# Humanitarian Application of Science and Technology

## A participatory space for community growth

**Vanessa Sandoval, Jorge Ritter, Norma Cantero, Melany Cáceres, Romina Fillipini**

Departamento de Ingeniería Civil, Industrial y Ambiental

Universidad Católica "Nuestra Señora de la Asunción"

Asunción, Paraguay

*Abstract*—**Humanitarian Application of Science and Technology is an experiential learning program, in which students and teachers work with communities and institutions to promote social development and human dignity. The program is committed to social reality; therefore, each project is designed to meet the needs of a specific community. It is a space for training and professional growth through knowledge exchange. When developing projects, students learn to work in a multidisciplinary manner while contributing to community progress. There are two main elements that make this program a success; first the confessional identity of the University, and second, the deep Catholic culture of the Paraguayan countryside. Consequently, the program takes advantage of each parish organization to actively work with the community members. This connection opens to the possibility of improving the whole town. Thereby, ideas grow into improvement or constructions projects. These projects range from repairs in the local chapel to build community centres, sports fields, and educational centres; as well as urban planning and public sanitation. Having a project makes it easier for the community to raise funds. When the community starts constructing, the program oversees the progress. Through this cooperation, academia, the church, and communities, work together to fulfil their goals.**

*Keywords— Work with communities; experiential learning; community development projects*

## I. INTRODUCTION

"Humanitarian Application of Science and Technology" (HAST) is an experiential learning program created in 2016. Its main objective is to develop sustainable development projects in tune with the needs of each community. The program carries out architectural and engineering projects that creates new spaces or buildings, as well as the proposal of remodelling and refurbishment. The work includes survey, digitalization, computation and budgeting, as well as technical consulting and inspection.

HAST belongs to the Catholic University "Nuestra Señora de la Asunción" therefore shares its confessional identity; bases its principles and values on the Catholic religion.

HAST mission: students and teachers are committed to social reality and to contribute through their knowledge and work with communities, institutions and people, to carry out civil projects that promote social development and human dignity.

HAST Vision: To be recognized as a consolidated experiential learning program as well as a service office from the Catholic University; students and teachers are committed to communities and the society; in alliance with other organizations delivers projects of social development with visible results. It is a testimony of lay commitment and a source of inspiration for other initiatives.

For the student, the program aims to create a space for personal growth and professional training, while learning to work on multidisciplinary projects and contribute to community progress.

## II. AGENTS

### A. Society and the ecclesiastical community in Paraguay

Historically Paraguayan towns have grown around the Catholic Church; parishes are meeting elements for people, as well as a place where service is provided to accomplish social development. Nowadays, religion still is an integral part of Paraguayan culture; community members organize themselves around the parish to meet their needs and to address their objectives therefore, improve their community. As part of this culture, the priest in charge of the parishes is a community leader and try to improve the welfare of his people.

### B. The academic community

The program has a General Director and an Executive Coordinator, both professors of the university; a Project Coordinator and a Budget Coordinator, both senior students; these are paid positions by the university.

At least one internship is mandatory for engineering students; therefore, the program accepts some interns from 6 to 8 months; besides that, students can get academic credits for working in an specific part of a project. In addition, other faculty members provide technical advice in their particular areas.

## III. METHODOLOGY

### A. Identify a problem or social need

The parish priest contacts HAST when he identifies the need to build or improve some infrastructure. In a first contact, the parish priest explains the problem or idea that the community has. Then, a team meet with him to gather the necessary data and generate a proposal if possible in the community itself; these data range from survey and measuring existing infrastructure to an estimate how much the community is able to invest in the project.

## B. Brainstorm approaches and solutions within the HAST team

The team works in a roundtable in which the ideas and technical proposals are debated among all the members, in which students and teachers are heard alike; it is a participatory process supported by self-evaluation.

Before developing the ideas into a project, the collected data is share inside the HAST team; to generate the best solution within the resources and budget.

## C. Choose the best solution with the community

The proposal that will be developed as an executive project is chosen with the whole community. In these meetings, the pros and cons of each idea are discussed; after listening to the participants' concerns, the most convenient proposal is chosen.

## D. Developing the project

One team member is designated to develop the project. This usually includes draw executive blueprints and calculate the budget. After the project is reviewed and approved, is handed over to the priest, so the community can raise funds and carry out the project.

## E. Carrying out the project.

The level of community engage in caring out the project relies on its size and the funding sources; the same is true about HAST participation in it.

For example, during chapels repairs parishioners usually donate their labour; in these cases, HAST makes routine field visits to inspect and provide guidance.

When it comes to major constructions, usually funding is requested to the government or other organizations; therefore, they are responsible for the construction and inspections.

## IV. CASES STUDY

### A. Santuario de la Virgen del Paso – Itapé, Guairá

Construction of the Sanctuary for 2,000 seated people; the approximately built surface is 1700 square meters.

The project includes the executive blueprints, the material computation, the budget, the technical specifications, the documentation needed to call for bids and other features. In this project due to the high cost and the found source (funds come only from the parishioner's donations) the construction is taking place in stages.

The project was delivered in November 2016; during 2017, foundations and columns were built; in 2018 the slab of the atrium was built. HAST accompanied this work with frequent visits to the construction site; in this visits the levels were controlled, as well as the loading before and after the atrium concreting.

### B. Seminario Mayor Nacional del Paraguay – Asunción

Seminary school housing blocks refurbishment and the transformation of a chapel into an auditorium.

For the transformation into an auditorium the roof, doors and windows were integral changed; the floor was replaced, the painting and the electrical installations were renewed, and a new AC and sound system were installed.

The work in the housing blocks included specific repairs and improvements in sanitary installations, renewal of the laundry areas, doors and windows' maintenance, electrical installation adjustment and the repair of the floor and ceiling.

In this case, a HAST member oversaw all the work; because several of the repairs were carried out by the Seminar students, or small contractors.

### C. Centro de Formación Integral – San Carlos, Caazapá.

This Training Center aims to be a source of community development; the project includes the construction of classrooms for technical training, a retreat house, an auditorium and of a roofed sports centre that can be used as a party hall. The idea is to prevent young people from leaving the town, while generating a space that attracts to participation in community events. As a first stage, the funds are being raised to build the classrooms.

### D. Capilla San Roque – Caazapá, Caazapá.

San Roque's Chapel remodelling and reconditioning. The altar and tableau were remodelled using slab stone and paint, and shelves were mounted. For the reconditioning of the chapel's nave a suspended ceiling was installed, with new lighting fixtures and ceiling fans.

The initial survey was conducted in March 11, 2017. The blueprints and budget were delivered in May 9; a visit was made in May 20, and the reopening was in August 16, 2017 at the patronal festivity.

## V. RESULTS

### A. The academic community

Since 2016, 27 students had worked in the program: 3 as employees, 5 as interns and 19 for academic credits; 59% are women and 41% are men; 85% are students of civil engineering, 11% of environmental engineering and 4% of architecture. Simultaneously, 6 professors had worked as consultants in: environmental studies, urban design, structures, roads, civil constructions, concrete and geotechnics.

The students had been able to do professional training, such as measuring and surveying, digitization, project development, material computation and budgeting. Knowing the towns and community members helped then to understand the need for well-done projects, instilling a culture of quality and social equity. Furthermore, while contributing to the participatory community progress, students started to see professional practice as human interaction, because projects always involve people.

*B. Society*

From June 2016 to August 2018, HAST developed 35 projects in 22 communities. These projects had contributed to the community with work (projects, advice and supervision) whose value approaches USD 300,000 (three hundred thousand dollars). The minimum wage in Paraguay is USD 10 per day.

Among the projects developed there are:

- 12 renovations of churches and chapels,
- 7 new parish halls,
- 5 renovations of educational institutions,
- 3 new children and elders' homes,
- 3 new temples,
- 3 training complexes featuring classrooms, sports centre, auditorium, retrieve home and
- 2 urban planning projects.

Each community decides their priorities and where to allocate their resources, seeking social or community welfare. In all cases, the projects generate a space that community members can use to seek personal grow; schools, sports centres and meeting areas integrate society and made it more equal. Therefore, these projects empower community members.

Because of the scarcity of professionals and funding in the Paraguayan countryside, most constructions are made without blueprints, calculations or technical specifications. A great contribution of the program is the design and calculation of the structure, as well as quality control and inspection. Resulting in lower costs, better resource allocation and above all greater safety.

## VI. CONCLUSION

Students and professors elaborate sustainable development projects based on community needs and oversee the carrying out to ensure quality. The program is a space for professional training and personal growth.

The program aims to create development poles in the Paraguayan countryside through construction work, that goes from improving the local parish to build sports centres, and classrooms. The priest management of the projects is an important element for the success, as parishes provide a meeting place in which communities members look toward social development.

Humanitarian Application of Science and Technology, as an experiential learning program from the university, creates a space for participatory community growth; in this cooperation between academia, the ecclesiastical community and society in general each part contributes and receives.