

MIT D-Lab

Monitoring, Evaluation
& Learning D-Brief
November 2020



EVALUATION QUESTIONS

1. How valuable are the collaborations between MIT D-Lab students and TEWDI?
2. How effective have these projects been at achieving desired outcomes for students and for TEWDI?
3. What factors lead to successful outcomes for students and for TEWDI?

What Factors Contribute to a Successful Experiential Learning Project?

Each year, MIT D-Lab offers dozens of courses that help students acquire competency in participatory design, understand and apply principles of engineering and design, engage in hands-on work, learn to think critically about global development, and participate in meaningful field experiences. Students gain hands-on, real-world experience through class projects with local community partners.

For over a decade, MIT D-Lab students have partnered with TEWDI Uganda, a non-governmental organization located in Soroti, Uganda. TEWDI's mission is to mobilize communities to participate in promoting longer, healthier lives and socioeconomic freedom for women and children in Eastern Uganda. In partnership with TEWDI, D-Lab class projects have ranged from advancing clean cooking technologies to teaching innovation workshops to youth. The four D-Lab classes that have worked most closely with TEWDI are D-Lab: Development, Introduction to Energy in Global Development, Applications of Energy in Global Development, and Design for Scale.

In the summer of 2020, an evaluation was conducted to investigate the outcomes of MIT D-Lab class projects that partnered with TEWDI Uganda between fall 2013 and fall 2019. This evaluation examined the outcomes that projects achieved for both TEWDI and D-Lab students, as well as the factors that contributed to these outcomes. Drawing on survey responses from D-Lab students and interviews with those students, D-Lab staff, and TEWDI staff, this Evaluation D-Brief summarizes key lessons about the outcomes of D-Lab projects and the factors that contribute the most to their success.

KEY FINDINGS AT A GLANCE

1. Many students felt that their project was successful in the short term, but they were less confident about the long term.
2. Through partnerships with MIT D-Lab, TEWDI Uganda has gained new skills, improved its products, and increased profits and cost savings.
3. Because most D-Lab projects initiate a starting point for future work, they have the potential to promote continuity across semesters.
4. Four factors had the largest impact on project success: the ability to conduct fieldwork, the people collaborating on the project, the skills and knowledge learned in class, and clear goals and expectations.
5. Overall, the projects are successful at achieving desired student learning outcomes and promoting continued student engagement with the partner and topics after the project's duration.

METHODS

In summer 2020, MIT D-Lab students, instructors, and TEWDI staff were asked to share information about their project experiences over the last seven years. Data was collected in two ways: a student survey and semi-structured interviews with students, instructors, and TEWDI staff.

Student Survey: The survey had a 33% response rate, with a total of 28 students responding, representing participation in 20 projects with TEWDI from 2013 to 2019. These included projects from five classes—D-Lab: Development; Introduction to Energy; Applications of Energy; Design for Scale; and D-Lab: Supply Chains—as well as independent thesis projects and Undergraduate Research Opportunities (UROPs).

Interviews: Sixteen students, six D-Lab staff members, and three TEWDI staff members participated in interviews, comprising a mix of one-on-one and group interviews. During the interviews, students were asked about their project experience and the impacts it had on their future decisions. TEWDI staff were asked about their experiences with student projects. D-Lab instructors were asked about the partnership with TEWDI, student experiences, and the metrics for successful projects.

FINDINGS

1. Many students felt that their project was successful in the short term, but they were less confident about the long term.

When asked to rate the success of their project on a ten-point scale, the average score was 6.8, with scores ranging from 4 to 10 across projects. On average, projects from the Applications of Energy class were rated the most successful, with an average score of 8.0. Projects from the Introduction to Energy class had the lowest average rating, at 6.3.

Instructors were not surprised by these ratings, and expressed that they were higher than expected. One instructor stated that a project that meets even half of its original goal is a successful project. This comment illustrates the fact that instructors and students may not define success in the same way, and it speaks to the need for being more clear about expectations and measures of success upfront.

“...in terms of developing relationships with our partners, [and] executing the devices we had planned to, I believe we did that. How useful were these devices in the long term, latter trips would...determine. In terms of partnering versus dictating, I think we did that as well....Seeing that other trips followed makes me think that this trip went well.”

2. Through partnerships with MIT D-Lab, TEWDI Uganda has gained new skills, improved its products, and increased profits and cost savings.

TEWDI staff mentioned gaining new skills, especially through the field visits that usually occur twice a year. They see the partnership as mutually beneficial, with both sides learning from the partnership. The partnership has helped TEWDI improve their products, especially their clean-burning charcoal briquettes, efficient cookstove design, and improved fruit dryer. TEWDI staff stressed that improved designs lead to cost savings, which allows TEWDI to hire more staff. Staff also shared that customer demand for their products has increased, which they credit to the improvements that D-Lab students have helped them make over the years. On the technical side, staff have learned new skills that enable them to make improvements to their machines. These include prototyping, research, and testing skills. TEWDI staff mentioned gaining inspiration from students on how to improve their biomass dryer. Students have also shared knowledge around issues such as carbon monoxide, which one staff member said was eye-opening.

The partnership has also provided TEWDI with cross-cultural learning experiences and travel opportunities, allowing them to better communicate and engage with partners.

Finally, the partnership has helped to increase TEWDI's visibility and credibility, and this has led to new partnerships. TEWDI mentioned multiple partnerships with universities in the United States and Europe, and credits the initiation of these partnerships to its work with D-Lab.

“Being associated with MIT helps people take TEWDI seriously. It helps people see value in what we are doing and has also led to others adopting our solutions.” - Betty Ikalany, TEWDI

3. Because most D-Lab projects initiate a starting point for future work, they have the potential to promote continuity across semesters.

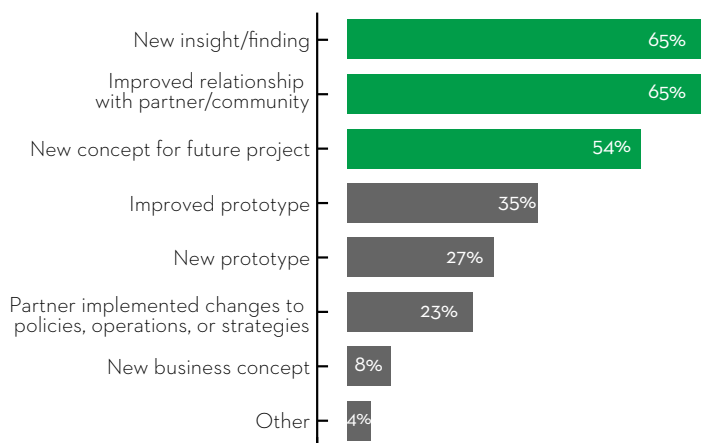
When asked about the outcomes of their projects, 65% of students said that their project produced a new insight or finding, 65% replied that their project improved the relationship with the partner or community members, and 54% thought that their project produced a new concept for a future project.

When reviewing these findings, instructors mentioned that these top three outcomes were not often framed as original goals of the project, which may lead students to feel that their projects were not successful. While instructors still see these outcomes as indicative of success, the interviews suggested that students did not always share that belief.

Students frequently mentioned that they didn't achieve their original goal, but did achieve a revised goal or goals. Goals were often revised

after visiting the field and better understanding the reality and conditions on the ground. Flexibility and adaptability were highlighted as being important to achieving successful outcomes. Students also mentioned that it would have been helpful to have clearer goals at the start.

The majority of projects lead to a hand-off for future projects. n=26



A few students also mentioned that they felt they were “reinventing the wheel.” One D-Lab: Development student stated that they felt like a lot of shared and learned experience was lost between semesters. Based on the data and interviews, it seems that although many project outputs lead to hand-offs for future projects, they may not be effectively translating from semester to semester.

Students who took both Introduction to Energy and Applications of Energy, which are structured so they can be taken in sequence, mentioned how helpful it was to have project continuity. They were able to clearly see the project building from semester to semester, and obtained field experience in between classes, so they understood the on-the-ground conditions. This gave them a better sense of reality as they worked on the project during their second semester.

“Our project was mostly geared toward helping TEWDI dry their briquettes. It was very difficult to practically prepare beforehand because so much of the drying is dependent on the local climate. I think our biggest contribution to TEWDI was not the original intention of our project, but the things we observed about their process to have more practical projects for future students.”

4. Four factors had the largest impact on project success.

The Ability to Conduct Fieldwork

Students frequently described the fieldwork experience as transformative. They emphasized how it helped to ground their project in reality. TEWDI staff also mentioned how helpful it is to have students visit them and to be able to collaborate with students in person.

“The fieldwork that I completed during my trip to Uganda in 2017 was one of the most valuable things that I was able to do for my thesis project. For me, seeing the TEWDI facility and meeting the people who work there was extremely helpful in understanding how the Makaa stoves are fabricated and how that process could be improved.”

People: Mentor, Partner, Team

Mentors: Mentors were rated as the top factor affecting success. According to students, having a mentor with a prior relationship to the partner and who was knowledgeable about the conditions on the ground proved indispensable. They also noted that the mentor played a helpful role in facilitating and guiding the projects on site, especially because they knew what to expect and where to get resources. Their technical skills and knowledge were also an asset to the student teams.

Partner: TEWDI was also mentioned frequently as a major reason for success. Students talked about how welcoming and friendly TEWDI was, and overall that they enjoyed collaborating with TEWDI. Students and staff described TEWDI staff as being engaging and knowledgeable, and praised TEWDI for providing outstanding field support to the teams that travel to Soroti. They also stated that TEWDI helps prepare students and the community for the field visit and help to set expectations once they get to the field.

“The collaboration with TEWDI provided valuable field insights we would not have been able to gain otherwise. Betty and her team were accommodating, helpful, and caring for our team in getting us the access we needed for our project.”

Team: Although not rated as highly important as the mentor or the partner, a student’s team was frequently mentioned in interviews and the survey. Students felt that their team’s ability to work together, problem solve, and work towards a common goal were very important. Students also mentioned that the importance of their team members was less related to skills and more about commitment.

Skills and Knowledge

Students attributed much of their project’s success to the specific competencies gained through the class itself. When asked to rank the importance of each skill area to the project outcome, the most important skills and knowledge areas for each class were:

- Understanding user needs and gathering user feedback in low-resource settings (Introduction to Energy)
- Prototyping skills (Applications of Energy)

- Hands-on skills required to implement selected development project (D-Lab: Development)
- Design for remote manufacturing (Design for Scale)

Goals and Expectations

This theme was mentioned frequently in interviews with students. Many students mentioned feeling like the goals of the project were unclear and vague, which led to wasting time up front trying to define the problem. Students stated that having a clear goal allowed for more time to be spent on the project, and it also allowed them to better understand their impact because they had clear milestones and ways to measure success.

5. Overall, the projects are successful at achieving desired student learning outcomes and promoting continued student engagement with the partner and topics after the project's duration.

All students reported that they gained new skills, knowledge, attitudes and perspectives through their projects. In particular, students appreciated gaining cross-cultural, real-world experience and a better understanding of development challenges and their complexity.

More than two-thirds of the students found ways to continue engaging after the semester ended: 32% of students continued to engage

with TEWDI, 25% continued research on a topic related to the project, and 21% continued working on the project on their own time.

Over half of students surveyed also reported more long-term outcomes associated with the project. 30% of students pursued a job/career in a social impact field after graduation, 15% volunteered for a related organization, 15% pursued further education in the field, and 7% started their own social venture. Students who started a social venture or volunteered with an organization in the social impact field were most likely to attribute these choices to their experience with the D-Lab project. Students who chose to pursue a career in a social impact field were less likely to attribute this choice to their experience with the D-Lab projects, which suggests that students who go into those fields were already planning to do so before taking a class with D-Lab.

Even those who did not enter the social impact sector reported that the project had affected their professional lives.

"It has advanced my ability to discuss high-level science and engineering with people who may not be educated in these fields. It has been extremely helpful during my time as an engineer at SpaceX."

CONTACT

MIT D-Lab Monitoring, Evaluation, and Learning

Samantha Jorgensen, MEL Fellow (smjorgensen@utexas.edu)

Artie Maharaj, MEL Associate (maharaja@mit.edu)

Laura Budzyna, MEL Manager (lbudzyna@mit.edu)

MIT D-Lab Academics

Libby Hsu, Associate Director of Academics (slhsu@mit.edu)

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FIND OUT MORE ABOUT

MIT D-Lab Academics: d-lab.mit.edu/academics

TEWDI Uganda: tewdi.org/

ABOUT MIT D-LAB

MIT D-Lab works with people around the world to develop and advance collaborative approaches and practical solutions to global poverty challenges. The mission is pursued through our academics program of more than 20 MIT classes and student research and fieldwork opportunities; our research groups spanning a variety of sectors and approaches; and a group of participatory innovation programs we call innovation practice.

Image from page one: The D-Lab team, along with students from Makerere University and TEWDI staff members, pose for a picture at the top of Soroti Rock. (Photo credit Lauren Bustamante)