

Encouraging innovative entrepreneurship in engineering students in central amazon

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Introduction

Contemporary society is characterized by rapid and constant changes in all its segments, especially in the professional field, which involves the emergence of new professions and the disappearance of others. In the Engineering area, new sub-areas arise, and many others merge to meet the needs of the current socioeconomic context that is increasingly driven by commercial relationships to the detriment of human relationships. We understand that it is possible to articulate commercial and professional relationships in a humanized way that has entrepreneurship and innovation as articulating and legitimating elements.

In this sense, the Academy STEM Project, developed by the Amazonas State University and is funded by Samsung, using resources from the Informatic Law of the Western Amazon (Brazil's Federal Law N° 39 of Decree N° 10.521/2020, encourages innovation and entrepreneurship through training courses aimed at engineering academics at the University in various fields of science that contribute to the process of training the engineer in contemporary times. Entrepreneurship and innovation are the guiding pillars, as these are fundamental pillars within the new industry 4.0

Academy STEM Project

The Academy Stem Project, developed at Amazonas State University, is aimed at training capacitating of students at various levels. The main purpose of the project is to strengthen the engineering ecosystem in Manaus, capital of the state of Amazonas and which has one of the main industrial parks in Brazil, therefore requiring qualified labor to meet the demands of the industries. To achieve the general objective, the project is subdivided into three main pillars:

The first is the "attraction" pillar, aimed at high school students. Training courses are offered in two mobile makerspaces, which travel to peripheral areas of the city to train students who otherwise would not have access to technologies such as 3d printing, laser cutting, prototype construction, robotics, and programming. Once this magical STEM world is introduced, it is expected that students will feel encouraged to continue their academic life in one of the University's engineering courses and therefore help in the overall objective of the project. It is worth noting that such training, once imbued with maker methodology, foster skills

related to technological innovation, disruption and entrepreneurship through digital manufacturing, additive manufacturing, project planning, among others. Now it is easy to understand the name "attraction", as it seeks to attract new and more interested in the STEM world to the University's engineering courses.



Figure 1 Academy STEM mobile makerspace during one activity for high school students

The second pillar of the project is the so-called "permanence". It is known that engineering courses have, around the world, high failure, and dropout rates. This is associated with several factors, such as the lack of preparation related to basic concepts, the distance between the contents taught in high school and what is seen in college (especially in underdeveloped countries), the methodology of classes used by teachers or, even, the evaluation methodology that professors use in their courses. In this way, the permanence pillar offers training for both students (both leveling students in basic subjects and bringing concepts that relate the contents learned during undergraduate courses and the most important subjects of the present time) and teachers (bringing training in methodologies teaching activities and new ways of evaluating). With this, the objective of reducing the evasion and retention of students in engineering courses is achieved, making the time of permanence of these students at the University more effective.

The last pillar of the project is the so-called "excellence", which aims to offer complementary training that narrows the gap between what is traditionally taught in undergraduate engineering courses and what is demanded in the industrial job market. It is known that, in addition to the technical skills

required of a professional, soft skills such as teamwork, organizational behavior, project management, innovation and creativity management, among others, are currently required. As it is evident, the main objective of the excellence pillar is to transform the student who obtained his training in engineering into a more complete professional, ready for the challenges of the modern job market.



Figure 2 External image from STEMLAB, structure where all training is offered for university's community

Innovative Entrepreneurship

Undertaking in an innovative way is a need for all professional areas in the 21st century, so it is of paramount importance that universities are aware of this situation to enable training that involves this important topic. Entrepreneurship and Innovation are closely linked and must walk together aiming at the success of an enterprise, because while entrepreneurship ensures that the company or business becomes viable in the market by supplying an existing demand, innovation guarantees the originality, viability, and sustainability of the business.

Entrepreneurs are divided into two classes: entrepreneurs by necessity and entrepreneurs by opportunity [1]. Entrepreneurs by necessity represent those who have no other job option, while entrepreneurs by opportunity choose a professional or commercial option from the various aspects of their careers. The Academia Stem Project has its focus on opportunity entrepreneurship by offering academics from the undergraduate engineering courses at the Amazonas State University training that provides them with knowledge and methodologies that deal with the area of entrepreneurship and innovation capable of instrumentalizing them. They consistently enter the job market after graduation.

The idea of innovation is characterized as a movement of renewal, transformation, or creation of something existing, or not, that meets a collective need. We currently see many Startups in the most diverse areas of knowledge that aim to meet a need in a particular market segment. In the contemporary context, Startups can transform not only the

commercial market in which they operate, but also society itself.

Conclusions

It is in this perspective that the Academia Stem Project intends to promote and legitimize Entrepreneurship and Innovation in the Engineering Courses of the Superior School of Technology of Amazonas State University, by offering training with theoretical and practical activities capable of resizing curricular knowledge of the disciplines, adding elements of contemporary society focused on problem situations in the context of academics who need emergency resolutions, such as: air, soil and river pollution; forest fires; healthy eating with Amazonian culinary elements; solidarity economy; new technologies for the Amazon, among others.

References

- [1] G. M. V. Valle et al; "Motivation for entrepreneurship: necessity versus opportunity" *ANDPAC/RAC*. Rio de Janeiro, v. 18, n°3, art. 4, 2014, p. 311-327.