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Youth Design the Future of Transportation for Their Community

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I. BACKGROUND

The complexity of a globalized world, accelerating technological advances, and rapid change challenge educational systems. Around the world the call is to develop 21st century skills with a focus on career readiness, ability for lifelong learning, and collaboration skills (Ananiadou & Claro, 2009). The development of the foundational elements of civic engagement (civic knowledge, skills, and dispositions) of children and youth is also a dominant concern for educators and policymakers. Unfortunately, not all youth have the same opportunities to develop civic self-efficacy. However, the civic empowerment engagement gap can be closed by providing underserved students with interactive and authentic civic experiences (CIRCLE, 2013; Levinson, 2012; Rubin & Hayes, 2010).

We strove to create such an authentic civic experience and piloted the Fresno State Transportation Challenge (FSTI) at an elementary school in the Washington Unified School district, Fresno County, California. Washington Union School District is one of the poorest school districts in the United States. According to the American Community Survey by the US Census (2016) is currently second nationally when it comes to measuring concentrated poverty rates, out of 40,500 residents- 42.8% are living below poverty line. Other issues like violent crime, domestic violence and child abuse, drug and alcohol abuse, incarceration rates, gangs, poor child nutrition are all correlated with a high poverty concentration. It also has the highest percentage of African American residents in Fresno (13.9%, as compared to the Fresno average of 5.6%). The demographics of the 398 students at the Middle school are as follows: 97.9% economically disadvantaged, 48.3% English learners, 78.4% Latinx, 7.5% African-American, 11.8% Asian, 1.8% White. In the 2016/17 school year 32% of students in the West Fresno Middle School met or exceeded the state standards in English Language Arts/Literacy (2016 California state average of 48%). Similarly, in Math 19% met or exceeded the achievement in English Language Arts/Literacy, compared to 37% at the state level (California Department of Education, 2017). The topic of transportation lends itself very well for project-based service learning and action civics. 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?

II. METHOD

PARTICIPANTS

The students that participated in the project were in an after-school program at Fresno West Elementary School and came from 1st, 2nd, 3rd, and 4th grade. We created two groups of students with about 25 students each and worked with them for 1 hour a week over an 8-week period. Initially we also had about 40 middle school students involved, but it turned out to be too big of a group to start out with.

THE FRESNO STATE TRANSPORTATION CHALLENGE

The “Fresno State Transportation Challenge” involved university faculty, university students, K-12 teachers, K-12 students, and community members. The culminating outcome was a community showcase, where students presented their work to the community. Because we use a service learning approach, the students were guided to develop projects that have a positive impact on the community. Furthermore, they could participate in an annual competition for students organized by the FSTI. Overall, the challenge spanned 8 weeks with weekly 1 hour sessions structured as follows:

Phase 1 – Brainstorm topics

Phase 2 – Research of various topics

Phase 3 – Develop and plan action

Phase 4 – Implement action - Iterate and improve

Phase 5 – Share results with school and broader community

PEDAGOGICAL APPROACHES

We focused on two innovative pedagogical approaches. We used an action civics pedagogy for setting the broader context of the project, and eduScrum for the student teams to collaborate with adults on their projects.

The action civics pedagogy is rooted in service-learning, youth participatory research and human-centered design thinking. We conceptualize it in the five phases discussed above. Students brainstorm topics, research various topics, develop an action plan, implement and iterate on the plan, and share results with community.

We worked with the students using eduScrum, which is a pedagogy that makes learning visible and helps students work in self-managing teams.

III.RESULTS

Learning about Transportation

The children learned extensively about transportation. Initially most younger children (1st and 2nd grade) did not know what the word transportation meant. They learned about it in the first meeting and explored different transportation modes. By the second meeting, they could define the term "transportation." Over the next few weeks, transportation engineering students shared more information about transportation related topics with them. They did this through presentations that they had originally been presented in their university classes, and by developing content specifically addressing questions from the children or the challenges that children saw in their community (e.g. pedestrian safety).

Phase 1: Brainstorm Transportation-Related Issue in Community

Once the children developed some foundational knowledge about transportation, we guided them to identify a transportation-related issue in their community. Because we adopt a service learning and action civics pedagogy, the goal was to make the content relevant to their real-world situation. We encouraged students to think about how they could help improve their community. Examples of issues identified in the pilot study included: (1) it was not safe to walk to school; (2) families lacked transportation (no car, car issues, no money for bus, no access to public transportation...); and (3) people getting injured in traffic accidents, traffic jams, pollution from exhaust, etc.

Phase 2: Researching a Problem

After identifying a number of issues, the students were guided to focus on one issue and research this topic more closely. In the pilot study, they chose pedestrian safety as an focus. Not many students walked to school; an issue that students identified was that walking was not safe. We researched further what exactly the issue was. In general, safety was a concern, but the children normalized it. Objectively their neighborhood is a very high crime and high poverty area. Safety concerns were, for example, getting attacked by a dog when walking, no sidewalk, speeding cars, getting kidnapped when walking, strangers, it being dark at night, and having to walk alone.

Phase 3 and 4: Applying the Learning of Transportation

After researching one problem, the students applied the information that the engineering students shared with them to develop solutions. We tried to encourage the children to see themselves as engineers and change agents, and that their job as engineers is to make the community better. The engineering students guided the children through the engineering cycle and supported the children in developing solutions, and iterating on their solutions.

The engineering students taught kids about ways to make traffic safer. They also showed the kids pictures of schools from the affluent side of town, and how the streets looked there. The goal was to stimulate ideas on how to improve their own school and to raise their critical consciousness.

The children were eager to build something. The university students created a cardboard model of the school and the streets close by and asked the youth to come up with solutions, providing

speed bumps, signage, overpasses for crossing streets, sidewalks, crosswalks, traffic lights, and parking for the school buses. The students also displayed great creativity developing novel solutions such as: drone landing spots for autonomous drones to drop off kids, mobile drone safety surveillance for kids walking home with the potential to drop ropes in case of danger and airlift them out, and even a flying house that would bring kids to school safely.

Phase 5: Share Results with Broader Community

The children presented their work at a community event. They collected signatures for a petition to improve the safety of walking to school. They also set up the cardboard model of their school and let the other kids explore solutions with Legos and play dough. Parents and community members were engaged in discussing the safety issue, and an overwhelming majority of community members confirmed that traffic safety in front of the school had been an issue for years.

Civic Engagement - Transportation Equity

The fact that many of the adults (teachers, parents, community members) vehemently confirmed the traffic concerns of the students showed the potential for the youth to support their community in terms of transportation equity and advocacy. The community was concerned about traffic safety around the school for years, but nothing had been done about it.

University Students as Inspiration and Role Models

The kids really enjoyed interacting with the university students and built personal relationships with them. If one of the university students could not make it, the kids would ask about them. Many of the kids would hug the university students to say bye. Overall, the K-8 students were inspired by the project, and many of them expressed their belief that they could go to college and become engineers too. This is a remarkable result for this community and shows the potential of the Fresno State Transportation Challenge to support a college-going culture and build a pipeline for transportation-related careers.

Involvement with K-12 as Authentic Learning Experience for University Students

The university students themselves reported benefiting from the involvement in the Fresno State Transportation Challenge in a number of ways. They felt like they were able to inspire younger kids. At the same time, they were able to apply the content that they learned in their transportation engineering courses to real world issues. They also felt treated as important part of the university outreach, they commented that them being younger created a different connection of the university to students, rather than just the professors working with students.

Knowledge about the Engineering Profession

The children initially had very limited knowledge about what engineers do in general. We repeatedly discussed with the children what engineers do and particularly the activities that transportation engineers engage in. When asked who designed the building they were in, the consensus in one of the groups was that God designed it. Upon further probing, they pretty much attributed everything in their experience to God. This group was mainly composed of 1st and 2nd graders and stimulated a very interesting discussion about how different structures in their environment came into being.

We discussed the role of engineers in building schools, streets, bridges, sidewalks, cars, etc. When asked the same question the week after, the children were much clearer about the work of engineers, and actually started overgeneralizing and started to attribute too much to the work of engineers.

IV. DISCUSSION

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. Students also developed their knowledge about the transportation engineering profession, and developed their belief about being able to attend university. The university engineering students that we brought in to support the K-8 students in their work on the transportation-related project connected well with the students and served as role models. At the same time the university students appreciated the opportunity to be able to interact with younger students and engage in meaningful learning. The interactions with the community were insightful and supported the work of the students.

Another goal was for the students to present their work at Fresno State to other researchers supported by the Fresno State Transportation Institute during a conference. Ironically, the students were not able to come to the conference, because they had to take standardized tests that day. Although that goal was not achieved, the idea is very promising and shall be pursued in the future.

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 and were able to use eduScrum to solve complex issues, and then apply it to improve their community. This innovation grant provided a lot of learning on how the Fresno State Transportation Institute can collaborate with schools in the future. The next challenge will be how to create a model that is sustainable and self-sufficient.

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