Rising to the Transportation Challenge—Students **Applying STEM Solutions to** Improve Transit

Christian Wandeler & Steve Hart California State University, Fresno

cwandeler@csufresno.edu







California State University Transportation Consortium

Transportation Institute

FRESN@STATE Discovery. Diversity. Distinction.

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Executive Summary

- What is the transportation challenge?
- What did we do?
- What are the results?
- How does it continue?

Fresno State Youth Transportation Challenge

 The goal is to create a project around the topic of transportation so that youth can research an issue, take action and have a positive impact on our community.

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Background

• THE FUTURE OF EDUCATION?

-> PROJECT-BASED LEARNING

FOR

 K-I2 STUDENTS, UNIVERSITY STUDENTS AND OTHERS INVOLVED



K-I2 STUDENTS...

- develop their knowledge and sensitivity in regards to transportation related issues,
- develop awareness of transportation related careers (e.g. law, policy, engineering, advocacy...),
- practice their academic skills (e.g. literacy, STEM),
- develop their 21st century skills: critical thinking, communication, collaboration, and creativity,
- develop their leadership and citizenship skills,
- develop an agile, growth mindset,
- increase their overall sense of hope and self-efficacy to create a healthier and more prosperous future for themselves, their community, and their planet.

K-I2 TEACHERS...

- develop their knowledge and sensitivity in regards to transportation related issues,
- develop awareness of transportation related careers (e.g. law, policy, engineering, advocacy...),
- learn state of the art pedagogy to support the development of 21st century skills: critical thinking, communication, collaboration, and creativity
- teachers passion for project-based learning and service learning
- develop an agile, growth mindset
- develop teachers' mindset as change agents and interrupters of negative cycles.

UNIVERSITY STUDENTS...

- learn to work with youth
- develop an agile mindset and agile teamworking skills
- potentially increase their own interest for teaching profession
- give back to community
- increase interest in transportation related careers, the engineering paths, and potentially support recruitment for Fresno State

COMMUNITY...

- learn to work with youth
- develop an agile mindset and agile teamworking skills
- potentially increase their own interest for teaching profession
- give back to community
- increase interest in transportation related careers, the engineering paths, and potentially support recruitment for Fresno State

INDUSTRY...

- learn to work with youth
- Opportunity to engage with youth
- Give back to community
- increase interest in transportation related careers

Methodology

- Engineering design process, Design Thinking
- Agile learning methods: eduScrum
- The action civics pedagogy is rooted in servicelearning, youth participatory research and humancentered design thinking.

Phases of the Challenge

- Phase 0) Explore what is transportation, modes of transportation, how do students get to school?
- Phase I) Identify the problem, presentation of challenge: Walking: How many walk? Conduct a walkability audit, conduct a safety audit
- Phase 2) Explore, Research, Ideate solutions: What can we do? Design, create what have others done? how can it be solved
- Phase 3) Design and Create solutions, test, improve
- Phase 4) Action: present, exchange with others, civic action





- eduScrum is an active education process developed by the Dutch chemistry teacher Willy Wijnands.
- The way software teams manage their work is adapted to school environment. -> Students learn critical career skills, how to work in a team, how to manage a project.
- Students work in teams, manage their learning activities and their progress in a project based component.

Project	GeduScrum	Team name		Team Members	
Stories	Celebration Criteria	To Do	Busy		Done
D.o.D.	D.o.F.	Run Up Chart		Impediments	

Ist PROJECT - After School Program

- The research question for this innovation grant was: Can we leverage the expertise and resources of the Fresno State Transportation Institute to bring high quality educational experience to underserved students and help them improve their communities?
- We found strong support that the "Fresno State Transportation Challenge" can teach elementary students about transportation, about transportation-related careers, and get them to apply this to a transportation related issue in their community in the context of an action civics-oriented project.
- The pedagogical approaches of action civics and eduScrum that we used are very promising. We found strong evidence that the students develop an agile mindset



How do you get to school?

Is walking safe?



How can we make walking safer ?











2nd PROJECT– SUMMER SCHOOL

3 Weeks Summer school

3rd grade

5th grade

7th grade













Transportation conference













3rd Project Fall during the school year

- During the school year with teachers and engineering students visiting the students
- How can we increase safety of walking to school?

Participants

- 7th grade classes from a rural school district (Selma Middle School) 3 teachers, 60 students
- 3rd grade classes from an urban school district (Washington Elementary School) I teacher, 20 students

Example: Projects 7th grade

- Makerspace class: Designed an electric and remote controlled skateboard, an underground tube transportation system...
- Computer Science Class: Designed an app to increase safe walking to school (app has a map linked to crime data, emergency button, videos to learn self-defense for kids)

Example: Projects 3rd grade

- Protective necklace that takes care of intruders
- Autonomous electric sports car
- Flying unicorn transport
- Self-defense chewing gum

Capstone: Showcase and visits to Fresno State Campus

- 7th grade classes from a rural school district visited and presented on Camus 12-12-2019
- 3rd grade classes from urban school district visited and presented on Camus 1-24-2020

Presentations at Fresno State 7th Graders



Presentations at Fresno State 7th Graders



Presentations at Fresno State 7th Graders



Visit at Local Transportation related Manufacturer 7th Graders



Presentations at Fresno State 3rd Graders



Quantitative Results 7th graders



ELA was a comparison group

Outcomes: self-efficacy beliefs



Outcomes: knowledge about careers



CONCLUSION

- The Transportation Challenge is an effective way to engage students and teachers in transportation related learning and focus on improving their community.
- Future
 - Fresno State challenge 2020
 - Central Valley challenge 2020

THANK YOU!

Do you want to do this with your students?