

## **EDUBOX**

*A redesigned shipping container that functions as a mobile learning environment for underserved communities*

### **Introduction**

The faculty of Engineering Technology at the University of Twente has been awarded by Nuffic with a grant for the Orange Knowledge Programme “Learning & development for a Sustainable future for refugees & host communities to promote co-existence and Socio-Economic Development”. Their aim is to contribute to increased quality education and vocational training for refugees and internally displaced persons and host communities in Jordan and Lebanon (University of Twente, 2020).

In context of underserved communities and displaced people, the primary focus is on facilitating basic needs including water, food, shelter, security, and energy. On the long term, education must also be provided. In humanitarian crises, most attention concerning education is often directed towards the primary and secondary school levels. Refugees above the age group of secondary school level (age 12 to 18) are considered less vulnerable than school-age children, and therefore often miss out on higher education (Sheehy, 2014). This is partly due to the lack of adequate infrastructure and resources.

### **Aim**

Therefore, this project aims to provide a learning environment to underserved communities which can be used for higher education and Technical Vocational Education and Training (TVET). By offering these underserved communities the opportunity to follow education and develop themselves, this will hopefully lead to the possibility to start a better life.

This will be realized by redesigning a shipping container to a learning environment, called the ‘EDUbox’, which includes all the necessary equipment for higher education and TVET. The focus within this project is on refugee camps and underserved communities in Jordan and Lebanon, but the EDUbox will be designed as a universal environment so it can be used wherever needed in the world. This learning environment will be designed flexible enough, so different education programs are able to make use of it.

### **Research / requirements**

After research has been carried out on the needs of the target group related to education and existing solutions to redesigned shipping containers, the following main points of criteria were defined;

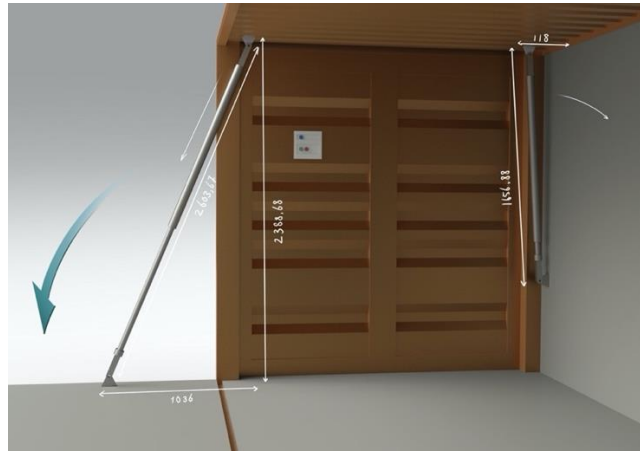
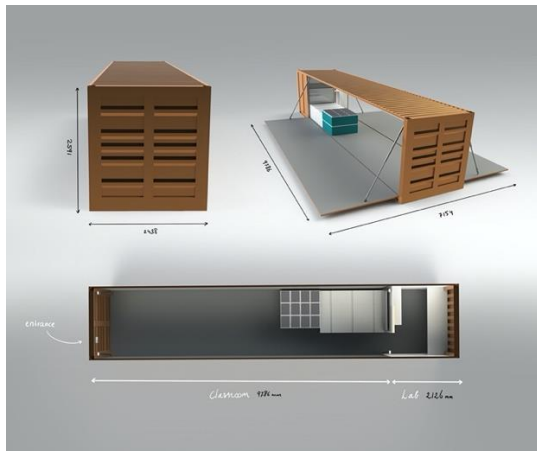
- The dimensions of the modified container should stay within the defined dimensions by the ISO regulations of a 40 ft shipping container (12,192 m length, 2,438 m width, 2,591 m height)
- The system should be efficient in transport and installing; the less actions needed to operate the system, the better
- The learning environment should flexible enough to adapt to different education programs

### **Final design**

Based on the research and the requirements, different concepts were designed and evaluated based on the initial criteria after which a final design for the EDUbox has been created.

The final design of the container exists of two main parts, one part including opening side walls which will function as the classroom, and a small lab in the back of the container behind a separating wall (figure 1). During transport, the EDUbox can be closed off using lockboxes, which will offer optimal protection against vandalism and burglary.

When closed, all furniture inside the container can be stacked together compactly, which will leave enough space left for other materials such as the solar panels and a mounting system since the solar panels will be added on top of the container after it has been arrived at its location.



**Figure 1.** EDUbox packed together for transport **Figure 2.** Hydraulics used for unfolding the container

The container unfolds using four hydraulic cylinders (Figure 2), which are connected to the ceiling of the container. These hydraulics can be controlled using a small control panel that is attached to the door used as entrance.

When unfolding the container, a tent structure (Figure 3) will unfold with it which will completely close off the learning environment allowing it to be used in most weather conditions. This tent structure can also be (partly) opened so it can be used as a sunshade to allow wind to blow through (Figure 3). The tent canvas is partly made from transparent material, which will illuminate the learning environment with natural sunlight. Apart from this, the learning environment will be equipped with lamps so that it can also be used in the dark.

The furniture inside the container is completely flexible, which allows different educational programs to arrange the interior of the learning environment according to their preferred teaching methods. The furniture can be set up as a table at which two people can work or can be extended so a total of six people can make use of it. The chairs can also be used as a storage space, by lifting the top part of the chair. By stacking two chairs on top of each other, it can be used as a barstool for inside the lab, where the desks are higher. For transport, the chairs fit exactly underneath the table, enabling the furniture to be folded compactly together as can be seen in Figure 1.



**Figure 3.** Tent structure closing off the learning environment

## References

- Acaps. (2020, August 25). *Syrian refugees in Jordan*. Retrieved from Acaps: <https://www.acaps.org/country/jordan/crisis/syrian-refugees>
- Sheehy, I. (2014, October 15). *Refugees need access to higher education*. Retrieved from University World News: <https://www.universityworldnews.com/post.php?story=20141015204738526>
- UNHCR. (2020, December 8). *Refugee Data Finder*. Retrieved from The UN Refugee Agency: <https://www.unhcr.org/refugee-statistics/>
- University of Twente. (2020, August 7). *Orange knowledge programme - tailor-made training awarded to the faculty of engineering technology*. Retrieved from Humanitarian Engineering, University of Twente: <https://www.utwente.nl/en/humanitarian-engineering/news/2020/8/746125/orange-knowledge-programme-tailor-made-training-awarded-to-the-faculty-of-engineering-technology>