UF Herbert Wertheim College of Engineering
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Establishing Sustainable Programs: Creating Lasting Computer Science Summer Programs for Middle School Students (Evaluation)

Wednesday, June 26, 2024
American Society of Engineering Education – PCEE Session W333

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POWERING THE NEW ENGINEER TO TRANSFORM THE FUTURE

Agenda

1. Introduction
2. Goldberg Gator Engineering Explorers
3. Expanding Beyond Summer Programs
4. Building Sustainability in Year 2
5. Creating Sustainable Programs
6. Conclusions & Future Work

1. Introduction: Informal Learning

- Informal learning is outside of the classroom that can be structured or passive [1-2]
- Often held at schools, local libraries, museums [1-2]
- A platform for diversity and equity because it can fit the needs of schools and students across different locales, e.g., urban, suburban, and rural areas [3]
- Opportunity for targeted enrichment to develop new skills in STEM for K12 students and facilitators [4-5]

1. Introduction: Sustainability

Sustainability

- The ability to operate independently over a prolonged period.

Funding

- Starts with local donors or small grants for development and implementation [7], [8], [12].
- Securing long-term funding is a major challenge.
- Pros and Cons to charging a fee for camp attendance.

1. Introduction: Sustainability

Trained Facilitators

- Teachers, undergraduate students, and even high school students to support programs
- Gain the experience of learning and leading and can apply experiences to their own learning or classrooms [7], [8], [12], [13]

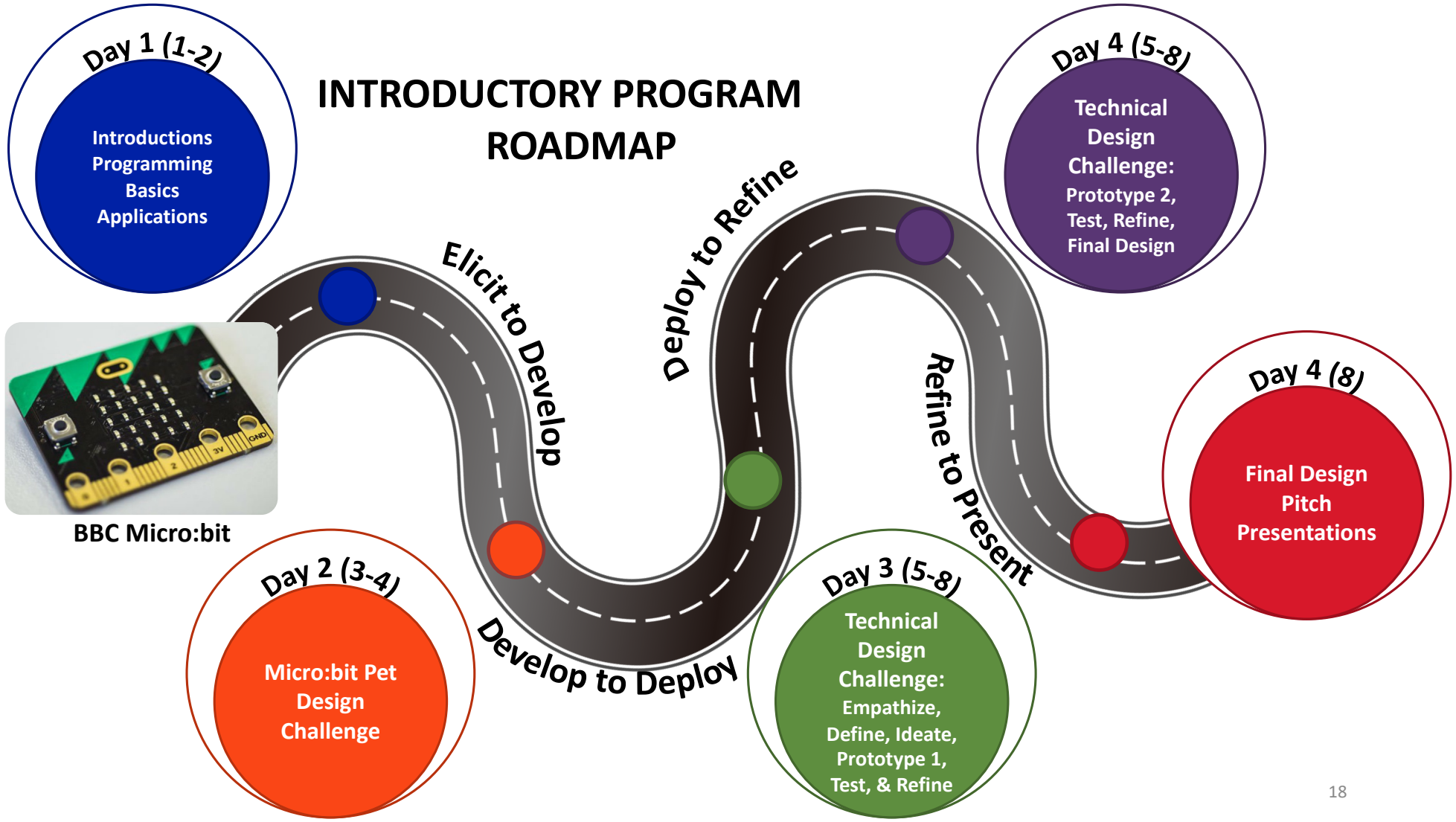
Continuity

- Community infrastructure
- Multi-year programs with re-useable materials and technology

2. Goldberg Gator Engineering Explorers

- Informal Summer and afterschool programs for underrepresented middle school students across Florida
- STEM pipeline – focused on computer science, computational thinking, programming, AI and Machine Learning
- The overarching goal is to encourage students to explore STEM applications and incorporate skills into their future experiences in education and the workforce.

2. Goldberg Gator Engineering Explorers



18

2. Pilot Program Design - 2022

Structure	Locations	Format Options	People

• Funding from a single UF Donor
• No cost sharing
• Core grant team of teachers and undergrads
	• 6 school districts
	• 8 Sessions
	• City, Suburban and Towns
		• 4 Full Days
		  • 7-8 Hours
		• 8 Half Days
		  • 4 Hours
			• 4 Teachers
			• 6 Undergrad Mentors
			• 110 Student Participants Grades 6-9

3. Expanding Beyond Summer Programs

After piloting summer camps, GGEE, students, and teachers wanted continuing programming with the micro:bits and programming during the school year

2022 Pilot Afterschool Programs

Duration	Method	Program Level	Participation
• 10 Weeks	• Virtual Code at Home	• Intro, Advanced	• 22 Students

4. Building Sustainability in Year 2 - 2023

Structure	Locations	Format Options	People

• Funding from multiple donors, a grant, and city
• Cost sharing
• Train local teachers and undergrads
	• 8 school districts
	• 22 Sessions
	• City, Suburban, Town, and Rural
		• Introductory or Advanced Programs
		• 4 Full Days
		  • 7-8 Hours
		• 8 Half Days
		  • 4 Hours
			• 10 Teachers
			• 10 Undergrad Mentors
			• 319 Student Participants Grades 6-9

4. Building Sustainability in Year 2 - 2023

Afterschool programs continued in year 2 with the addition of teachers hosting sessions in their classrooms.

2023 Afterschool Programs

Duration	Method	Program Level	Participation
• 8 Weeks	• Virtual Code at Home • Hybrid Classroom	• Intro, Intermediate, Advanced	• 150 Students

4. Building Sustainability in Year 2

1. Methods to recruit interested schools and districts
2. Increase program ownership by schools and districts
3. Engage cost-sharing partnerships
4. Recruit students to participate in programs
5. Research and program assessment
6. Providing multiple opportunities for students to return to the program

5. Creating Sustainable Programs

- Informal conversations with school district partners
  - Directors, Principals, Teachers
- Linguistic Content Analysis was completed on field notes to classify and assign meaning to key words derived from Word Count Analysis
- Keywords were then contextualized and categorized

What factors influence a district's decision to participate in summer programs, including considerations of funding, existing programs, and barriers at both district and school levels?

Keyword	Impact	Context	Text Example
Funding	Positive	Extra Funds from ESSR	"...district emphasis on offering summer and afterschool with ESSR funds..."
	Negative	Lack of funding sources	"It's going to come down to student's need and ability to fund these programs."

What factors influence a district's decision to participate in summer programs, including considerations of funding, existing programs, and barriers at both district and school levels?

Keyword	Impact	Context	Text Example
Students	Positive	Student interest	“When we look at the number of students who apply for engineering programs at high school levels shows there is interest…”
Teachers	Negative	Teachers doing extra work	“…willingness of teachers to do something extra…”
Alignment	Positive	Integration with other school/ district initiatives	“…the program aligns with building capacity with industry certifications and IT and coding…”

Who are the key decision-makers within a district for engaging in these programs, and should outreach focus on individuals associated with CTE, STEM, or other areas?

Keyword	Person	Context	Text Example
District	CTE Director	Funding sources	"CTE department in the beginning. Your goal is to get in with those…"
	Superintendent	Expectations/ Accountability	"If it is coming from the superintendent office or academic office or regional superintendent office likely they will not want to disappoint the boss"
School	Principal	Influence	"I think is likely the principal because they are likely to decide yay or nay on the program"

What criteria do districts use for selecting schools and teachers for these programs, including aspects of location, status, and teacher qualifications?

Theme	Keywords	Context	Text Example
School Attributes	School Identity	Alignment	"In the schools where we pilot the program, all of them had a STEM related theme at their level."
	Location	Equity	"...location was important. We had a north county and a south county, so everyone was covered."
Teacher Attributes	Effort	Alignment	"I wanted to make sure the teachers were already teaching something related to the concepts covered in the summer program. I chose them by if they cover materials in their classrooms"
	Willingness	Teachers doing extra work	"...willingness of teachers to do something extra"

6. Conclusions

- The main take-aways to inform program sustainability:
  - **Ensure program buy-in and accountability** by contacting district leadership and including all stakeholders in the conversation
  - Contact districts before funding allocations are set to **ensure program funding**
  - **Ensure program alignment** to district-level and school-level themes, curriculum focus, and CTE pathways
  - **Ensure clear messaging and communications** with all stakeholders, including how the program aligns with district initiatives

6. Future Work

- Future work will include **extended interviews with stakeholders, including parents,** towards program integration into existing district infrastructure
- **Develop sustainability roadmaps** with established GGEE district partners of 2+ years

Acknowledgments

- The GGEE programs and research were supported by donors to the Herbert Wertheim College of Engineering through the University of Florida Foundation.
- State of Florida Department of Education (291-1231C-2C001) and schools, districts, and cities for providing supplemental funding to support Goldberg Gator Engineering Explorer Summer Programs in Year Two.
- The opinions expressed in this paper reflect those of the authors and do not represent the views or opinions of other individuals within the University of Florida. All work from this program is original.

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THANK YOU!

ANY QUESTIONS?

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