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The Fresno State Transportation Challenge

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CSUTC California State University Transportation Consortium

FRESNO STATE
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REPORT 20-23

THE FRESNO STATE TRANSPORTATION CHALLENGE

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16. Abstract

The goal of the "Fresno State Transportation Challenge" was outreach to schools and community engagement, to provide K-8 students opportunities to learn about transportation and transportation-related careers, and to practice 21st century skills by solving a transportation-related issue in their community. Through the pedagogical frameworks of action civics and eduScrum (a method to facilitate self-managed teamwork with a visual board), teachers and students worked on solving issues in their community. They learned design thinking to identify issues and develop solutions while using eduScrum to manage their work. University students from transportation engineering visited the schools regularly to support the K-8 students in their work on a transportation-related project. The study tested two different formats: summer school and during the regular academic school year. The research question was: What is the impact of the "Fresno State Transportation Challenge" on K-8 students, K-8 teachers, university students, and community members? The research methods involved observations, open interviews, and a final survey of participants. Key findings reveal the Transportation Challenge is suited to teach elementary and middle school students about transportation and transportation-related careers, and to encourage them to apply this knowledge in addressing a transportation-related issue in their community. The involvement of university students had a positive influence on the younger students' learning in regard to motivation, role modeling, and broadening the perspective of transportation-related careers. The pedagogical approaches of action civics and eduScrum facilitated the development of career skills, such as collaboration, communication, creativity, teamwork, critical thinking, and persistence to overcome challenges. Implications for practice include that leveraging university resources, such as the Fresno State Transportation Institute, can be an effective way to engage K-8 students and teachers in transportation-related authentic learning experience, increase their awareness of transportation-related careers and topics, and develop their career skills.

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I. EXECUTIVE SUMMARY

The Fresno State Transportation Challenge (FSTC) uses an action civics approach to support K–8 students to develop transportation-related projects that have a positive impact on the community. The culminating outcome is a community showcase, where students present their work to the public. After an initial pilot phase in spring 2019, in an after-school setting during the normal school year, the Fresno State Transportation Institute (FSTI) supported two cycles of the Transportation Challenge during the summer and fall of 2019: an intense three week program during summer school, and an eight to ten week program during classroom instructional time during the normal school year. Our research examining these two cycles found strong evidence that the Transportation Challenge can teach elementary and middle school students about transportation, about transportation-related careers, and empower them to apply this knowledge in addressing transportation related issues in their community. Participating university students, who supported the K–8 students in their work on these projects, had a positive influence on the young students' learning experience and served as inspiring role models. Likewise, the university students appreciated the opportunity to interact with younger students and engage in meaningful learning. The pedagogical approaches of action civics and eduScrum, which frame the Transportation Challenge, were found to be an engaging framework that, on one hand, created a meaningful context for the program, and allowed all students to engage in the work on the other. The K–8 students reported that they felt they had a chance to be creative and work on meaningful projects to improve their community and learned how to collaborate better, work in a team, develop their critical thinking, and overcome challenges when working on the project. Overall, action civics approaches such as the Transportation Challenge are an effective way to involve youth in learning about transportation and empower them to have a positive impact on their community.

II. INTRODUCTION

The complexity of a globalized world, accelerating technological advances, and rapid change in many areas of society challenges educational systems. Around the world, the call to develop 21st century skills with a focus on career readiness, capacity for lifelong learning, and collaborative skills rises.[1] The development of the foundational elements of civic engagement (civic knowledge, skills, and dispositions) in children and youth is also a dominant concern for educators and policymakers. In response, this paper posits that the academic and civic empowerment gap can be closed by providing underserved students with interactive and authentic civic experiences.[2] Project-based service-learning is a proven approach to developing these skills.[3] Moreover, the topic of transportation lends itself in an extraordinary fashion to interdisciplinary learning that is relevant and applicable to students' lives. At the same time, the Southwest Transportation Workforce Center (SWTWC) has identified a particular need for workforce development for the transportation industry. The *National Transportation Career Pathways Final Report* highlights "the fundamental lack of engagement at the K–12 and community college level unnecessarily restricts awareness and access to these professional careers."[4] If trends from other areas in education hold up, it is likely that this lack of engagement is even further exacerbated for underserved students. Unfortunately, not all youth have the same exposure to a wide diversity of career paths or opportunities to engage in high-quality learning experiences and develop the self-efficacy to achieve academically, pursue demanding careers, and have a positive impact as citizens.

During the spring of 2019, the Fresno State Transportation Institute (FSTI) designed and piloted an authentic civic learning experience: Youth Designing the Future of Transportation. During this experience, students identified a transportation-related issue in their community, designed a solution, shared it with their community, and advocated for its application. The pilot run was implemented during an after-school program in an elementary school in Fresno County, California. This community is historically underserved with high levels of poverty and crime and low levels of academic achievement. The leading transportation issue the students identified was that walking to school was not safe. They collaborated with participating university students and came up with ways to make walking to their school safer. Then, they presented their solutions to the community, who were able to interact with a model the students built of their school. The students collected signatures for a petition to make walking to the school safer. Currently, public officials are working on improving the signage and adding more sidewalks. The research examining this pilot program found strong evidence that the approach can teach K–8 students about transportation and transportation-related careers, and empower them to apply this knowledge in addressing a transportation related issue in their community.[5] To continue this research and improve upon the pilot phase, the Fresno State Transportation Challenge (FSTC) was further developed. The goal of the present study was to examine how the FSTI and university resources can best be leveraged to work with K–8 students on transportation topics. The study expanded its scope in regard to grade levels, school districts, and formats of implementation. While testing different formats, the research focus was on the outcome and guided by the research question: what is the impact of the FSTC on K–8 students, K–8 teachers, university students, and community members?

THE FRESNO STATE TRANSPORTATION CHALLENGE

The FSTC involved university faculty, university students, K–8 teachers, K–8 students, and community members. The participants worked on meaningful projects to solve a transportation-related issue in their community. The culminating outcome was a community showcase, where students presented their work to the community. The authors focused on three innovative pedagogical approaches. First, they used an action civics pedagogy for setting the broader context of the project. The action civics pedagogy is rooted in service-learning, civic advocacy, and youth participatory action. Projects are framed in a way that encourage youth to experience themselves as active citizens who can make a positive impact on their community and society in general. Second, they used a design/engineering thinking process. Design thinking and engineering thinking are systematic processes used in the industry to develop solutions to problems with the goal to create innovative, user-friendly products and services. Key phases of these processes are: identifying a problem, researching, empathizing with users, ideating, prototyping, testing, and improving. The students thus learned through this process to identify needs of the community, and then develop, test and improve solutions. Third, they used eduScrum as a pedagogy to facilitate the organization of the project. Scrum is an agile process framework for managing complex knowledge work, originally developed in the software industry, but now used in a wide variety of contexts. The eduScrum method is an adaptation of this system to education. Students are working in self-managing teams, use a visual board with tasks written on post-it notes to make their work visible, and facilitate their collaboration. By using eduScrum students develop important career skills, such as collaboration and communication. The method also made it possible for each teacher to facilitate multiple small teams, and thus create an environment where students experience autonomy and responsibility to work on a project that interests them and engage fully in the project.

The process spanned four to six weeks, with weekly, hour-long instructional blocks. The process began with building students' knowledge about transportation-related topics and information. Then, students brainstormed topics and identified transportation-related issues in their community. Next, students explored extant research to design, ideate, and develop an action plan. Students then created a prototype or implemented their action to test and get feedback on it, leading to further testing, analysis, and improvement. Lastly, students shared their work with the broader public.

In this first development phase the educational scaffolding of the program focused on guiding students through the design/engineering thinking process and did not have a set curriculum. Transportation students from the University developed and shared a few presentation about transportation, depending on the interests of the students (e.g. modes of transportation, drones, autonomous vehicles, school sidewalk designs, etc.).

III. METHODS

PARTICIPANTS

The students that participated in the project came from one urban and one rural school district in the Central Valley in California. Both school districts had a very high percentage of underserved students, based on the percentage of free and reduced lunch of 88.2% and 83% reported by the California Department of Education. In the first iteration of the FSTC, during three weeks of summer school third, fifth, and seventh graders from the urban school participated (*n*=90 students). These grades were chosen in order to test the program with a variety of age groups. The second iteration took place during the school year and included one third grade class from the urban school district (*n*= 20 students) and three seventh grade classes from the rural school district (*n*= 60 students). In a first step of expanding to a different school district, the work in the rural district focused on their middle school.

RESEARCH DESIGN

The authors' research design consisted of a *mixed methods* approach, which combines both quantitative and a qualitative data.

The quantitative data was collected from a survey administered to the seventh grade students at the end of the project to assess the impact of the FSTC. The authors measured students' transportation-related learning, their interest in transportation-related careers, their aspirations for higher education, their civic engagement, and their overall engagement with the project.

In order to evaluate the impact of the project, three conditions with varying degrees of interaction with the transportation project were created. The seventh grade students were grouped by three teachers at the same middle school. The subjects taught by the teacher during the periods they participated in were makerspace (students learn to create things in a shop with tools, 3D printers, laser cutters, etc.), computer science (students learn about computers, coding, designing apps, etc.), and English Language Arts (ELA). The makerspace and computer science classes fully participated in the project, while the ELA class was added as a comparison group. Full participation meant that University faculty led and coached the teachers in conducting the project during weekly sessions. University students regularly visited the classrooms to support students in their design processes and project management tasks through the eduScrum boards. Lastly, these students visited Fresno State to present their work. The comparison group, the ELA class, had limited interaction with the transportation project. University faculty visited twice and facilitated a discussion about which modes of transportation the comparison group used to get to school, how safe walking to school was, and launched the students into exploring ways to make a positive impact on this problem. However, there was no ongoing support from university faculty or university students for the ELA students. There was no systematic use of eduScrum processes, and this class did not present their work at the showcase at Fresno State. Table 1 reports the demographics of each group.

Qualitative data was collected through observations throughout the project and interviews

with University students, teachers, and community members. This component was designed to capture the complexity and experiences of the project process.

INSTRUMENTS

About a week after the completion of the project, an online questionnaire was administered to children with questions regarding their evaluation of the transportation project. Some quantitative items were developed specifically for this project and covered transportation-related learning ("I learned about transportation related issues"), 21st century skills ("I practiced critical thinking"), motivation and persistence ("I was more motivated than usual in school"), and civic engagement ("I learned that I can contribute to create a healthier and more prosperous future for my community"). In order to keep the survey as short as possible, we refrained from constructing scales and used single items to measure constructs with four possible responses ranging from 1 "not at all" to 4 "a lot." At the end there were also some open-ended questions in regards to their experience: What have you liked about this project? What have you NOT liked about this project? What are some things you have learned in this project?

The interviews of the teachers and university students were semi-structured. Participants were asked questions such as: What did you like about the project? What impact on the K-8 students did you notice? How is this different than what happens normally in school? What could be improved in the program?

IV. RESULTS

The research question of this study was: what is the impact of the FSTC on K–12 students, K–12 teachers, university students, and community members? To answer this research question, the authors conducted a quantitative analysis comparing three groups with varying degrees of interaction with the transportation project, and conducted a qualitative analysis in which the observations and interviews conducted during the study are reported.

QUANTITATIVE RESULTS

Table 1 reports the demographics of each group, indicating that a very high percentage of participating students had Hispanic backgrounds, and that the comparison group had a lower percentage of males than fully participating groups.

Table 1. Demographics by Middle School Student Group

Group		Sex	Ethnicity/Race				
		Male	American Indian or Alaska Native	Asian	Hispanic/Mexican American	White/ Caucasian	Other/ Mixed Race
Makerspace	Count	12	1	0	13	2	1
	% within Group	70.6%	5.9%	0.0%	76.5%	11.8%	5.9%
Computer science	Count	9	1	0	8	0	0
	% within Group	100%	11.1%	0.0%	88.9%	0.0%	0.0%
ELA	Count	19	0	1	27	0	8
	% within Group	52.8%	0.0%	2.8%	75.0%	0.0%	22.2%
Total	Count	40	2	1	48	2	9
	% within Group	64.5%	3.2%	1.6%	77.4%	3.2%	14.5%

Transportation-Related Learning

Figure 1 depicts student-reported transportation-related learning. The two groups that were most intensely involved in the FSTC reported consistently higher results than the ELA comparison group. The authors conducted least significant difference (LSD) post hoc tests to statistically test for mean differences. They found statistically significant differences in the learning reported about transportation issues between computer science and ELA groups (p=0.011); transportation careers between makerspace and ELA groups (p=0.001) as well as computer science and ELA groups (p=0.010); and in learning about going to university between makerspace and ELA groups (p=0.012) as well as computer science and ELA (p=0.014); and engineering-related careers between makerspace and ELA groups (p=0.000) as well as computer science and ELA groups (p=0.008).

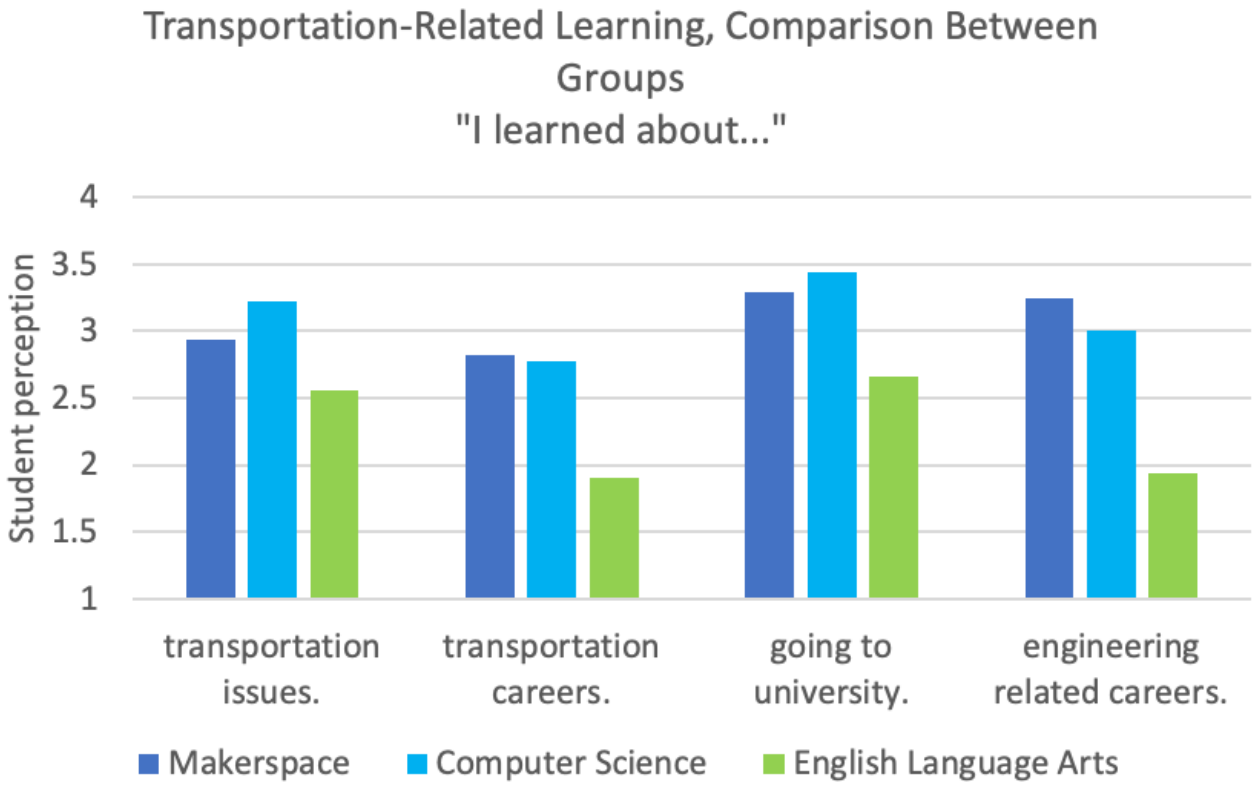

Figure 1. Transportation-Related Learning, Comparison between Fully Participating Groups of Middle School Students and the ELA Comparison Group

Developing 21st Century Skills

The extent to which students felt they were developing 21st century is reported in Figure 2. The two groups that were most intensely involved in the FSTC reported consistently higher statistics than the ELA comparison group. LSD post hoc tests were conducted to statistically test for mean differences between the ELA class and the other two groups. Statistically significant differences were not found in academic skills but critical thinking was higher for computer science (p=0.003), learning to collaborate better was higher for both makerspace

(p=0.002) and computer science (p=0.002), learning to communicate better was higher for both makerspace (p=0.001) and computer science (p=0.017), and learning to be more creative was higher for makerspace (p=0.014) as well as computer science (p=0.035).

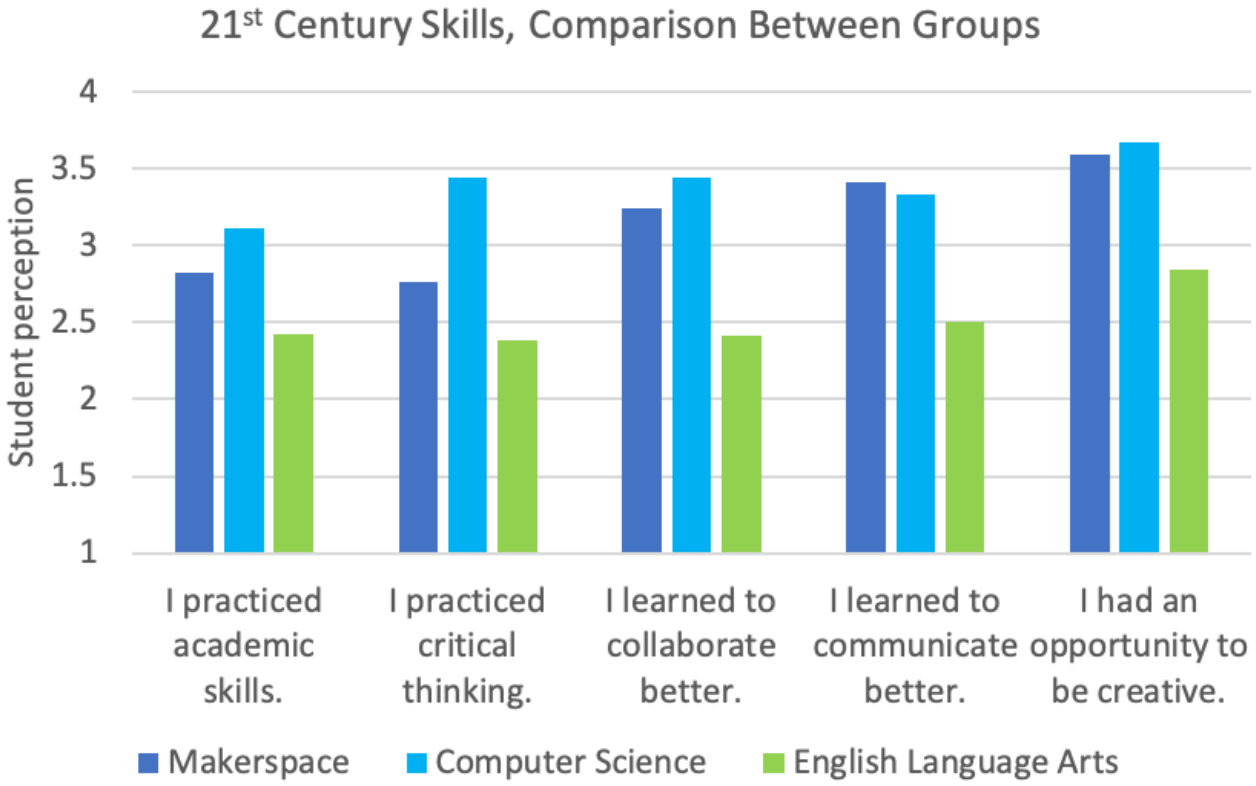

Figure 2. 21st Century Skills Comparison between the Three Groups of Middle School Students

Developing Motivation And Persistence

The students in the two groups that were most intensely involved in the FSTC reported higher motivation and persistence. LSD post hoc tests were conducted to statistically test for mean differences between ELA and the other two groups, finding statistically significant differences in motivation in school for makerspace (p=0.011) and computer science groups (p=0.021) over the ELA group. Likewise, students reported learning not to give up and to learn from failures at a higher rate in makerspace (p=0.037) and computer science groups (p=0.025).

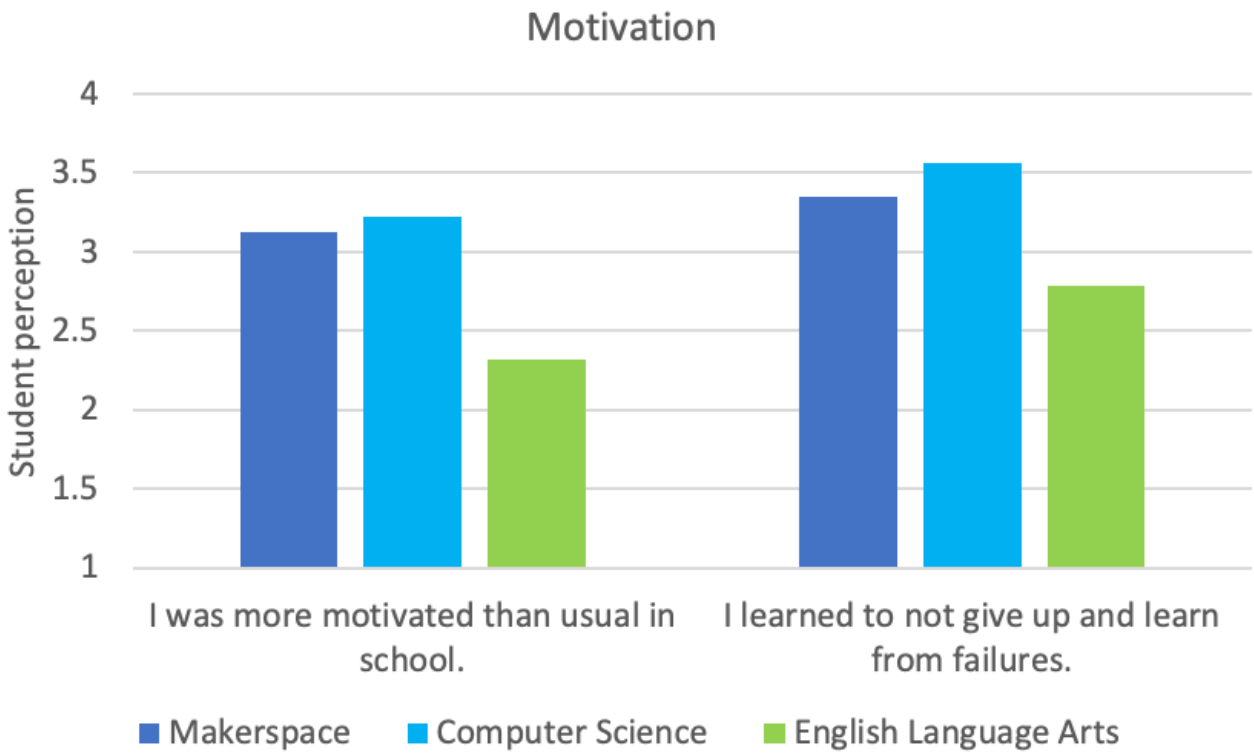

Figure 3. A Comparison of Motivation and Persistence between the Three Groups of Middle School Students

Developing Civic Engagement

The two groups that were most intensely involved in the FSTC reported high levels of learning about being an engaged citizen and their efficacy in contributing to a healthier, more prosperous future for their community (Figure 4). However, there were no statistically significant differences between the groups in regards to these areas.

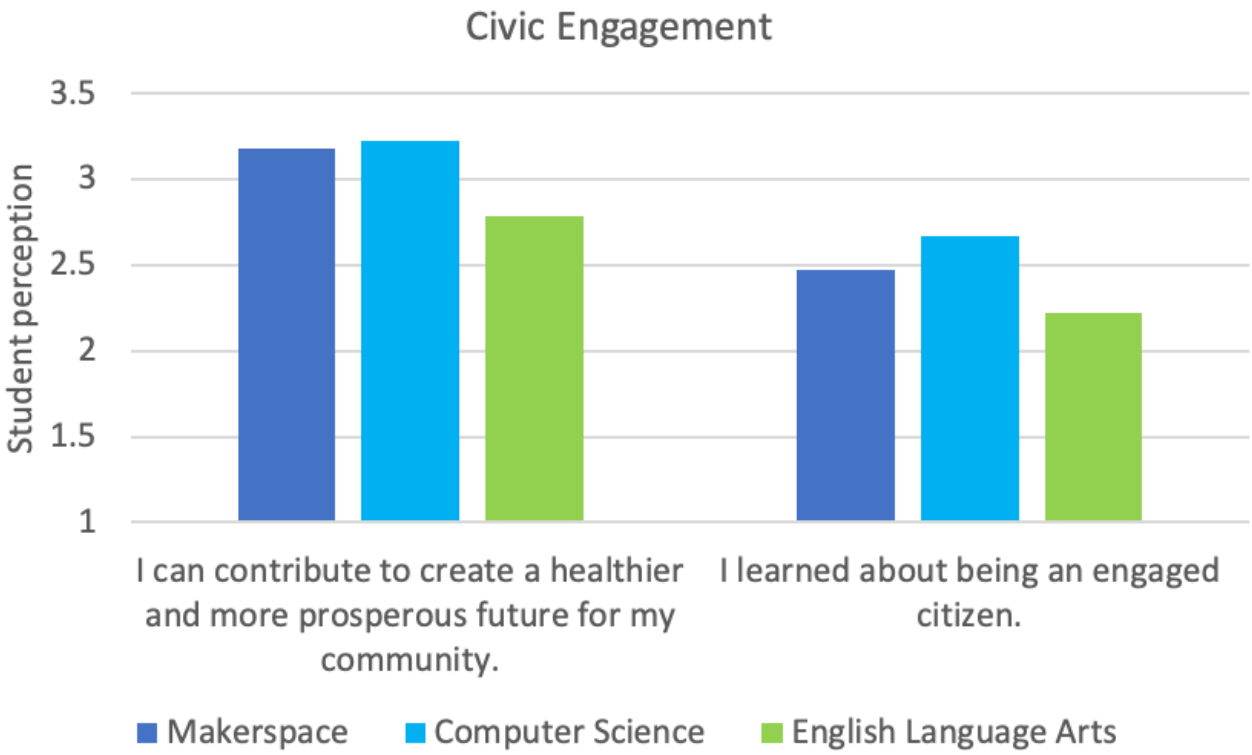

Figure 4. Civic Engagement between Three Groups of Middle School Students

QUALITATIVE RESULTS

Qualitative data gathered through observation and interviews is combined below to elaborate on how this process impacted different participants.

Impact on Elementary and Middle School Students

Transportation-Related Service-Learning

The action civics approach of rooting the project in terms of serving and improving their community definitely made the project real and motivating for students.

The following student comments highlight the affinity for working on something that improves their community:

> "I liked working with my friends and making something to help our community be safer."

"I liked how this project is used to help other citizens."

In order to support the intrinsic motivation of students, it is crucial to connect the learning to their interests and needs. Framing the learning about transportation as a way to improve the community provided immediate practical relevance and helped contextualize the students' learning.

Applying Transportation-Related Knowledge

The students' ability to transfer their transportation knowledge and insights across domains and apply it to a community issue are indicative of deep-level learning. While the third graders during summer school initially required a lot of educational scaffolding (e.g. What is transportation? What is engineering? What is a mode of transportation?), they ended up incorporating their learning into their projects and applied it in relevant ways. For example, during the summer school program, the third graders were shown a YouTube video about a gondola system in Medellin, Colombia and then one team transferred this transportation solution to their problem of making walking to school safer. The seventh graders, during the summer school iteration of the FSTC, seemed to struggle with this transfer/application process. For example, despite having participated in a lecture about transportation by a Fresno State Transportation faculty, only few teams applied that information in their project. The seventh graders during the school year, however, had no difficulty applying their learning to the needs in their community. The main difference was that they were more closely supported by their teachers during the school year, which seems to indicate that the teachers play an important role to support this transfer of learning. It also offers an opportunity for the project to scaffold the transfer of knowledge more directly.

Creativity and Application of Transportation-Related Ideas

In order to model a professional practice of professionals or scholars meeting at a conference and learning from each other, we organized a transportation conference at the end of the summer school session. During the conference, the third and fifth graders met in the seventh grade classroom and presented their work to each other. When the seventh graders were asked afterwards what they thought about the third graders' solutions, they commented that "little kids have crazy ideas." The comment referred to an idea for a flying bed that would take kids to school safely. Interestingly enough, two weeks earlier, transportation faculty from the Fresno State University had presented to the seventh graders about drone technology, autonomous vehicles, and discussed what people would be doing in autonomous vehicles, how they would use their time, what those vehicles would look like, etc. While the seventh graders engaged in these conversations imagining the future of transportation, they still seemed confined by the status quo. The younger students were much more creative, although they didn't have direct exposure to the information shared by the university faculty. They really used their imagination to come up with solutions. Potentially, they tapped into experiences with media, TV, or other texts. Since a lot of the future of transportation is related to recent technological advances (e.g., battery technology, computing power, machine learning, business model innovation, etc.), certain ideas from science fiction are becoming more realistic. Some comments from students included:

"I liked that we got to show people our ideas and what kids can come up with."

> "What I liked about this project is that we were creative and that we worked as a team. Also, that we understood what we had to do and we communicated."

The students have shown great creativity in their proposed projects. It required creative thinking to be able to envision how technological advances will impact society and how the students can leverage these advances to improve their community.

Transportation Careers and Attending University

The students also enjoyed the interaction with the university faculty and the university students. They asked many questions and were particularly interested in the university students' career pathways. This was evident for all age groups, but while the younger participants displayed a more general idea of "one day attending Fresno State University," discussions with the seventh graders centered much more specifically around how to apply for college and the availability of financial aid. The university students shared some of their personal situations and how they overcame difficulties to be able to attend the university. Participants commented:

> "It made me get ideas on what I want to do when I grow up."

> "What I most liked about this project is that I was able to think a little about my future."

> "What I like is that we had the opportunity of going to the Fresno State campus."

The university students functioned as role models, with the K–12 students paying attention to details from their lives. For example, participants asked one all-male group of university students if there were any female engineering students at Fresno State University. It is thus important to be mindful about the image that is portrayed by the university students to ensure the younger students see a diversity of people represented. Similarly it was very impactful for the students to visit the University campus and see it for themselves. A majority of the students had never been there and interviews indicated that the visit made the idea of going to University more real, and also more attainable.

Team-Based Learning with eduScrum

The students seemed to enjoy the pedagogy of eduScrum. They actively engaged with their teams' eduScrum boards, which helped them organize their work and get a sense of the bigger picture of the project. They mapped their design/engineering thinking processes on the eduScrum boards, which helped the teams track their progress and manage their collaboration. Grouping the students into teams also made it easier for each student to play an active role and have a voice in working on something that was relevant to them. These quotes corroborate this view:

> "It was fun to work as a group to help make this project and not to do it alone."

> "What I liked about the project was that it was made as a team and that it had some difficult parts to make."

"I liked that we all got to communicate better and combine our thoughts and ideas."

Working in teams on a meaningful project can offer some of the most impactful and enjoyable learning experiences for students. A pedagogy such as eduScrum supports the intrinsic motivation of students and helps to facilitate collaboration and avoid typical frustrations with groupwork such as unequal participation or unclear expectations.

Impact on K–8 Teachers

Classroom teachers also shared an overall excitement to work on an authentic transportation-related project. The participating teachers valued the ways the FSTC connected real-world experience to their curricular materials. The teachers also expressed that a lasting impact of the project was that their professional practice benefited from learning new instructional approaches, such as utilizing eduScrum, design thinking, and the action civics framework. In addition, teachers valued the collaboration with the university students and faculty as well as the community. The makerspace teacher, during the school phase, who took his kids to visit a local manufacturer and supplier of truck parts, noted that this experience provided a great opportunity to highlight similarities of the machines in the manufacturing plant to the tools and machines available to the students in the makerspace (e.g. laser cutter, lathe, drills, etc.) and exposed students to different careers in the transportation manufacturing industry. Lastly, teachers expressed gratitude for being acknowledged by the university. They made a point that as underserved schools they often feel left aside. The interactions with university faculty and students as well as the visit to the Fresno State University campus were powerful experiences for their students.

Impact on University Students

Overall, the university students enjoyed the experience. They talked about sharing their expertise with youth, "I enjoyed being able to go out and use my experiences and what I have learned in school to motivate young minds to pursue STEM-related fields and challenge themselves to think and solve problems." They also realized their personal academic journey was important to the kids, "The ability to share my story with other kids—not only did our group inform them about Transportation Engineering but also inspired them to continue with their education based on our experiences." The university students also expressed that they learned about kids and how to work with them:

"I learned that kids are more enthusiastic about doing a project when they are given the freedom of coming up with their own ideas."

"I learned how to communicate to children important ideas and values."

The university students were impacted by the project in a variety of ways. They not only felt more connected to the community, but also had an opportunity to be role models and pass on their passion for transportation. The authors hope that these exchanges between different generations of students will be extremely beneficial to building a career pipeline and get more students interested in university and particularly transportation-related careers.

Impact on Community Members

Some parents of the involved students participated in the visit to Fresno State University, during which time they provided some informal comments. One parent of a third grader assisted his son during the explanation of the prototype his group designed. The father was visibly proud of his son's work, and commented about how excited the student was about this project. This indicates how parental involvement can be fostered through projects like the FSTC and suggesting they could be leveraged more systematically in the future. Another parent shared her goal for all six of her children to go to college and that it was her first time to go to the Fresno State campus. Some of her children were already attending a local community college and were planning to transfer to the university. This is an indication of how an aspiration to attend college can be supported by the outreach of the university and the organization of culminating showcases on campus. All in all, the collaboration with parents could become more pronounced in the future.

V. DISCUSSION

The quantitative and qualitative data collected over the course of this project indicates that the FSTC is a high-quality educational experience that can engage underserved students and help them improve their communities. The quantitative data indicates that FSTC participants demonstrated transportation-related learning and development in 21st century skills such as critical thinking, collaboration, communication, and creativity. Furthermore, the students reported feeling more motivated to attend school and to persist in overcoming challenges. The qualitative data further captured the rich impact of the FSTC. Interactions with university students and faculty provided K–8 students with opportunities to explore transportation-related careers and consider university options for career development.

The pedagogical approaches of action civics and eduScrum were engaging and empowered students to select a project that matched their interests, fostering school engagement. Working in teams also helped create an engaging experience. The eduScrum method, paired with university faculty and student support, made it possible for the students to work in different teams and by having multiple different topics available, most students were able to work on a topic according to their interests. This ensured that students had a voice and choices in their learning experiences.

Overall, the FSTC is an effective way to engage K–12 students in transportation related topics and connect them to university resources. Some of the challenges of the project, ironically enough, are transportation related. It was not always easy to bring the university students to the K–12 schools. Conversely, bringing the K–12 students to the university campus required transportation resources as well.

In the next phase of the program, the authors of this study recommend creating a model that is sustainable and self-sufficient. For example, providing more professional development for teachers upfront would facilitate the implementation of the FSTC program. Also, increasing parental involvement would open up further possibilities to interact with the community and strengthen the home and school connection. Additionally, providing more transportation-related educational content through video and other technology would help facilitate students' understanding of transportation issues. Further, establishing a broader network of education and transportation professionals would strengthen the content and procedures of the FSTC.

ABBREVIATIONS AND ACRONYMS

ELA	English Language Arts
FSTC	Fresno State Transportation Challenge
FSTI	Fresno State Transportation Institute
LSD	Least Significant Difference

ENDNOTES

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2. CIRCLE, *Civic Learning Through Action: The Case of Generation Citizen*, (Medford, MA: Tufts University, 2013); S. Hart and C. Wandeler, "The Impact of Action Civics Service-Learning on Eighth-Grade Students' Civic Outcomes," *International Journal of Research on Service-Learning and Community Engagement* 6, no. 1, article 11 (2018); M. Levinson, *No Citizen Left Behind* (Cambridge, MA: Harvard Education Press, 2012); B. Rubin and B. Hayes, "'No Backpacks' versus 'Drugs and Murder': The Promise and Complexity of Youth Civic Action Research," *Harvard Educational Review* 80 no. 3 (2010): 352–379.

3. A. Furco and S. Root, "Research Demonstrates the Value of Service Learning," *Phi Delta Kappan* 91 (2010): 16–20.

4. SWTWC, *National Transportation Career Pathways Initiative Final Report* (Long Beach, CA: California State University, 2019), 24.

5. C. Wandeler, S. Hart and F. Mercado, *Youth Design the Future of Transportation for Their Community* (San Jose State University, CA: Mineta Transportation Institute, 2019).

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PEER REVIEW

San José State University, of the California State University system, and the Mineta Transportation Institute (MTI) Board of Trustees have agreed upon a peer review process required for all research published by MTI. The purpose of the review process is to ensure that the results presented are based upon a professionally acceptable research protocol.

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