near monthly basis for training on WISEngineering and the activities as they have been developed. The Liaisons then visit the BGCs assigned to them to work with the Facilitators who implement the activities with the youth. Each activity has been introduced to every Facilitator with a one-on-one learning experience.

How have the results been disseminated to communities of interest?

Co-PI Melissa Rhodes is now a regional officer of the Boys & Girls Club of America, so she is able to communicate directly with headquarter staff regarding the project. Further, we have a BGC in Charlottesville, VA as a member club; they are situated in the southeast regional network of BGCA and have made presentations about WGG. The PI and co-PI Rhodes presented a workshop at the Northeast regional conference. Bernadette Uzzi is the co-PI representing Brookhaven National Laboratory, she is a key liaison and co-developer of the Facilitator Guides. She has incorporated project activities at BNL. Conference and journal papers have been presented and will be noted under Key Outcomes.

What do you plan to do during the next reporting period to accomplish the goals?

We will continue the near monthly meetings of the management team throughout the year. There is an all-day meeting scheduled for the all the participating BGCs (15) with the executive

directors, grants coordinators and facilitators in mid-September. The implementation of the ten shorter units will begin by mid-October (some flexibility is given clubs re starting date) and continue on a weekly basis until the activities are completed. The extended time activities can be done during the academic year, or delayed until summer 2017, again a club prerogative. There will be use of personal and video PD, with a strong reliance on video PD. This will enable us to fine-tune this virtual PD, allowing scalability in the future. We will present at the Northeast Regional BGC meeting, recruiting 10 more BGCs for years 4 and 5. On-going collaboration with evaluation team, BGCs and BNL. Dissemination at conferences, journal articles, continued collaboration with CAISE and Boys & Girls Club of America.