

Examining Experiential Science Education in *Sistema de Aprendizaje Tutorial* Program

In rural areas of Central America, youth rarely have the opportunity to study in secondary school, with access and proximity to schools being just one of the barriers that limits their enrollment. Particularly, Honduras has some of the lowest secondary enrollment rates for rural areas, and is stricken by high rates of child labor and extreme poverty. When rural students are able to attend school, they are often met with a curriculum that is not suited to their lifestyle; the approach to content is theoretical and academic, separating topics like biology, mathematics, and social studies, with few references to rural vocational skills. In this way, rural students are further marginalized from achieving a successful education and career in their home communities. While the Honduran government has tried to expand middle schools into rural villages, the standard secondary education programs, Centro de Educación Básica (CEB) uses a curriculum that is not at all applicable to their rural context.

The Sistema de Aprendizaje Tutorial program (Tutorial Learning System or SAT) is an innovative educational program throughout Latin America created to develop rural communities in a holistic way. This approach integrates curricular domains into a series of workbooks with emphases on community service, ecology, and basic moral values, applied to local projects rooted in agriculture. With recruitment of tutors from local communities, whose backgrounds and cultural knowledge complement the assignments, the SAT program has been shown to be highly effective in increasing test scores as compared to traditional secondary schools. In attempts to understand the facets of this intervention that relate to effective teaching, UC Berkeley Professor Erin Murphy-Graham has conducted research over several years in poor, geographically isolated communities of Honduras with both CEB and SAT programs. With a focus on identifying the particular supports of SAT that they believe to contribute to these beneficial outcomes, they have noted the unique recruitment and preparation, curricular resources, and accountability of the program.

In joining this community of researchers in Honduras, I examined one particular slice of the SAT curriculum: the teaching of science, ecosystems, and agriculture. As the communities with SAT naturally demonstrate interdependence with the land they are situated on, I observed that the integration of agriculture into the school curriculum is equally contextualized by local knowledge and practical application to students' lives. To explore this interplay between culture and academics outdoors, I spent three weeks studying how curricular projects linking science to agriculture are designed, instructed, and implemented, and the varying roles of community members in both investment and maintenance of these projects.

SAT teachers (or tutors, as they are called) unite regionally three times a year for a 2-week intensive training, covering the four texts they will teach in their next block of courses. As tutors progress through the grades with their same group of students, the training groups, as well as the classrooms, develop strong rapport and collective knowledge. In my time at the training center in Comayagua, I transitioned from an observer shyly making conversation with tutors at their lunch break to a contributing member of the pedagogical team. Trainers oscillated between modeling professional teaching strategies and promoting reflection about the texts. Tutors became active in the training by preparing sections of the lessons to teach to their peers. In this way, collaboration built upon critical feedback, and clarification of the content was accessible to all.



Tutors collaborate on a community-based health project during a training session. (Comayagua)



Tutor-training session on chemistry integrates formulas, tool use, and developing a foundation of the scientific process. (Comayagua)

In conducting interviews with tutors throughout the training, I began to understand that SAT’s philosophy of empowerment and community leadership was wholly taken up by their tutors, who then went to great lengths to pass it on to their students. Often from non-educational backgrounds, the tutors expressed that the trainings promoted the processes of learning from one another, rather than simply from tutor to student, and facilitating discussions where ambiguous answers were accepted and encouraged. With minimal access to the Internet or highly technical equipment in their communities, tutors utilize their natural spaces as a place of study. Local class projects included gathering household data on common illnesses in the community and promoting awareness to eradicate them; building gardens out of recycled materials with organic compost, and raising chickens (*Cría de Pollos*), a process that began with the construction of an enclosure, weighing the birds after each feeding, and ultimately processing, cooking, and selling the meat to community members.



Ninth grade students take a break from processing chickens at the

end of their *Cría de Pollos* project. (Piedras de Afilar)

After hearing from the tutors about the hands-on nature of these projects, I embarked on several long bumpy rides up unmarked roads to see them in person. What the SAT classrooms lacked in indoor space (many were doubling as the primary grade classrooms, and ceded wall decorations to those classes) was abundantly made-up for in outdoor resources. Adjacent to every school site was a garden, with distinct rows and projects unique to each grade level. In one community, students built beds at their home site and maintained it with their parents, following guidelines from their workbooks. Streams and watersheds were sources for exploring fluid dynamics and critical talks on conservation and maintaining tree cover. I took a tour with seventh graders in Diamante de Sion to see where they cultivated worms to enhance the organic material in their soil. With articulate awareness, they described the aerobic and anaerobic processes for building compost, as well as the acute affects of climate change on the agricultural economy in their region, and country.



SAT projects designate each grade to cultivate a garden plot within their community. (Piedras de Afilar)

Yet beyond the content goals of science and math, at the root of every SAT project lies an innovative way for students to improve the ecological and economic standing of themselves and their communities. The projects have the capacity to scale up into microbusinesses that support other families' agricultural endeavors. In delicate but charged conversations addressing the frequent use of chemical fertilizers, clear-cutting, and burning, trainers, tutors, and students alike understood that overall health relies upon a collective care for the land, and inherent in that task is a deep understanding of its ecology. By inviting their elders, often unable to have finished school themselves, to engage in the inquiry process of collecting data, experimenting with new techniques, and sharing in the results, the rural sites serve as a powerful source of communal knowledge and trust.



Seventh grade students chat with PI Erin Murphy-Graham after class. (Diamante de Sion)

This project will continue with a thorough analysis of the workbooks and teaching strategies of the tutors and trainers, as a way to demonstrate the successful strategies making headway in rural schools. As a part of a nation-wide reform, SAT in Honduras is in a unique position to serve as a model for other countries with the same challenges in secondary education. In articulating the methodologies for experiential science learning, as well as the personal stories I uncovered in Honduras, I hope to maintain a connection with these students and teachers, grounded in the resiliency of nature.