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# *La formación laboral e investigativa a través del vínculo Universidad – empresa Labor and research training through the university – productive centers link*

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**Resumen:** La presente investigación se realiza en la Facultad de Construcciones de la Universidad Central Marta Abreu de Las Villas, y la sede universitaria Cayo Santa María, Cuba, en vínculo con la Empresa Constructora de Obras para el Turismo Cayo Santa María. Tiene como objetivo exponer los resultados de la vinculación Universidad – empresa para la formación de un profesional competente, creador, y, con ello, contribuir a la enseñanza de la arquitectura, la ingeniería y la licenciatura en esta especialidad.

**Palabras clave:** Formación laboral; Relación Universidad - empresa; Práctica profesional; Formación integral

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**Abstract:** This research was carried out in the Faculty of Constructions of the Central University Marta Abreu of Las Villas, and the municipal university in Cayo Santa María, Cuba, which has links with the Construction Company of Touristic facilities in Cayo Santa María. Its objective is to expose the results of the University - enterprise link for training a competent, creative professional, and contribute to the teaching of architecture, engineering and the specialty.

**Keywords:** Labor training; University -enterprise relationship; Professional practice; Integral formation

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**Abstract:** The present investigation is carried out in the Faculty of Constructions of the Central University Marta Abreu of Las Villas, and the university headquarters Cayo Santa María, Cuba, in connection with the Construction Company of Works for Tourism Cayo Santa María. Its objective is to expose the results of the University - company linkage for the formation of a competent professional, creator, and, with this, contribute to the teaching of architecture, engineering and the degree in this specialty.

**Keywords:** Job training; University - business relationship; Professional practice; Integral formation

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## **Introduction**

The breakthrough achieved in all areas of human development demonstrate that in university education, construction majors need excellence in training the masons; that is to say, they require comprehensive training as professionals that contemporary society needs,

hence, they must reach a level of mastery of the most advanced sciences and technologies to later apply that knowledge in new situations, in order to become transforming agents who will contribute to the solution of problems in a creative way.

(...) The recognition of Higher Education as a transcendent educational process, is determined by the purpose of responding to changes in the complex globalized world in which we live, and consistent with the consideration that it constitutes a space of social and intentional appropriation of culture university, through social relations of a formative nature that develop among subjects, as a process of cultural management that leads to the sustainable transformation of reality (Fuentes, 2009, page 181).

University majors have, among other objectives, to achieve a close link between higher education, production and services and, with it, a strong interrelation between teaching, research and production, and the consolidation and development of teaching units, and labor institutions to train university students in each territory of the country that requires it. As premises for this transformation, we had the experience gained in the development of production practices, and the establishment of a network of teaching units, recognizing the need to enhance both the labor and research, vital components in the educational process.

The growth and strengthening of the link between the University and the productive centers has constituted one of the central themes of the scientific -technological policies in Latin America in the training of future professionals.

Although various authors and regional and international organizations estimate the 70s of the last century as the period of the interrelation of both sectors, it was in the mid-80s that in several countries of Latin America began an awakening that facilitated the linkage.

In Cuba, since 1959, the curricula of university majors are designed based on the University- productive centers interrelation, and the Faculty of Constructions of the Central University Marta Abreu of Las Villas has been present in every place of constructive development of great magnitudes such as the social works in the 1970-1980, the Nuclear Power Plant of Cienfuegos (1988-1992), the hotels in Varadero, Cayo Coco and, at present, the tourist pole in the northeastern cays of Villa Clara.

The University -productive centers linkage is conceived and carried out with the participation of the students of the last years of Architecture, Civil Engineering, Hydraulic Engineering, and Education, specifically the Construction Educators' major, of the Faculty of Construction of the Central University Marta Abreu of Las Villas, tutored by the professionals of the "Cayo Santa María" Construction Enterprise of Facilities for Tourism (ECOT in Spanish), the real estate company ALMEST, and the International Economic Association Bouygues Batiment International (AEI - BBI).

Through on-the-job work practice, it contributes to the development of competences for the performance of tasks and the execution of construction work, which guarantees the training of future professionals who appropriate a comprehensive general culture that allows them to develop socially, and apply knowledge, skills, values and actions to successfully face the problems that arise in daily life once incorporated to the working life.

Students learn to live together by staying for a period of five to six months outside the central residency, in a university institution located in the areas of the productive center and managed by the professors and students of each major, where the development of courses for workers, postgraduate improvement, scientific research and individual training are also fostered.

In this way the modern university is linked to the national reality and the territory in the solution of social problems, a role discussed in the words of Alegret (1997) when he proposed: "updating and completing the professional training of those who graduate from universities, constitutes a demand and a responsibility that the educational system has to face at present" (p.28).

The process of linking the University with the productive centers (in the case of the Faculty of Constructions through the university facilities in Cayo Santa María and the Construction Enterprise of Facilities for Tourism Cayo Santa María) promotes the training of teachers in the company through bilateral agreements, and comprehensive training of students by skilled and professional construction personnel that will train them to calculate the necessary materials, organize work, distribute resources, advice about technical aspects, manage and control resources, among others.

The process is based on a procedure of mentoring by the company's specialists who are responsible for the execution of the different hotel and extra-hotel projects built in the area, with an integral education for the student. Teachers and specialists agree that there is a quality education in student learning and a comprehensive training process for the future professional.

The objective of this research work is to present the results of the university - productive center relationship for the training of a competent professional. A population of 164 students from the last years of the majors of the Faculty of Construction of the Central University Marta Abreu of Las Villas: 42 students of the fifth year of the Architecture major, 80 of the fourth year of the Civil Engineering major, 36 of fourth year of Hydraulic Engineering, and five of third year of the major Educators for Construction.

### **Development**

During the last years the advance experienced by the technological development and its impact in almost all the sectors of the society has revolutionized most of the activities, for that reason the students of the construction majors require high professional preparation, a continuous training and a constant link with experts of different disciplines. In that way the staff places knowledge, science and technology in prominent places on the scale of knowledge and intelligence, a necessity in all construction professions.

The accumulated, institutionalized and multidisciplinary knowledge required to search for solutions to the complex problems of the production and use of technologies is a fundamental heritage of the universities, so "the interaction or link between the University and the productive centers is an aspect not only desirable, but inevitable" (Plosky, 1995, p.23).

The differences between the culture of the University and that of the productive center are sources for the cultural growth of both institutions, each contributing what the other does not have. The University taxes reflection, analysis, scientific research, the ability to identify the technological needs of the productive center and contribute to its technological development, while the productive center brings experience based on practical knowledge.

This relationship between productive centers and University materialized when the Construction Company for Tourism, since 2002, began executing the construction projects of the hotels of the tourist pole of the northern keys of the Villa Clara province, in which knowledge and insights proved essential to solve the problems they faced to adapt to the constant changes and achieve business success. The challenge included:

- Capacity for 60 students at the residency.
- Conference room for 60 people.
- Computer lab with internet service connected to the intranet of the Central University.
- In the first semester the fifth year of the Architecture major was incorporated.
- The conditions were created so that the greatest possible number of theses could contribute to the solution of specific problems of the productive center.
- Study schedules were planned for the mornings and work scheduled for the afternoon.
- Categorization of the professionals of the productive center so that they can be advising professors of the University, and deliver lectures, talks and teaching conferences.
- Selection of a tutor of the productive center and a tutor of the University for the development of the thesis. The tutor of the productive center contributed to establishing the problem that required solution, and the practical knowledge and information required for it. The tutor of the University provided the theoretical and methodological framework.
- In the second semester, students of the fourth year of Civil Engineering, fourth year of Hydraulic Engineering, and third year of the major in Construction Educators were incorporated to the project.
- The residency and the university center assimilated not only students of Architecture, Civil Engineering, Hydraulics Engineering and Construction Educators but also other majors, depending on the needs of the productive center.
- Labor practices were carried out mainly in the works of the International Economic Association, but later they extended to all areas of the productive center.

- The residency and local university center became the sites for the coordination of scientific research of high level to solve problems of scientific difficulty.
- The university center there also backed up offers of postgraduate courses, diploma courses, master's courses, among others that the productive center need for its development.

On the basis of these conceptual ideas, on September 11, 2006, the Cayo Santa María university center began operating; it was officially inaugurated on February 17, 2007 by the Minister of Higher Education Ph.D. Juan Vela Valdez, who wrote in the visitor's book:

Today is a very happy day for Cuban higher education, for the Revolutionary Armed Forces, for the Revolution. This dream, made reality, makes possible the integral education of the professionals of the Central University Marta Abreu of Las Villas. My congratulations to all those who have made this work possible, to its constructors and technicians, to the professors, students and managers.

At this moment, the university center has more than 50 part-time professors categorized as teachers and tutors of the on-site work experience. The students remain at the headquarters from Monday to Friday. The teaching is carried out in the morning session, from Tuesday to Friday, from 8:00 am to 12:05 pm; the work practice is carried out in the afternoon session, from Monday to Thursday, from 1:00 pm to 4:00 pm in the projects that take place in the tourist center Cayo Santa María. University cultural and students' life activities are carried out based on the plan conceived in the educational project each year upon admittance to the university center.

In ten years of work the university center has trained 1183 professionals of the different majors of the faculty of Construction: in Architecture 420, in Civil Engineering 575, in Hydraulic Engineering 87, in Education, specialty Construction 5; 121 foreigners of 34 countries; of other faculties of the Central University Marta Abreu de Las Villas 73 students have graduated *in situ*; from the Universidad de Oriente, the university center has graduated 21 Architects, and 2 students of the University of Camagüey.

The university center in Cayo Santa María has reported benefits for the University that can be summarized in the following aspects:

- Students and teachers know the real problems of the productive center and the projects in execution.
- Scientific research and professional training respond to the real needs of the productive centers.
- The prestige of the University is enhanced by enhancing the quality of graduates, professors and created science.

For the productive center the link with the university center has brought as results:

- A better and greater access to improvement by its professionals, managers and workers in matters of business interest.
- Practice has trained students to help directors, leaders and technicians in the solution of everyday problems.
- The productive center temporarily summons trained personnel for the investigation and solution of the main problems.
- Elevation of technological and organizational innovation.
- Solution of problems of great impact, of scientific and technical difficulty based in interdisciplinary research with scientific leaders of the University.
- Incorporation of new theoretical knowledge into business knowledge.
- Gradual development of an innovative culture in the organization, and of the system of science and technological innovation.
- Early development of knowledge management.
- Elevation of the quality of the professionals of the productive center who can investigate together with the students, develop postgraduate studies, systematize and consolidate their knowledge when acting as advising professors.
- Greater sense of pertinence and commitment to the productive center which leads to spiritual and moral satisfaction.

Main contributions of research and activities carried out by the university center:

- Mitigation measures for the cracking of the Bungalows (extensive to the FORSA system).
- Bioplastic viscosity modifier of national authorship.
- Low carbon cement.
- Cayo Santa María exhibition site to measure in real conditions the durability of the materials used in the constructions.
- Accreditation of the laboratory materials of the company.
- Training of the specialists of the company in undergraduate, postgraduate, masters and doctorate courses.
- Solution of technical problems in construction sites.
- High value technical services: pathologies of materials, design of special materials, evaluation of materials, development of technical standards.

The university students' life and cultural activities enhance the work developed to educate future professionals by strengthening the links with the educational community in which they live, achieving an active participation in their political, social, labor and cultural activities. Among these activities are:

- Participation in morning or evening meetings held by the residency managers and the productive center on a weekly basis in the institution or in the working area, in political events convened by the company in salutation to important national or international dates, and in voluntary work in the projects carried out in the tourist pole, the productive center and the university center.
- Exhibitions of work in the events and forum of the company.
- Sports meetings and cultural activities with the workers and specialists of the works where the students develop their labor practices.
- Visits to monuments and historic centers.

All these benefits result in the training of a more competent professional and that science is put in function of the solution of the real problems of society.

## Conclusions

Linking the University with the productive centers through the work of the university centers contributes to enhancing the quality of the teaching of architecture, engineering and training a professional researcher who is competent, creative, and possesses human and ethical values.

The university center of Cayo Santa María constitutes a great strategic place for granting an opportunity for the productive center to increase performance and move along the paths of business improvement.

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