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Summary of what I learned at the Faculty Professional Development Program

European Academy of Otzenhausen, Germany

The Faculty Professional Development (FPD) Program at the European Academy in Otzenhausen, Germany was a fantastic experience. The focus on global perspectives and sustainability drew me to the FDP program because these are timely issues vital to our future and the future of the next generations. The FDP program expanded my understanding of and engagement in sustainability. From the well-structured sessions of the conference I learned current efforts in the fields of (1) renewable energy production, (2) access to clean water, (3) wastewater management, (4) organic farming, and (5) education about sustainability. For example, I learned the guiding European Union policies that are shifting most of Europe towards advancements in these five areas. The visits to the wind and solar power plants, organic farms, zero emission campus, and institute for high-speed dynamics also gave me first hand experiences of what Germany is doing to lead the way for sustainability efforts in Europe.

I have applied what I learned to my daily life, in actions ranging from small and personal to large and academic. Some small changes I've noticed myself making are to always use a reusable water bottle, not accept plastic bags when purchasing items at a store, politely discouraging the use of disposable plastics when planning family food-centered celebrations, and making more informed decisions and selections of the food I eat.

Some of the academic changes I've made are incorporating sustainability ideas in the classes I teach. For example, the FDP program impacted my work this summer with the local school districts. I am co-PI on a Teacher Quality Grant titled "Collaborative for Advancing Mathematical Proficiency III," which was funded to help Henry County mathematics teachers' effectively integrate standards from Science, Technology, Engineering, and Mathematics (STEM). I planned and implemented a multi-day STEM focusing on renewable energy using K'NEX to build a wind-powered water pump (Figure 1[1]), a hydroelectric power plant (Figure 2), and a solar powered car (video link here). In these activities, we first discussed the background information about why renewable energy is important and used existing data to gain an understanding of the current power production methods and their impact on the environment. Then we built the K'NEX models and ran experiments with them, which allowed for conversations promoting understanding of STEM concepts as well as the importance of promoting sustainability.

For example, I had teachers experiment which angle of the fan blades of the wind-powered water pump (Figure 1) led to the maximum volume of water being pumped given a constant flow of air from a fan. We could then relate the STEM concepts optimization, angles, wind speed, and volume of water, addressing standards in engineering, mathematics, and science. A similar approach was taken with the hydroelectric power plant (Figure 2), where teachers were allowed to vary the flow of the water using different sized funnels, along with the height at which the water was poured to determine maximum energy production of the hydroelectric power plant. A third example of using renewable energy as the context of understanding STEM concepts comes

[1] All pictures and video were taken after a signed consent form was collected.

from the video, where teachers timed how long the solar powered car took to travel two meters and then used technology to share and represent the class data using a histogram (Figure 3). We then made hypotheses for why the three slowest cars, taking more than 17 seconds to travel 2 meters, performed this way. This idea of designing an experiment, collecting data, representing and analyzing data, hypothesizing, redesigning, and retesting plays to core ideas in science, engineering, and mathematics, and uses technology to support this process.

Looking forward, I can say the FPD program will continue to impact my future personal and academic life. For example, I am currently writing an NSF EAGER grant to continue developing STEM content knowledge with local teachers. If funded, I plan on again using sustainable energy as a backdrop to explore these concepts.

Figure 1: Wind-powered water pump.

Figure 2: Hydroelectric power plant

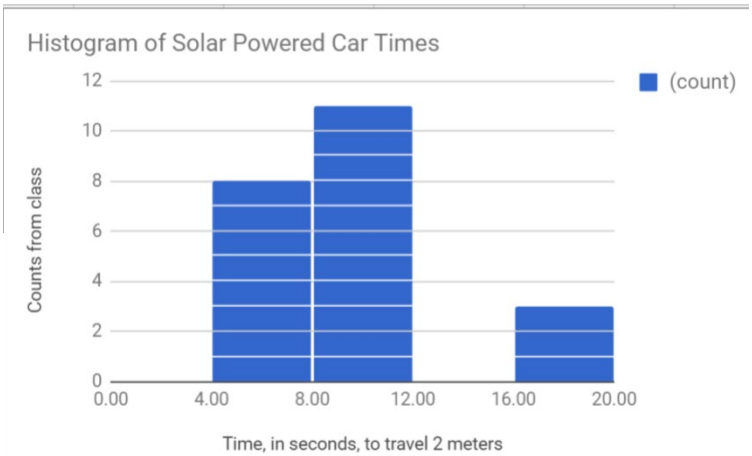

Figure 3: Histogram of data from solar powered car experiment.