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Young Scientists Academy

Agency Mission:

Empowering all youth to be community ambassadors of science.

Project Summary:

***Asking for a \$20,000 WIN Grant**

We request funding to support a scientific literacy and reading comprehension STEM improvement program to enhance lifelong confidence and skills in literacy, reading, technology, and communication for youth in New Hanover County. This is a new initiative that will be incorporated into the curriculum of all our existing programs.

Our beginner-level (Explorer) programs include Sidewalk Science, where we introduce youth to science in their own Neighborhoods, and Code Niñas, a computer science program that allows girls to gain confidence and skills in coding, computer building, website development, and more. As youth gain skills and confidence, they graduate into our advanced-level (Ambassadors) programs, including the Youth CAUSE (Climate Action and Urban Sustainability Emissaries) Initiative that engages youth as ambassadors in the use of science and technology as tools for solving socio-environmental issues in our communities; and Field Science Ambassadors, an after-school program focusing on hands-on experiences, field expeditions, and career preparation.

Program Details:

We have established proof of concept incorporating elements of scientific literacy, reading comprehension, and technological proficiency in our current programming, and now we aim to implement this concept as a formal and more comprehensive program throughout the 2022-23 school

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year. Funds will be primarily used to assemble a multidisciplinary team of educators, social workers, teachers, librarians, academics and community partners to assist in developing the STEM curriculum and implementing it across all our programs, as well as providing strategies for running and expanding this program in the long term after the funding period ends. This funding will allow us to have an immediate impact on the community by increasing youth served in our programs by 20% as well as providing increased access to STEM resources and innovative learning opportunities for our participants, such as constructing a library at YSA and development of a youth science app.

Collaboration and teamwork are key elements to the success of this program. Youth participating in our programs at both levels, Explorer and Ambassador, will be introduced to the core fundamentals in science literacy and reading comprehension via two main themes: 1) traditional hands-on and empirical approaches that emphasize material learned in school, and 2) technology and coding experiences that expose youth to advanced and cutting-edge techniques used in the rapid growing technology sector. All activities will be aligned with NC school curricula and learning standards to reinforce any material covered by teachers in the classroom. An overview of the specifics of the program are as follows.

At the Explorer level (grades 3-5) students will learn in small group settings about the scientific method and how to apply it in their daily lives, and they will work on developing their reading comprehension through reading and writing about science fiction books, scientific articles geared toward children, and science blogs. For example, students will read scientific articles from the youth peer-reviewed science journal *Frontiers for Young Minds* where articles are written by expert scientists for youth and reviewed by approved youth editors. To develop reading comprehension skills, youth will work on summarizing the main points of the articles in question in their personal journals, and then they will discuss their work in a group setting. Explorer students will also start to learn the core fundamentals of computer science and how to use Python and HTML coding to develop beginner-level games and webpages, and data analysis (e.g. graphs, tables, basic statistics). Using these computer science skills, Explorer youth will learn management skills by helping organize the YSA library through development of a digital catalog of all donated science books at YSA.

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Reading, critical thinking, discussion with peers, and effective communication are core elements to applying science for the greater good in society. At the Ambassador level (grades 6-8), students will learn to apply the fundamentals of scientific literacy and science communication to conduct real world scientific research that address real world issues in the Cape Fear region and beyond such as climate change, urban sustainability and public health. Youth will also learn how to advocate for change in their community using science and technology through collaboration and discussion with partners and elected leaders. Students will present their research at regional events (e.g., YSA Annual Earth Day Summit) and share their ideas on social media and through the production of short films and podcasts using YSA's recording studio. Ambassadors will also participate and gain experience in the peer review process, a major part of the scientific method, in a small group setting by being advocates and youth reviewers for Frontiers for Young Minds. Participants will be expected to review each other's work including written blogs and articles, and they will also participate in a book club, where they share a longer written book review for either a science-related nonfiction book or a science fiction novel from the YSA or NHC library catalog. As part of the book club experience, ambassadors will collaborate with their school's annual book fair to highlight STEM literature and conduct educational demonstrations for youth who do not attend YSA in-person programs.

Lastly, all our youth will also assist in the development of a youth science app called "The Mariposa Project" that introduces youth to science concepts including scientific literacy in a new, engaging, and unique way. The goal of the Mariposa Project app is to translate core science fundamentals into a digital realm that enables youth (participants of YSA and all youth worldwide who want to learn science at home) to learn about the scientific method, how to apply science to solve problems in their communities, and more. Work will begin on the app in summer 2022, and over time, youth who go through this program will write code and contribute to development of this app by completing intermediate to advanced coding projects in small teams, including creation of profiles for all youth in YSA programs, interactive teaching modules on how to do science, and a reward system to keep youth engaged in learning. Future versions of the app will eventually include resume creating modules and cover letter evaluations, with a long-term goal of preparing youth for a successful future in STEM fields.

Impact:

Based on our strategic goals and objectives, our outcomes are:

- 1) Participants gain essential science literacy and reading comprehension skills they will use for the rest of their lives and apply them to their future careers.
- 2) Participants learn basic research skills and know how to utilize a variety of library resources.
- 3) The development of an interactive STEM app to be used by youth in YSA and with access to mobile and desktop devices worldwide to provide equal access to scientific concepts including science literacy and communication.

To achieve these outcomes, our programs are structured so that we meet youth where they are in terms of their level of knowledge and learning style which allows for a logical progression in the development of scientific literacy skills. Additionally, we will collaborate with our existing network of nonprofit partners and Title I schools, and work directly with teachers and librarians to create our curricula and lesson plans for this program. We will also collaborate closely with local corporations and other partners to develop programs and skill sets that are geared toward improving scientific literacy and confidence that will benefit the workforce in the future.

All levels will write individual blog posts about STEM topics, which may include the history of science, diversity and inclusion in science, revolutionary scientific discoveries, and current science topics. Finally, YSA will collaborate with our local public librarians in the development of a cataloging system for our own science library at YSA and at various community centers throughout New Hanover County. In the digital age, it is important to emphasize reading a physical book and writing thoughts and ideas on paper for reading comprehension and information retention (source: Parlier). Through this program, students will not only improve their scientific literacy and reading comprehension skills, but they will also learn how to conduct proper research by utilizing library resources. The culminating scientific communication event entails all students presenting at the Annual Earth Day Summit and contributing to a report at the end of the program. YSA has had proven success with students in both our

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Explorer and Ambassador level programs presenting to the public and the Wilmington City Council.