

AN INTEGRATED THEORETICAL-PRACTICAL EXPERIENCE IN THE PRODUCTION ENGINEERING COURSE: PARTNESHIP UNIVERSITY-ENTERPRISES

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Abstract - Several micro and small enterprises manage to improvements in their productive system aiming at increasing quality and efficiency of their production line. However, high costs of consulting services for the accomplishment of this sort of project, enables this alternative for most of them. The likelihood of integrating the productive sector with the academy ensues as a solution to these enterprises which need a rise in competitiveness in a everyday more daring market. On the other hand, universities are trying to adopt new pedagogical approaches with the purpose of gathering high level of theoretical knowledge with their practical application. Thus, collaboration programs with the partnership between teaching and research institutions and productive sector organizations, fills up gaps and enhances the theoretical-practical link. The article purpose is to show the experience that is currently being developed in the subject "Method Engineering" of Production Engineering Course of CEFET/RJ.

Index Terms - academical experience, engineering education, partnership university-enterprises, production engineering,

INTRODUCTION

On more and more globalized markets, the enterprises are searching for technological innovations as a differential that ables then to be more competitive. This importance is highlighted by the necessity in obtaining improvements on the existing products quality, on new products and services, end on the processes improvements.

Although, projects and studies to implement actions that can optimize and develop do not receive the necessary importance or are considered expensive for Brazilian companies, particular small and medium ones.

By the other side, the universities are looking to adopt a new pedagogic approach in order to ally high level theoretical knowledge to their practical application. There so,

collaboration programs that involves the partnership between teaching and searching institutions with productive sector organizations will complement this needs, making stronger the link between theory-practice.

During the XIX ENEGEP- Encontro Nacional de Engenharia de Produção, held on Rio de Janeiro in 1999, was proposed by SEBRAE the approach between universities and small and medium enterprises aiming to develop professionals that can be more capable, experts and conscious about the importance of this enterprises for the country's improvement.

Thought this partnership between SEBRAE and ABEPRO, the Engineering Production courses were invited to present projects that look to improve the students graduation and, at the same time, promote the development of this small and medium enterprises attended by SEBRAE.

The receptivity to SEBRAE proposal was excellent and there were presented 15 projects, including a project to form Centers of Technical Assistance on Engineering of Methods presented by CEFET/RJ.

The objective of this paper is to show How this project is going on, telling the experience that have been being developed on the Engineering of products subject for the 5^o period of the Engineering of Production Course.

This project, started March 2000, has been having excellent results and a big acceptance and support by the local entrepreneur.

PROJECT DESCRIPTION

Objective

The general objective of the project to form Centers of Technical Assistance on Engineering of Methods is to narrow the channel of practical and theoretical knowledge by developing improvements on the productive systems of the micro, small and medium companies on several industry sectors, elaborated by students with the technical supervision of CEFET/RJ teachers.

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Partners Main Functions

SEBRAE/RJ's competencies:

- Make the interchange between the enterprises and the universities;
- Coordinate the Project.

CEFET/RJ's competencies:

- Technical orientation;
- Establish Project route.

Enterprise's competencies:

- Provide the proper installations, allowing visits for the projects development;
- Provide the necessary informations.

Student's competencies:

- Develop the project, thought raising informations and visiting company's the installations;
- Inform SEBRAE/RJ, CEFET/RJ and the enterprise about how the works are going on and the difficulties they are facing;
- Elaborate and present a final report to the enterprise and to SEBRAE using institutional resources if necessary, in some pre-established place.

Project Steps

To the project development four basic steps must be accomplished: (1) Project's Planning and development; (2) Report issue; (3) Report analyses; (4) Experiences valuation.

(1) Project's Planning and Development

Essential step when will be defined the work routes, actions, adaptations and necessary alterations to get to the better results.

The students that will work on the project receive orientation about: professional behavior before the visits; possible difficulties and how to pass trough them; and each one's role – SEBRAE/RJ, CEFET/RJ and the enterprise. This are environmental activities held on class room lectures.

Parallel to this, the work times are been defined, formed by the students, that will act on the enterprises.

With the number of work groups, should begging a selection process in the companies. SEBRAE/RJ, represented by the Regional Development Agency, selects and invites the enterprises to participate to the project, booking a formal meeting where the entrepreneur will receive all the informations regarding the project. The invited enterprises are SEBRAE/RJ clients. This facilitate the work times access to the enterprises informations and installations guaranteeing a quick raise of the necessities.

Afterwards will start the companies visits. On the first visit, the work times are accompany by the project coordinator to a first presentation, installations familiarization, and to raise informations about company's necessities and difficulties. This accompany will facilitate the coordinator decisions during the project.

The orientations meetings are periodical between the work times and the orientator teacher . The doubts about directing the application of the knowledge learned on the classroom on the productive sector will be orientated on this step of the project.

(2) Report Issue

The report will be done by the students, under the teacher orientation and based on the informations and observations raised during the visits to enterprises installations.

It's structure follows a route pre-established between the teaching institution and SEBRAE/RJ.

(3) Report Analysis

The presentation seminary will happen on the classroom, in a pre-establish date, in order to allow the student to explain to their colleagues the results and to develop their expression skills. On this moment, the work times will delivery the final report to the orientator teacher, that will set a meeting with SEBRAE/RJ coordinator in order to analyze the material they received.

Latter, they will book visits with the entrepreneur to give them the final report. The project coordinator accompany this visits to supply the entrepreneur with further necessary informations.

(4) Experiences valuation

The project evaluation will be realized trough a questionnaire with the entrepreneur. Parallel will happen a evaluation made by the students.

The results from this evaluations will be published on event's seminaries congregating all partners (CEFET/RJ's students and teachers, SEBRAE/RJ coordinators, and enterprises representatives).

Steps of the Project and Schedule of Activities

The steps of the project are: Planning; Groups definition (work times); Environmental; Enterprises selection; Formalization meeting; Visits; Orientation meetings; Project presentation seminaries; Final report analyze; Entrepreneur report release; Evaluation; Results presentations seminaries.

The Figure 1 shows the steps of the project and the Figure 2 presents the schedule of activities.

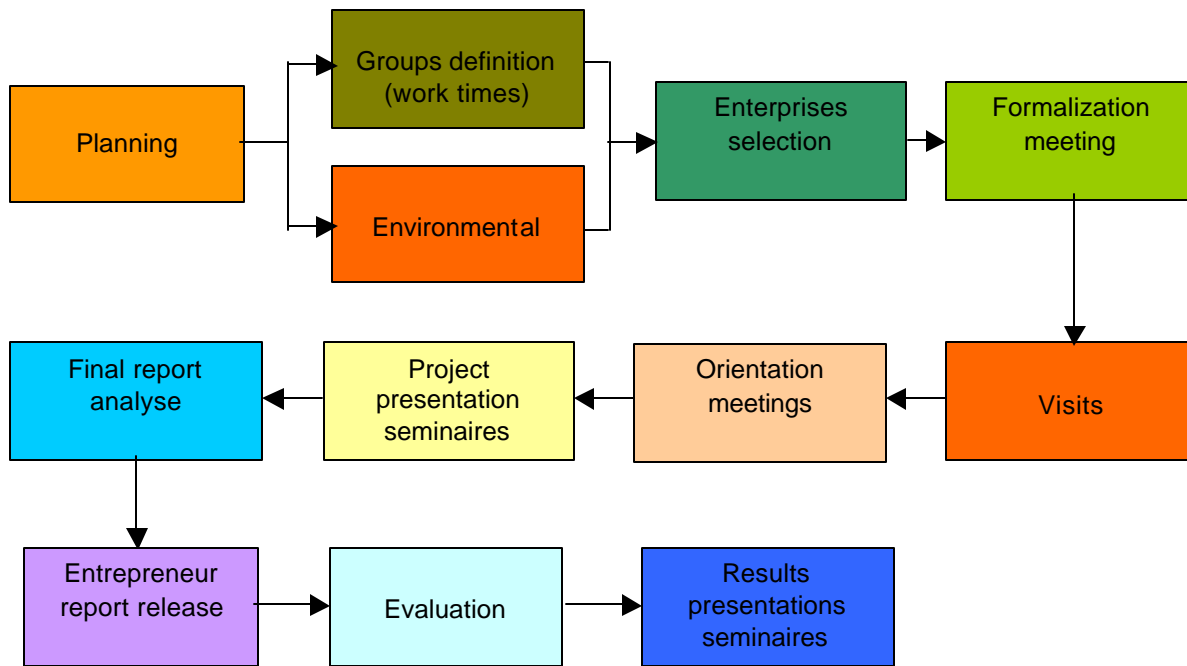


FIGURE 1
STEPS OF THE PROJECT

ACTIVITIES	WEEKS																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Planning	█																			
Environmental	█	█																		
Works groups definition			█	█																
Enterprises selection		█	█	█																
Formalization meeting					█															
Visits																				
Orientation meeting																				
Classroom presentation of the project																				
Report analyse																				
Report delivery to the entrepreneurs																				
Evaluation																				
Final presentation of the results																				

FIGURE 2
SCHEDULE OF ACTIVITIES

PROJECT PROCESS

The project began on March 2000, when the subject Engineering of Methods began to be given, which correspond to two credits (01 class-hour and 02 practical class-hour).

The following chart presents the number of students that have this subject, as well as the number of work groups that developed projects in enterprises indicated by SEBRAE/RJ, and the average of expected visits to the integralization of the project, in each period of class. We should highlight that

some groups decided to develop their projects on their own work places .

TABLE I
NUMBER OF WORKS BY SEMESTER

	1° semester 2000	2° semester 2000
Number of students that did the subject	25	51
Total number of times formed	09	12
Total number of times that developed projects in enterprises indicated by SEBRAE/RJ	06	06
Average of expected visits	06	06

BENEFITS

As a benefit, as to say, positive results observed until now :

- Students interest and motivation in applying the theoretical teaching they absorbed.
- Receptivity, support and interest by the entrepreneurs assisted by SEBRAE/RJ.
- Schedule to develop the project related to the subject "engineering of Methods" done.

The benefits we expect until the end of the project:

- perspective to continue the jobs on the enterprises.
- The formation of the center of technical assistance of SEBRAE/RJ with CEFET/RJ STUDENTS.
- A bank with the projects developed that will act as a bibliographic support for future works on this area.
- Positive evaluation by the entrepreneurs of works and projects, SEBRAE/RJ technical staff and CEFET/RJ students and teachers.
- Students professional development.

FURTHER STEPS OF THE PROJECT

Due to the excellent results, inclusive with the local entrepreneurs, this project could be enlarged to embrace other subjects of the Engineering of Production course, not only be restricted to engineering of methods. The new subjects, in a first moment would be Ergometrics and Maintenance Management.

There so, instead of the Center of Technical assistance in Engineering of Methods, will be implanted a laboratory ready to absorb several knowledge areas from Engineering in Production. We are talking about the Production Management laboratory to be installed on CEFET/RJ, with the following functions:

- Professional development of the student from CEFET/RJ.
- To have the student close to the market.
- Improve and increase the student knowledge about the Brazilian companies dynamics.
- To make possible a better interaction between CEFET/RJ and the productive sector.

- To get projects in enterprises, using academy methodology, that can be developed on the Junior enterprise on CEFET/RJ.
- Define the critical point on enterprises productive process.
- To narrow the theoretical and practice knowledge.
- To create on the micro, small and medium companies the interest about the engineering of productions professional.
- To a center of competitive intelligence in witch regards Engineering of Production, maintaining a link between associations, universities and other institutions.

The laboratory we refer will count with SEBRAE/RJ support, expecting to star functioning during this year.

CONCLUSIONS

The partnership that have been held between CEFET/RJ and the productive sector, with SEBRAE/RJ's and ABEPRO's support, have been showing very positive results.

Once the companies demands technological knowledge and the universities are sources of this kind of knowledge, the search for a bigger interaction between the parts is a target looked by all countries. Particularly, in Brasil, experiences of this nature are very recent and just now the results starts to make any sense.

The partnership that have been made between CEFET/RJ and SEBRAE/RJ with ABEPRO support is an example that have been showing very good results, making that the initial proposal of the center of technical assistance on engineering of methods area were enlarged to the implementation of the laboratory of Production Management embracing several areas of knowledge on Engineering of Production.

This innovate experience, that aims to ally the theoretical knowledge to the practical applications, has been showing that a closer relationship between academy-enterprise, could generate better benefits for all partners, contributing for a better professional development and, at the same time, to the development of the productive capacity of the country.