

academic growth that practices and routines by K-12 leadership change allowing them to find the time to explore important educational opportunities that are shared with them, especially those that are offered at no cost to the schools. Each project may not have the persistence of the ECS4Alabama leaders to pursue traditional recruitment approaches like one-on-one meetings.

4.3 Sustaining ECS in ECS4Alabama Schools

The 60 teachers trained by the ECS4Alabama project are pioneers and trend-setters for the state in educating students in ECS. An ECS4Alabama survey administered to project teachers reveals that 88% would like to teach ECS long into the future with another 79% willing to receive training on other CS courses. These are remarkable findings as all project teachers are teaching CS out of field. These facts are a testimony that with the appropriate training, educators in any area can learn to teach ECS and develop a passion for it. As such, our ECS teachers will serve as role models who will continue to advocate for CS in their schools and inspire thousands of students to take ECS and other CS courses.

The reality is that the K-12 teaching profession is prone to teacher turnovers. Teachers earn promotions, move to a new school or eventually retire. Thus far, seven teachers trained by the ECS4Alabama program have been affected by turnovers. Re-training is thus needed, costing the program valuable resources. School Principals also change frequently in Alabama schools, which has been equally problematic for the project. Having no awareness of ECS, they sometimes do not realize how critical it is for ECS to be taught by a trained teacher. Due to complex internal dynamics of the schools, we have witnessed situations where new Principals assign ECS to teachers who have not received any formal training in ECS, while the teacher who had gone through training is re-assigned. In such cases, not only do the training and resources go to waste, the effectiveness of the course is significantly reduced in many ways, which can be detrimental to our collective mission of preparing large and diverse cadre of students with CS experiences.

There are many recent positive events that will help us to sustain the ECS4Alabama project, beyond the duration of our National Science Foundation funding. The new legislation mandating that all schools in Alabama must offer a CS course will be a catalyst to help ECS maintain longevity in schools and that it be taught by a trained ECS teacher. Additionally, discussions by project leaders with Alabama's Department of Education about the aforementioned challenges has led to the identification of an official at the Department of Education who will serve as a liaison for the project and help to address the challenges of ECS teacher continuity in ECS schools. Related to funding, Alabama legislators have allocated over one million dollars in the state's Education Trust Fund, which is expected to increase in future years. The solution to the ubiquitous problem of teacher turnover, however, has remained elusive. This is not unique to the ECS4Alabama initiative.

5. Conclusion

There are a range of indicators, both qualitative and quantitative, that suggest a strong positive impact of the project in terms of the preparation of new teachers for CS instruction and the learning of CS by students. Notable broader impacts as a direct result of the implementation of the ECS4Alabama effort include: 1) the creation of a very supportive network of teachers across 60 high schools, with the majority from high-needs settings, assist each other to address challenges and share accomplishments; and, 2) an opportunity for students from these schools, many of whom come from socio-economically underprivileged backgrounds, to access CS, an enriching STEM subject that is typically offered in more affluent districts. These students are gaining authentic experiences in critically important CS topics that are missing from the traditional high school curriculum, such as problem solving, coding, web designing, robotics and computational thinking. In the process, they are learning critically important 21st Century skills, gaining awareness of careers in computing and the prospects for a better quality of life that accompanies these careers due to their high earning potential. Even if CS is not an area of deep interest for students, immersion in computational concepts and critical thinking opportunities will be beneficial to them regardless of their areas of passion.

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