



Title: Formative research, POL and the influence of the teacher-researcher in the production of science and technology: Integrative project cases

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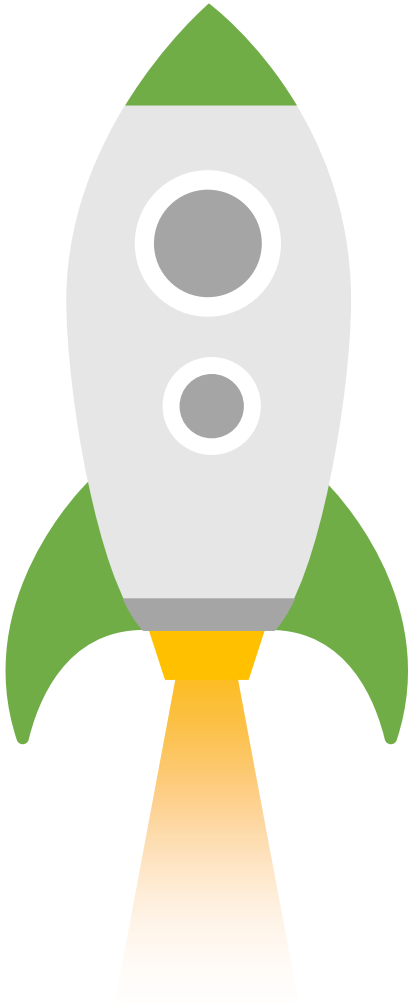
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Introduction

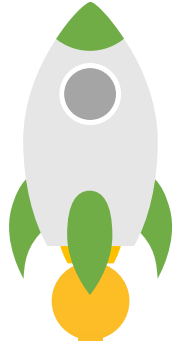
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Introduction



Objective

Document the articulating process of Formative Research, Project-Oriented Learning and teacher-researcher mediation, which materialize through a compilation of integrating cases that promote science and technology.

Introduction

1. Within the framework of science and technology policies



Developing scientific and technological potential have been central aspects of scientific and technological policy in Mexico, as part of the 2020-2024 Institutional Program of the National Council for Science and Technology in priority objective 6.

2. Formative Research and the teacher-researcher



Research is one of the fundamental functions of the University since it is part of the educational process and promotes learning and the generation of knowledge.

This research belongs to the field of political science in the discipline of didactic pedagogy and curriculum, in the subdiscipline of teaching.

3. Project Oriented Learning

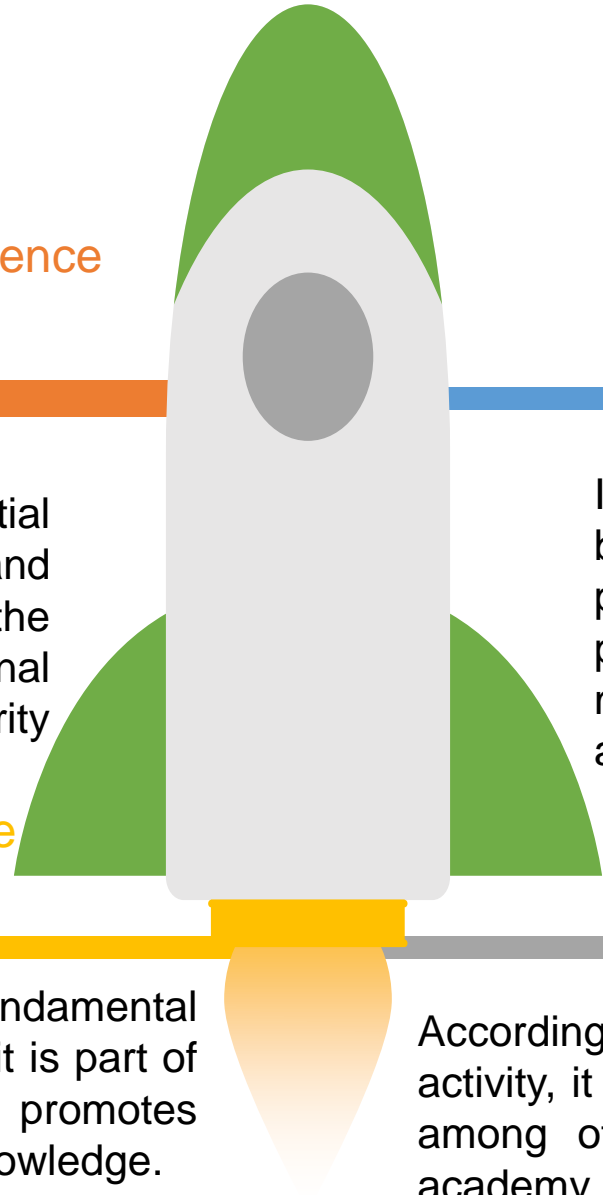


It can be considered a particular type of inquiry-based learning where the learning context is provided through authentic questions and problems within real-world practices that lead to meaningful learning experiences” (Wurdinger et al, 2007).

4. Integrative Project

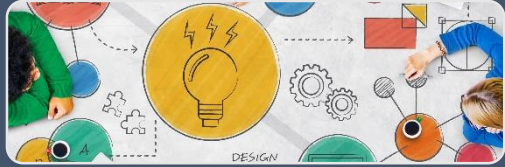


According to Arnáez, (2014) An integrating task "is an activity, it can be a project, a problem, an investigation, among others, that the teacher, the faculty or the academy design so that the student practically demonstrates what has been learned in a thematic unit.



Methodology

It is a qualitative research with a focus on participatory action research. It is divided into five moments:



Diagnostic

Analysis of the curricular mesh of the educational programs in a collegiate way.



Action hypothesis

¿How does the application of a formative research model using the didactic strategy of Project-Oriented Learning under the leadership of one or several teachers with research training allow the development of integrative projects in students of TSU's educational programs as part of their academic and professional training, in addition to paying for the construction of science and technology?



Pilot Test Planning

The needs and problems that must be addressed according to the semester, the educational program, the competencies and objectives pursued by the integrative project were identified.



Execution and development

In the 2020 and 2021 periods, the first phase of the integration project implementation was carried out.



Presentation of the results and socialization of learning

The results obtained are demonstrated by delivering the project report, the functional prototype and the socialization of the results through the oral presentation.

Result

Tabla1.

Relación de asignaturas que participan en el proyecto integrador en 5to cuatrimestre.

Programa Educativo	Código	Asignaturas (Eje, Enlace)	Tipo de asignatura	Función del docente (Líder, Asesor)
Mantenimiento área Industrial	18MAI-INT2	Integradora II	Eje	Líder
	18MAI-AROB	Automatización y robótica	Enlace	Asesor temático
	18MAI-FSC4	Formación Sociocultural IV	Enlace	Asesor temático
	18MAI-EOE2	Expresión Oral y Escrita II	Enlace	Asesor temático
	18MAI-INGV	Ingles V	Enlace	Asesor temático
Mecatrónica área Automatización	18MEC-INT	Integradora II	Eje	Líder
	18MEC-MICR	Microcontroladores	Enlace	Asesor temático
	18MEC-PVIS	Programación Visual	Enlace	Asesor temático
Tecnologías de la Información área Desarrollo de Software Multiplataforma	18TIS-PPLO	Principios para IoT	Eje	Líder
	18TIS-DSPP	Diseño de Apps	Enlace	Asesor temático

Fuente: Elaboración propia.



A compilation of integrative projects product of the 2020-2021 periods is presented in relation to the subjects described in Table 1, with the intention of disseminating what was produced in the classrooms and laboratories through the intellectual and creative construction of the students. that gave answers to the needs and problems of various kinds as a result of learning the project-oriented strategy, as well as the accompaniment of the Academic Body UTJAL-CA-9 Development of applications and Systems in virtual environments.

Result. Prototype relationship

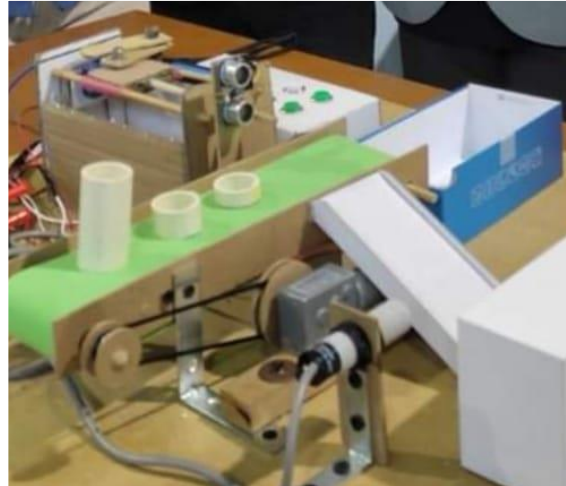
TSU Maintenance industrial area



Development of prototypes that meet the needs of the industrial sector.

- 1.1. Liquid and semi-liquid packaging machine.
- 2.2. Wireless electrical load control.
- 3.3. Prototype for Touch Screen Automated Egg Incubator.
- 4.4. Satirizing booth.
- 5.5. Arduino CNC prototype.

TSU Mechatronics Automation area



System prototypes.

1. Liquid packaging production line.
2. Gear shaper.
3. Automatic parts separator by color.
4. Potato washing machine.
5. Filling a tank.

TSU Information Technologies Multiplatform Software Development area



Internet of things prototypes.

1. Clothing store embedded system.
2. Comprehensive system for the control of patients in a treatment center for self-destructive behaviors.
3. Sales platform (Cream shop).
4. Medical office adjacent to pharmacy.
5. Embedded system (shoe store).
6. Membership control system for health and fitness club.



Conclusions

1. Strengthening of specializing, transversal and investigative skills linked to formative research.
2. Project-Oriented Learning Binomial and coupled with the scientific research process, allows to create new knowledge and provide solutions to needs or problems of the local business or industrial sector.
3. At the same time, the planning capacity is deployed (what will it investigate).
4. The identification of professional or productive sector problems.
5. Understand the scientific process that will allow you to guide your investigative efforts.
6. Display cognitive abilities to analyze and interpret information.
7. Work collaboratively.
8. Reflect on their own learning.
9. The accompaniment and influence of the teacher-researcher in the production of science and technology must be directed along two key paths:
 - 9.1. The instrumentalization of teaching-learning strategies as a path of practical training for the development of research skills.
 - 9.2. The installation of spaces where investigative skills are exchanged and shared bidirectionally between experts and novices.



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