

Leveraging the Collective Strengths of e4usa & FIRST for Greater Impact on the Future Engineering Workforce

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e4usa+FIRST
The e4usa+FIRST program establishes a partnership between two existing pre-college: Engineering for Us All (e4usa) and For Inspiration and Recognition of Science and Technology.
Goal
Establish and study the implementation of blended engineering (e4usa) and robotics (FIRST) experiences for students.
Context
This collaborative project removes the barrier between and leverages the strengths of existing programs in order to explore scalable and sustainable ways to more effectively meet the demand for highly trained engineering professionals.
Data Collection and Analysis
- Teacher focus groups - Teacher and student surveys - Classroom observations - Artifact analysis
Reference
Efe, S., Dalal, M., Carberry, A. R., Rogers, D., James-Okeke, P. A., Akinkugbe, I., & Figard, R. (2022). High school teacher's preparedness to implement blended e4usa+FIRST models in underserved communities. ASEE, Minneapolis, MN.

e4usa Curricular + FIRST Extracurricular	e4usa + FIRST Co-Curricular & Extracurricular	e4usa + FIRST Concurrent Curricular	e4usa + FIRST Sequential Curricular
Blending Requirements			
1 or more teachers e4usa is a stand-alone course FIRST is extracurricular	1 teacher Incorporation of FIRST+ content into e4usa unit(s) FIRST is also extracurricular	1 teacher e4usa and FIRST content taught concurrently within 1 course offering	1 or more teachers Separate e4usa and FIRST courses Course taught in sequence
Timing			
e4usa: 36-week curriculum FIRST: 3 times/week for 2-3 hrs. per meeting	e4usa: 36-week curriculum FIRST: FIRST+ Robotic Exercises (60 - 90 mins. each) plus FIRST meets 3 times a week for 2-3 hours per meeting	e4usa: e4usa class is a 36-week curriculum FIRST: FIRST+ Robotic Exercises (60 - 90 mins. each)	e4usa: 36-week curriculum FIRST: FIRST+ Robotic Exercises (60-90 mins. each) OR FTC class pack (18 or 36-week curriculum)
Adapt			
Participation: either or both simultaneously FIRST Competition: in-class students can observe	Participation: either or both simultaneously FIRST Competition: in-class students can observe	Content taught on alternating days or separated by a lab section FIRST Competition: in-class students can observe	Courses offered over 2 years, semesters, or quarters FIRST Competition: offer extracurricular FIRST program for students who want to continue
Results		Implications & Future Work	
Positives - Increased overall confidence to implement a blended model - Value toward collaboration, brainstorming, training, and extensive support. - Excitement toward increasing students' professional skills, access to resources, and interest in engineering.		- Expand the e4usa+FIRST community of practice to further cultivate collaboration and relationship building - Revisit how programming is taught to novice programmers - Rethink available resources to address barriers and enhance learning outcomes - Design a more cost-efficient mechanism to embed engineering into pre-college curricula - Simplify pathways to blend e4usa and FIRST in a classroom setting - Leverage industry to further advance and develop more accessible resources	
Concerns - Lack of experience with programming - Nervousness about first time implementation - Available physical resources - Travel to FIRST competitions			

Participants
2021-22 by the Numbers 9 SCHOOLS 10 TEACHERS 205 STUDENTS
Students by Gender ● Female ● Male ● Transgender or Nonbinary
Students by Race ● Native American/Alaskan Native ● Asian/Asian American ● Black/African American ● White ● Two or More Races
Students by Ethnicity ● Hispanic/Latinx ● Not Hispanic/Latinx



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