

GTEC Evaluation Overview
by Dr. Russell Faux

Evaluation research work on the GTEC project has been undertaken as a collaboration between GTEC project leadership and Davis Square Research Associates (DSRA), a Boston-area research firm with long experience in STEM educational innovations. The first round of data collection occurred during the 2012-2013, and relied largely upon pre-post survey findings to determine whether the innovation was effective at meeting its declared objectives. The research model was a within-group, change-over-time model, appropriate, we hold, for an innovation as this early phase of its development. The overarching research question that DSRA set about to investigate can be stated: What are the effects – cognitive, attitudinal, behavioral, and social – that can be reasonably attributed to participation in the GTEC project?

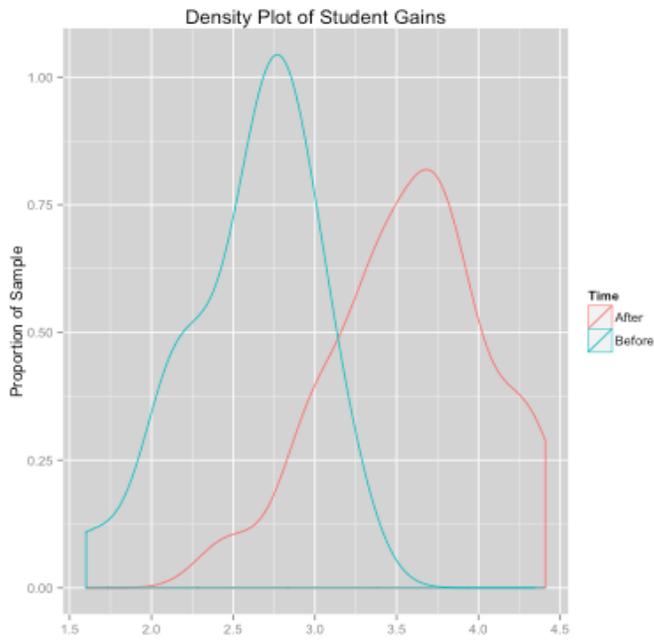
The sample for the survey data collection included all participants in the GTEC project. The demographic profile of the survey respondents is somewhat narrow, with 28 of the 30 respondents reported being from the USA. The methods included an extensive online survey comprising the constructs embedded in the research question. The reliability value for the survey was a very good 0.93 (Cronbach's Alpha), indicating that the questions regarding the target constructs were of more than adequate sensitivity.

Findings from the survey covered a wide range of points, and these will be summarized in the following bullet points:

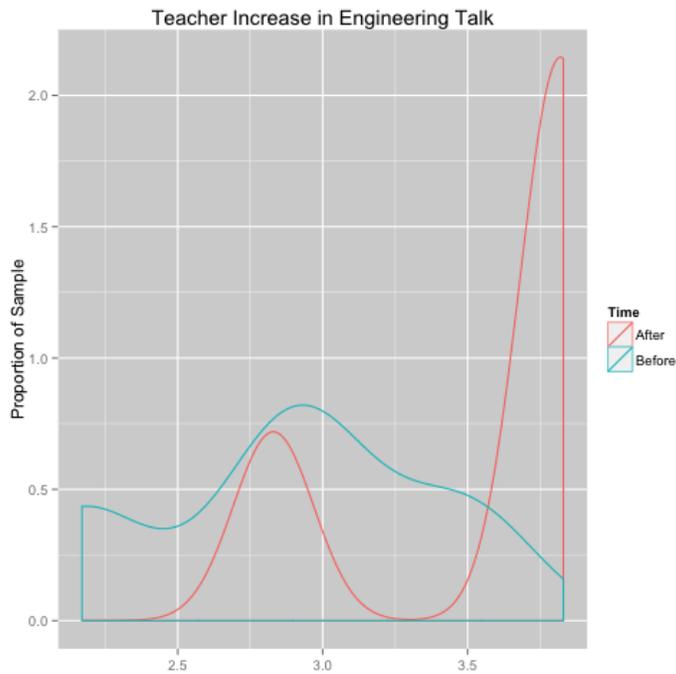
- Students chose to participate because they were motivated by the content, the possibility of collaborating internationally, or because they thought it would be good for their academic careers.
- Students most enjoyed the interactive aspects of the project.
- Students tended to use relatively simple and ubiquitous communication tools (e.g., Skype).
- Teachers were motivated by the professional development opportunities and by the idea that the project would be good for their students.
- Teachers also enjoyed the interactive aspects of participation, including the guest speakers

The following series of density plots show examples of the distributions some of the reported pre-post gains in the target constructs. The constraints of space limit what can be presented, though the reader will no doubt glean some insights into the relative effectiveness of the GTEC project.

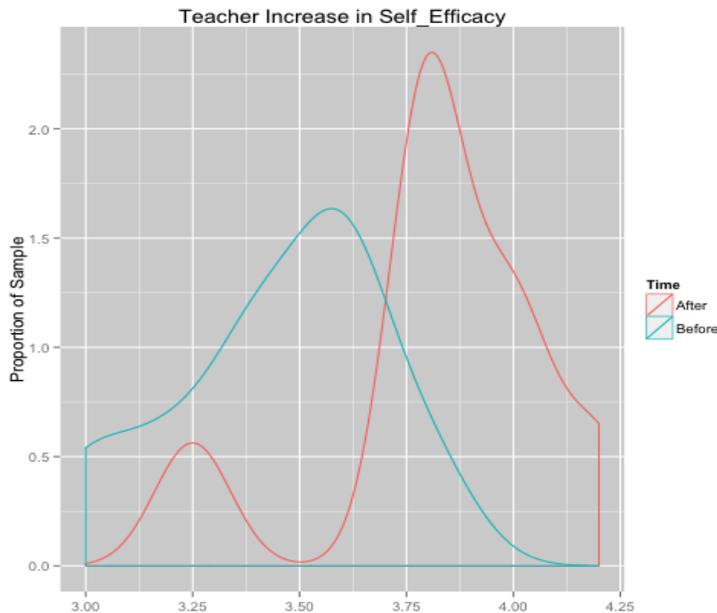
The first set of density plots show the statistically significant ($p < .05$, Wilcoxon) shift in the students' attitudes toward the study of engineering in this context.



The following density plots show the statistically significant ($p < .05$, Wilcoxon) shift in teachers' engineering talk.



A final pair of density plots shows the statistically significant pre-post increase ($p < .05$, Wilcoxon) in the teachers' reported levels of self-efficacy in teaching engineering.



The above findings, however preliminary, show that the GTEC project holds a great deal of promise for a larger-scale rollout. The project is able to tap into participant motivations and provide participants with meaningful and innovative educational experiences that appear to have exercised significant effects on learning, attitudes, and behavior. There are important aspects of future research that will need to be addressed, however, including:

- A more complete sample with a full description of the participants
- An assessment tool for measuring both fidelity of implementation and extent of exposure
- More work on assessments of learning that are tied to the actual content of the project
- Additional work on the validation of the project research instruments, perhaps expanding these with a more developed track of qualitative inquiry.

Overall, we at DSRA find that the GTEC project has a great deal of potential, and one that goes beyond the declared commitments to STEM education. The GTEC model, considered as a kind of pedagogical “container space,” could well support any number of other content areas, or even trans-disciplinary inquiry. Building on the participants’ interest in international contacts and technology, the GTEC project is in an excellent position to help students extend their social and cognitive networks, help them to experience the building of social capital, and assist them in the derivation of considerable learning and attitudinal benefits in the process.