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Practical training through University-Company integration: principles, scientific ideas and stages

La formación práctica a través de la integración Universidad-Empresa: principios, ideas científicas y etapas

Formação prática através da integração Universidade-Empresa: princípios, ideias científicas e etapas

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ABSTRACT
The practical training of the university student is of utmost importance for the performance of the profession. In this training, the University-Company integration is essential, which has constituted a fundamental interest in the different careers of Higher Education in the world and in Cuba; this shared work has taken a boom in contemporaneity given the transformations in the economic-social sphere. Practical training is an essential component of the pedagogical process and every day it demands more from the support of both institutions. The objective of this work was to support a system of principles, scientific ideas and stages that intervene in the student's practical training, through the University-Company integration in the Bachelor of Education careers. Mechanics and Education. Electrical from the University of Pinar del Río "Hermanos Saiz Montes de Oca", constituting this the main result of the investigative process. The research was carried out on a dialectical-materialist basis, in which theoretical and empirical methods such as historical-logical, inductive-deductive, analysis-synthesis, modeling, system approach, observation, documentary analysis and interview were used, which allowed a theoretical and practical study of the educational reality to arrive at this scientific result, which contributed to the preparation of students to face the professional problems demanded by the field of action of each career. It also made it possible to integrate theoretical knowledge into practice, as well as the development and consolidation of professional habits, skills and values, so that when they graduate they show adequate professional performance.

Keywords: company; practical training; integration; study practices; work practice; University.

RESUMEN

La formación práctica del estudiante universitario reviste suma importancia para el desempeño de la profesión. En esta formación es imprescindible la integración Universidad-Empresa, lo que ha constituido un interés fundamental en las distintas carreras de la Educación Superior en el mundo y en Cuba; esa labor compartida ha tomado auge en la contemporaneidad dada las transformaciones en la esfera económico-social. La formación práctica es un componente esencial del proceso pedagógico y cada día demanda más del concurso de ambas instituciones. Este trabajo tuvo como objetivo sustentar un sistema de principios, ideas científicas y etapas que intervienen en la formación práctica del estudiante, mediante la integración Universidad-Empresa en las carreras Licenciatura en Educación Mecánica y Licenciatura en Educación Eléctrica de la Universidad de Pinar del Río "Hermanos Saíz Montes de Oca", constituyendo este el principal resultado del proceso investigativo. La investigación se realizó sobre una base dialéctico-materialista, en la cual se utilizaron métodos teóricos y empíricos tales como: el histórico-lógico, el inductivo-deductivo, el análisis-síntesis, la modelación, el enfoque de sistema, la observación, el análisis documental y la entrevista, que permitieron realizar un estudio teórico y práctico de la realidad educativa para arribar a este resultado científico, que contribuyó a la preparación de los estudiantes para enfrentar los problemas profesionales que demanda el campo de acción de cada carrera. También posibilitó integrar los conocimientos teóricos a la praxis, así como el desarrollo y consolidación de hábitos, habilidades y valores profesionales, de manera que cuando egresen manifiesten un desempeño profesional adecuado.

Palabras clave: empresa; formación práctica; integración; prácticas de estudio; práctica laboral; Universidad.

RESUMO

A formação prática do estudante universitário é de extrema importância para o desempenho da profissão. Nesta formação é essencial a integração Universidade-Empresa, que tem constituído um interesse fundamental nas diferentes carreiras do Ensino Superior no mundo e em Cuba; esse trabalho compartilhado teve um boom na contemporaneidade dadas as transformações na esfera econômico-social. A formação prática é um componente essencial do processo pedagógico e a cada dia exige mais do apoio de ambas as instituições. O objetivo deste trabalho foi apoiar um sistema de princípios, ideias científicas e etapas que intervêm na formação prática do aluno, através da integração Universidade-Empresa nas carreiras de Licenciatura em Educação Mecânica e Licenciatura em Educação Elétrica da Universidade de Pinar del Río "Hermanos Saíz Montes de Oca", constituindo este o principal resultado do processo investigativo. A investigação desenvolveu-se numa base dialéctico-materialista, na qual foram utilizados métodos teóricos e empíricos tais como: o histórico-lógico, o indutivo-dedutivo, a análise-síntese, a modelação, a abordagem sistémica, a observação, o documentário a análise e a entrevista, que permitiram um estudo teórico-prático da realidade educacional para se chegar a esse resultado científico, o que contribuiu para a preparação dos alunos para enfrentar os problemas profissionais exigidos pelo campo de atuação de cada carreira. Também possibilitou a integração de conhecimentos teóricos à prática, bem como o desenvolvimento e consolidação de hábitos, habilidades e valores profissionais, para que, ao se formarem, apresentem um desempenho profissional adequado.

Palavras-chave: empresa; treino prático; integração; práticas de estudo; Prática de trabalho; Universidade.

INTRODUCTION

Practical training, in its historical course, has been enriched by the work of the University, which together with other scientific institutions has actively participated in the production of knowledge and scientific-technical development, associated with the training process of professionals and to a certain extent, it has relied on the company to develop certain actions of the pedagogical process.

In recent years, the link between the two institutions has been strengthened in the practical training of university students and at present there are various investigations on the subject of the University-Company relationship, linking, cooperation and integration, both nationally and internationally. It is appreciated that different terms are used to name the referred process; However, the purpose is the same: to take advantage of the educational potential offered by the company in the training of professionals (Ferreira; Mena, JA; Acosta and Mena, JL, 2019).

At this time, the management of research results and the production of knowledge is on the side of companies, scientific centers, technology parks, among others (Mena, JA, Aguilar, YE and Mena, JL, 2019).

In the literature examined on this subject, it is revealed that universities have the scientific potential for the provision of technological and research services and, in the case of developed countries, they have the means and materials necessary to also develop teaching, carry out processes productive and of services with a high demand; However, this is not the state that can be seen in many of the universities in developing countries, mainly in Latin America and Cuba, which is not the exception, where a certain level of lack and obsolescence of the study material base is manifested. , making it difficult to develop the practical training of students, which constitutes a basic element in knowledge, know-how to do and know-how to be in university professionals.

On the other hand, the international bibliography presents the University-Company link, closely linked to the National Innovation Systems.

The subject reaches such relevance that numerous national and international authors have investigated it, standing out Abreu and Soler (2015); Igartua (2017); Mena, JA, Aguilar, YE, and Mena, JL (2019); Mena, JA and Mena, JL (2020); Aguilar, YE, Mena Lorenzo, JA and Ramos, G. (2021), among others. The aforementioned researchers come to locate the company as an essential context to achieve integrality in the training of professionals.

According to Ferreira, Mena, JA, Acosta and Mena JL (2019), "this new vision of university education is only possible from shared professional training models, in which the university and the company constitute the two essential contexts throughout the professional training cycle" (p. 606).

These elements are patented by the Ministry of Justice. Official Gazette of the Republic of Cuba. Decree 364 (2020), which highlights the responsibility of production and service entities in the training of higher-level professionals.

Despite this, weaknesses that the training process of university professionals still presents are recognized. In the specific case of the Bachelor of Mechanics Education and Bachelor of Electrical Education careers, from the Faculty of Technical Sciences of the University of Pinar del Río "Hermanos Saíz Montes de Oca", practical training presents a group of limitations, detected through from an exploratory study carried out on educational practice, based on the observation of activities, the documentary review and the interview with professors

from the Department of Mechanical, Electrical and Construction Education, as well as specialists from companies in the territory.

It is found that the practical training of future teachers required by Technical and Professional Education (ETP) in the province of Pinar del Río in the aforementioned careers, is being developed without efficiently taking advantage of the potential that companies offer to develop there, among other activities, study practices and work practice; Issues that hinder the proper mastery of the modes of action that characterize their professional activity, as stipulated in the Study Plan for both careers.

In ETP, the Teaching-Learning Process for the training and development of professional skills is carried out through practical teaching, which is considered a main component of the professional training process. It constitutes an important reference for technical careers in university education, and in this context, it is assumed as practical training.

In this order, the concept Company includes the entities of production, services and educational institutions where students carry out academic, labor, research and extension activities; while teaching activities are also considered services that are provided.

From this point of view, the article's main objective is to support a system of principles, scientific ideas and stages that intervene in the practical training of the student, through University-Company integration in the Bachelor in Mechanical Education and Bachelor in Electrical Education careers from the University of Pinar del Río "Hermanos Saíz Montes de Oca".

MATERIALS AND METHODS

This descriptive research was carried out in the Bachelor of Mechanical Education and Bachelor of Electrical Education careers, of the Faculty of Technical Sciences of the University of Pinar del Río "Hermanos Saíz Montes de Oca", in the period between September of 2018 and September 2019. A population of 29 students from first to fifth years of the aforementioned careers, eight professors from the teaching department and six specialists from companies in the territory was used: Electronic Components Company "Ernesto Che Guevara", Integral Services Company Automotive and Construction Materials Company of the Siete Matas Industrial Zone.

The research process was produced following the dialectical conception of research that has the dialectical-materialist method as a methodological basis and theoretical and empirical methods were used. The theoretical methods used were:

The historical-logical: it made possible the study of the theoretical-conceptual framework on the practical training of students through University-Company integration in the careers described above, from different theoretical positions.

The inductive-deductive: facilitated the analysis of the subject, moving from the general to the particular and the singular, determining what is essential in the practical training of students through University-Company integration.

The analysis-synthesis: allowed to identify, organize, plan, contextualize and summarize the principles, scientific ideas and stages that must be considered for the development of the practical training of students in University-Company integration.

The modeling: made it possible to carry out the abstractions and generalizations that are

manifested in the projection of the system of principles, scientific ideas and stages.

The system approach: it was used in the integration of research results, as well as in the establishment of interdependence and subordination relationships of the system of principles, scientific ideas and stages of practical training in University-Company integration.

In the empirical investigations, the following were used:

The observation: it was carried out to practical training activities to verify its current state in the University-Company integration, in the aforementioned careers.

The documentary analysis: The Study Plans E (MES, 2016a), (MES, 2016b) of both careers, the documents of the Ministry of Higher Education (MES, 2018), as well as the work plans and reports of academic results were reviewed, allowing to verify to what extent and how the FP of the students is developed under the conditions of University-Company integration.

The interview: allowed to obtain valuable information, from teachers and specialists, about the development of practical training in University-Company integration.

RESULTS

This section presents the results obtained with the application of theoretical and empirical research methods. From the study carried out, the actuality of the problem was verified; It was also found that the current and future practical training of university students tends more and more to integration with the productive sector and services, as a requirement that society itself is demanding.

At least in the scientific literature reviewed, it was perceived that there are theoretical foundations that in the pedagogical, didactic and methodological order contribute to practical training in University-Company integration, but that stimulate to be enriched with new proposals, which led to the sustenance and contextualization of a system of principles, scientific ideas and stages by which the process in its development must be governed.

It was derived from the analysis that the treatment of the subject related to practical training in University-Company integration constitutes one of the essential pillars in the training of the qualified workforce in all sectors of society; in this case, with emphasis on the Education sector, from which the point of interest of this research emerged.

In the case of the empirical study, observation was applied to 14 activities in the study practice and the work practice of the students. It was found that the actions are undertaken without considering the integrated actions of the teaching department with the company's specialists. It was also corroborated that not all the potentialities offered by production entities and services are used for the professional training of future graduates of the Bachelor in Mechanical Education and Bachelor in Electrical Education careers.

In the same way, it was appreciated that there is a gap between the treatment of professional career problems and those of the business scenario, not following the appropriate methods for their solution, nor the stages through which the training process must go through with the assistance of the university and the company.

On the other hand, from the documentary analysis, it was found that the practical training modalities, within which study practice and work practice stand out, are

registered in the different study plans and normative documents of the careers, but the didactic-methodological indications for its development are not sufficient, since its procedural nature and its peculiarities in the University-Company integration are not recognized.

In the methodological work plans of each of the year's groups and in the academic results reports, little systematicity and monitoring of the diagnosis and the results that are being achieved in practical training in University-Company integration were found. There are not sufficient extension activities and actions included as an integral part of the work practice, in a way that favors the professional, social and humanistic development of the students.

It is appreciated that the evaluation is not conceived as a process where full-time and part-time professors and specialists representing the Company participate; Its realization in the University predominates, when it must be carried out, preferably, in the work entity itself where the practical training was developed.

Regarding the interview with teachers and specialists, the results of this instrument confirmed, based on the criteria of the majority of those interviewed, that FPin University-Company integration is being developed without following a systemic and integrating order of actions and operations that allow students to prepare adequately for the direction of the ETP process in the specialties of the Mechanical and Electrical branch, of this subsystem in the school-company-family link and other factors of the community.

The preceding assessments reveal the need for change in the perceived situation and, consequently, a system of principles, scientific ideas and stages is proposed for the development of practical training in University-Company integration, in Bachelor's degrees in Mechanical Education and Bachelor's Degree in Electrical Education from the Faculty of Technical Sciences, at the University of Pinar del Río "Hermanos Saíz Montes de Oca".

Principles of the practical training process in University-Company integration

In this work, principles are considered as those elements that, as a result of the empirical verification of the manifestations found, in the context of both institutions and of the theoretical systematization carried out, constitute starting points and foundation to govern the integrated work of the agents that they intervene in the training process of future professionals who will work as teachers in the ETP.

In identifying these, the basic principles of Cuban Education, based on Pedagogy and General Didactics, Professional Pedagogy, as well as the principles of school-business integration were considered (Mena, JA, 2012). Without trying to replace them, or deny their validity, as long as they are taken as support, the complex, multifactorial and diversified nature of the process under analysis, required the realization of a new proposal that responds to the interests of practical training in University-integration. Company. In this sense, taking as a reference the principles of the practical teaching process of Welding, in the conditions of the teaching workshop of the productive entity, proposed by Acosta (2012), the following were contextualized and agreed upon:

1. Principle of the consensual nature in the actions carried out by the agents who participate in the practical training process

It considers the relevance of the role played by teachers, specialists and students, in the process of practical training in the conditions

of University-Company integration, as it considers the correlation and consensus of their interests and actions during the organization, planning, as essential. execution and control of the process.

It is required that the potentialities that some possess are available for the benefit of the others, so that they develop professionally and achieve the objectives proposed from the economic, productive, educational and training points of view, without distorting the social order of each one of them and the entity to which they belong; although in this process the specialist also becomes a teacher for the student.

2. Principle of teaching and learning by producing during the practical activities that take place in the company

This principle allows considering the professional problem as a dynamic element in relation to which teaching and learning are organized. It expresses the need to take advantage of the potential offered by the productive process in practical training, for the appropriation of knowledge, skills, habits and values by students, without changing their learning and production activity towards others that are not contained in the Professional model of the corresponding career.

It is feasible, from a conception of the process, that the content is structured in its dimensions: academic, labor, research and extension; In addition to the fact that in the search for a solution to the professional problem the object is transformed, that it is manifested through that content which the student appropriates from the relationship between the object and the subjects that participate in the process.

3. Principle of the relationship between teaching-learning methods and technological methods of production

This principle requires that; To learn the diverse and complex technological work methods used by the student, together with the methodology for teaching each technical subject, teaching-learning methods must be used that allow more than memorizations and mechanical reproductions of the content, the integration of the knowledge to offer the ideal technological path in solving the professional problem, based on a process of search, confrontation of points of view, decision-making, interpretations, as well as socialization among students, teachers and specialists who direct the process of practical training in the conditions of University-Company integration.

For their part, technological work methods become the content of the practical training process and their use will depend on the productive context where the teaching activities take place and will have their learning space in the socialization process that occurs between the subjects.

On the basis of this principle, the main methods of practical training used in the company are argued, such as: demonstration, observation, independent work and the method of training in productive professional activity.

4. Principle of the differentiated character in practical training in relation to the level of complexity of professional problems

It justifies the need to know the characteristics, not only of the subjects that participate in the process, but also of the various professional situations that arise, to then define from planning, how to proceed in teaching practical skills and in the solution of such professional problems.

During the practical training process, under the conditions of University-Company integration and due to the level of complexity of production and service problems, there are operations that at a certain stage may be carried out by students, and others by specialists in more preparation.

The principle considers the successive approximation to the complexity of the practical activity in the course of the company's production or services. In this sense, FP will require the development of skills so that in a progressive way, those who in a first period were not able to face the task, achieve it in a short or medium term.

From the principles addressed, the scientific ideas that support the practical training process in the University-Company integration are raised, based on the research results of Acosta (2012), being the following:

1. The practical training process in the University-Company integration requires the joint work of the company specialist with the professor of the teaching department

From there, the idea is reaffirmed that teaching requires foresight and planning. It should be possible to integrate the efforts of the specialist and the teacher, towards the achievement of any objective during the process. The capacity for organization, planning, execution and evaluation, to act as a whole in the training of the student, will be a distinctive feature.

In this idea it is evident that the process is distinguished by its contextualization in the conditions of production or services of the company, which in principle was not conceived with the purpose of developing activities of teaching in it, in the training of the student. The aforementioned process is developed immersed in the tasks of the company and, therefore, assumes its dynamics and is conditioned to its ends, from the reconciliation of actions.

This relationship is characterized not only by being participatory, but also by its cooperative and developer nature, which will promote instruction, education, training and development through activity, communication and interaction between the subjects who participate in this process.

For the development of practical training, the preparation of both professionals is basic, taking advantage of the strengths of one in the preparation of the other. The teacher has to know all the elements of the company, to be able to properly guide the students and, in addition, prepare theoretically and methodologically to guide the specialists.

The work of the teacher and the specialist is of utmost importance. The work of the latter fulfills objectives of a political-ideological, pedagogical and social nature; For this reason, it is vital the preparation that he achieves from his integration with the professor of the teaching department of the University, for the professional training of the students.

Through reciprocity in their work, the formation of aspirations and interests for the profession in the student is strengthened, which in turn allows the development of said motivations to be consolidated. The young person finds himself in contact with the content of real work, making the object of science coincide with the object of the profession; He is given room for responsibility and creativity, reducing monotony, issues that must be addressed through the collective work of the teacher and the specialist.

For this, it is appropriate to return to what is related to planning, assuming this as the projection of a plan of actions methodically organized to obtain a specific objective; in this case, the development of the practical

training process in the University-Company integration, as it is a necessity and must be carried out on an intentional basis.

2. FP in the company is developed from a successive approach to the complexity of the professional problem

One aspect that should characterize this idea is to achieve an adequate correspondence with the systemic performance of actions, both by the specialist and by the teacher and the student, that lead to the solution of the professional problem, so it cannot be seen as a isolated activity, but rather its end should allow the performance of other jobs of greater professional scope in the company, which are decisive in the production and service processes, from an integrating and generalizing perspective.

In correspondence with the above, the successive approach to the complexity of the professional problem is understood here as, the progressive transit of students through the different tasks of production and services, during practical training in the company, in the solution process of this. The aim is to achieve the systematization of the content, starting from the establishment of the links and dependencies of each of the practical activities, with the rest of the production plan, of services and with the objective itself.

Thus, the practical training process will have as its beginning and end the approach and solution of these problems in the real conditions of the production process, from the training point of view, without losing sight of the progressive approach to its complexity.

Attending to the educational purposes, the problems are ordered by their degree of complexity and precision of realization; They must be in correspondence with the physical conditions, knowledge, skills and habits of the students at the corresponding stage of teaching. In this work, the classification of professional problems according to the degree of complexity is proposed, in correspondence with (Acosta 2012) in:

a) Simple professional problems: they consist of simple production or service tasks, with a low degree of difficulty; Its solution does not require deep explanations or great effort in relation to what needs to be done and how to do it, since they focus on the fact that the operation to be carried out is unique or predominant and does not require any special preparation. For these reasons, they go through the familiarization, reproduction and application of some technical knowledge acquired in teaching activities.

From the training point of view, their purpose is, in principle, to develop skills in the interpretation of technical documentation, mastery of basic operations and the application of occupational health and safety measures in the company.

b) Professional problems of medium complexity: they have the characteristic that the tasks to be carried out require mastery of the main actions and operations that make up the work. The problems to be solved require the application of the knowledge, skills and habits of the profession, corresponding to that stage of practical training; They consist of several operations, so the student requires more preparation.

c) Complex professional problems: they include all operations in their different forms and connections. During their execution, students combine the operations studied and obtain, with greater solidity, the skills, habits and professional values necessary for the world of work. Solving these problems requires creativity, diligence and responsibility, among other factors.

Students are requested to have the ability to search for different solution variants, propose the technological steps to follow, select the tools, instruments, equipment and, in general, the necessary tools; they must show what they can do. To do this, in the preparation stage of the activity it is necessary to make a mental effort to look for something that is not directly available, be it new technical knowledge or procedures and methods, by means of which you can solve the problem independently and creatively.

The foregoing expresses that, in this context, a diagnosis of the starting level of the students is required, which includes knowledge of their needs and potentialities for mastering the different operations, which will allow knowing if they are prepared to reach the solution way of the professional problem.

3. The practical training is conceived considering the rotation by job positions and by company networks

In relation to this idea, it is proposed that job rotation consists of the transit of students through two or more jobs of the same level and technological and / or functional content. In this case, it is done with the purpose that they can appropriate the skills corresponding to each activity.

It is important to note that in the organization that is available in the company, if it is a single job, rotation can be implemented as well. It is then projected based on the operations and technological steps contained in the activity to be carried out, for which certain sites are created that can be considered other jobs, subordinate to the main position. How to proceed in this case will be explained later.

The job is conceived as that part of the production or service area established for each worker (or brigade), equipped with the necessary means to solve the different professional problems in their work environment.

To assimilate the process of practical training in the jobs, companies must meet certain conditions such as: material resources, means of protection, qualified personnel, convenient geographical location, variety of production and willingness to take on the task.

The most widespread forms of organization of practical training in company jobs are determined from the characteristics of those jobs. They are:

- **The practical training in a single job:** it is carried out in those cases in which the company does not have several positions, or they are not equipped with the equipment, devices, instruments, tools, materials and qualified personnel, essential for practical training, Through the performance of the task of production or services, which consists of the professional problem to be solved. This workstation is designed to carry out one or a small group of operations.
- **Practical training in several jobs:** the equipment, devices, instruments and tools used by the student can be used in the same activity or in a greater variety of jobs or operations. Each position fulfills a certain number of productions or services, which may be interrelated or independent.

Under these conditions, the practical training is organized by dividing the group and each subgroup is located in the available jobs, where they will receive instruction from each specialist responsible for the respective site and the teacher, depending on the task of production or services, which is used to deal with the content of the professional problem

of the career and / or subject in the case of teaching activities.

- **Practical training in a mobile workplace:** it is carried out by changing this place frequently within the company itself or outside it; that is to say, on site. For the transfer of students to the place of work, organizational and safety measures must be taken to the extreme, since in most cases they have to travel through different areas within the company's facilities or use some means of transport, if it is an external task. As in the previous typologies, if the group is large, it is subdivided and practical training is developed, by rotating each operation that contains the professional problem to be solved. The specialist and the teacher will mediate the actions and operations during the activity.
- **The practical training in the jobs of the company networks:** it manifests itself fundamentally in those activities or jobs of a certain company, even if it specializes in some technology; Others provide miscellaneous services, which reaffirms the need for the aforementioned rotation to provide a multipurpose training for students to insert themselves into today's world of work.

As a distinguishing characteristic, these companies generally have one or two jobs. In this way, to carry out the practical activities, the specialist and the teacher proceed to subdivide the group and establish the rotation by the tasks of the job, as established in the previous cases.

This idea, like the previous ones, offers the possibility of projecting the stages through which the practical training process in University-Company integration passes.

4. The practical training process in the company progresses through sequenced stages

By virtue of this idea, it must be stated that this process, when carried out in the dynamics of production or services under the direction of the specialist, with the methodological advice of the university professor, acquires different nuances from what traditionally occurs in the educational institution. It is about invigorating and tempering practical training in this context and its essence is that it is necessary to establish a successive and orderly order in the process.

To do this, the following question can be formulated: what is the sequential order of the practical training process in University-Company integration? Time is also a fundamental component of teaching theory, insofar as it imposes the limit on the term of duration of teaching, productive and service activities, which allows regulating the interactive process between those who teach and those who learn. The stages are explained below:

Stage I. Familiarization with the company and with the job position

This stage has the purpose of familiarizing students with the world of work and, in particular, for their stay in the company, where they will receive practical training activities; In addition, in this first stage they will solve some simple professional problems.

Familiarization, as its name implies, presupposes that the student gets to know the new environment in which he is inserted; But this, on the few occasions in which it is held, is limited to a reception by means of an informative meeting about the company and a brief tour of the facilities; With this procedure, the concept itself of the stage is marginalized; Familiarization must be seen

as a process and not in a simplistic way, the act of reception is a moment of this.

The insertion of students in companies for the development of the practical training process must be carried out in the most possible formal way; a meeting must be organized with the leaders of this entity, with the vanguard workers and with the personnel in general. In this contact, the directors will announce the name of the company, the number of workers, its corporate purpose, its meaning for the national economy and will also tell the glorious traditions of the entity and urge its continuation.

It must also be knowledgeable about the mode of operation, the areas, operations and tasks of production and services that workers face, as well as the materials and products used. It is necessary to sensitize students about the technical norms of operations and about safety and hygiene measures for the protection of the Environment and for human health as a producer of material goods and services, from their own workplace, considering this site as the fundamental cell of the process.

It is then about revealing those elements that can affect the health or safety of students and workers in general. The occupational risks they present must be evaluated: the tools, tool apparatus and machines used, the working environment, flammable elements, explosives and toxic substances. Safety risks will also be assessed: fall, entrapment, fire, electrocution, burns, explosion and radiation. In general, ergonomic work conditions must be considered.

The familiarization actions bring together the awareness of those who participate in the process and, especially, of the students about labor discipline, mutual help, individual and collective responsibility, so that the practical training process in the context of the company is developed with the required quality. It is important to apply the systematic evaluation, concluding with a partial evaluation and with the criteria of passing for the next stage, by the specialist and the teacher, also giving participation to the students. It is recommended that it be done in-house.

Stage II. Development aimed at the treatment of professional problems in practical training in University-Company integration

This stage is the longest and contemplates the remaining period of the implementation of the practical training modalities, highlighting the study practice, the work practice and the classes of the different subjects, planned in correspondence with the tasks of the production plan or of company services. Its objective is to solve professional problems and, with this, consolidate the knowledge, skills, habits and values in the students, for the direction of the ETP Process in the polytechnic schools of the territory, mediated by the methodological actions of the specialist and the teacher. It should be noted that this article includes the polytechnic school within the company concept and the tutor is also considered a specialist.

Practical training in University-Company integration demands a renewed methodological action of teachers and specialists and requires an operational adaptation, flexible, contextualized to the technological and socio-occupational reality of the world of work. The fundamental content of the practical activity changes in this scenario and the diversity of jobs means that the organization becomes one of tutorial attention: individual or by subgroups, in which rotation by jobs and by business networks.

To effectively conceive practical training activities, the conditions of the production or service process should not be hindered, so in this context it is not convenient to plan it in

the style of the University teaching department. The previous considerations force us to think about it in a way that promotes essential changes in the functioning and that it assumes in its epistemological bases the relation production-services-practical training activities, specialist-teacher-student, among others. Regardless of whether the activity is carried out by the company's specialist, the presence of the University professor in it is essential.

At the end of the stage, a partial evaluation is carried out and the corresponding criteria are issued, by the specialist and the teacher, for the passage to the third stage. The evaluative judgments of the students must be considered.

Stage III. Evaluation of the results

Here evaluation is assumed as process and result; as a process throughout all stages. This stage is conceived for evaluation as a link in the teaching-educational process, in the field of practical training in University-Company integration. It is based on the holistic, dialectical and conscious nature of the process, as well as its complex, multidimensional, participatory and formative nature.

Seen in a narrow way, it is directed to the verification of the degree of fulfillment or approach to the objective; In its broadest sense, it includes the degree of response that the result gives to the process as a whole; that is, in correspondence with the social demand for the object of the profession, the professional problem, the objective, the content and the method; In this way, the process is evaluated in all its dimensions and it can be determined to what extent the proposed objectives were achieved. This act constitutes a balance of the stages described.

The analysis of the fulfillment of the general technical and economic requirements constitutes an element to be taken into account, as well as the relationships between the cost and the price of the materials and the articles of production or services, on which the action fell; this as part of the development of economic culture. The acts described above are developed with a participatory and democratic character, without forgetting the directive role of the specialist and the teacher.

DISCUSSION

The training of professionals in general and in particular in the field of education has been a permanent task of Cuban society since its origins and in it practical training has occupied a preponderant place to put the knowledge acquired from theory into practice; The different ways of carrying out this training has been conditioned, on the one hand, by the historical periods through which it has passed and, in another sense, by the results of the scientific, technical and technological development achieved in the technical sciences.

Without attempting to carry out a detailed study of the various models through which the training of professionals has gone through in the world and in Cuba, some references that constitute the premises for this study will be addressed.

It is pertinent to highlight within these models the Dual Training Systems, Germany as the main inspiration, with very positive results in other European countries, in order to improve the employability of young people, since labor insertion in these latitudes is accompanied by adequate levels qualification.

Igartua (2017) states that:

> At the European level, it is emphasized that dual training systems are characterized by the alternation between training and employment, which would be the defining characteristic of the model. Without its existence, it is not possible to speak of dual training. However, there is no clear definition about the specific elements or a strict distribution between one type of training and another, so it could be understood that any minimum learning in the workplace is sufficient to be faced with dual training (p. 101).

It is distinguished that in Germany the dosage can reach 80% of practical training in the company and 20% of theoretical training in school (two to three and a half years and attendance one or two days at school and three or four at the company, depending on the profession and the course in which it is).

A notorious element in the Igartua (2017) studies is that it recognizes that:

> The success of the model will not depend only on the presence of two different training spaces or on a subdivision between theoretical and practical training, but on the true involvement of both institutions and the shared work, which must start from the design itself of the training curriculum, of the planning of the most appropriate type of training and its timing for the synchronization of the development of both aspects simultaneously or as parallel as possible (pp. 105-106).

In a specific analysis, it is logical to infer that the training component should acquire greater relevance than the employment component. It is about moving towards a professional training where a greater integration of the University and the Company is experienced in the process and, for this purpose, the collaboration agreement considers the equal responsibility of both institutions.

The experience of these years, together with the needs and demands that society has raised in the new concrete historical conditions, leads to a new improvement of the initial and permanent training process of education professionals, constituting a complex challenge.

It is incomprehensible to assume a predetermined training model without considering the economic, business, sociological, cultural, social characteristics inherent in the labor market of the new context, in the country or territory in question.

Therefore, even when the solution is not to reproduce the model exactly, there are elements that contribute to the construction of one that conforms to the characteristics of Cuba. Following this idea, the proposal of Mena, JA (2012) of shared professional training is assumed in the research: An Emerging ETP model, which has been supported by a group of researchers, among which are Acosta (2012); Aguilar V., and Mena, JA (2014); Abreu and Soler (2015); Ferreira, Mena, JA, Acosta and Mena JL (2019); Aguilar, YE (2019); among others.

In this research, the referred model of FP is contextualized in the University-Company integration, particularly in the Bachelor in Mechanical Education and Bachelor in

Electrical Education careers at the University of Pinar del Río "Hermanos Saíz Montes de Oca".

It is considered that the University constitutes a strategic pillar in the economic-social development of any territory, so that "Strengthening the link between universities and companies is essential to promote the development of the country […]" (Díaz-Canel Bermúdez, 2019, p.4).

In this sense, Pérez and Acosta (2020) state that:

> Education and the world of work should not be separated, as they have been for a long time; That is why actions are currently being carried out to promote the integration of educational institutions with productive ones in the training process of students (p.495).

These steps must be undertaken by the teachers of the indicated careers, whose social responsibility is: to contribute to the political, ideological and professional development of the students who, as qualified workers and middle technicians, are trained in this education subsystem, achieving a leading role in all activities, so that they become people capable of marching at the pace of our times and pay attention to the development of values, attitudes and skills, especially those related to work and industriousness, with independence, responsibility, flexibility and self-critical character with a high social commitment (Ministry of Higher Education. Study Plan E, 2016a, pp. 5-6).

As has already been valued, practical training in University-Company integration is decisive for successful professional training; practice is at the base of knowledge and of each of its stages, constituting the supreme criterion of truth. It forms the basis of theory and this, in turn, serves practice. It can be asserted that there is no discipline instituted by man that does not benefit from practice.

The practical nature of Technical Sciences and the importance of teaching science by doing science applied to real life, is essential to awaken motivation and interest in students.

Mena, JA, Aguilar, Y.E and Mena, JL (2019) highlight the need for training and the development of practical activities in labor entities, under the direction of the school, which implies the development of professional skills.

In the careers studied in this research, it is distinguished that the practice of production and services constitutes the main program of curricular design, due to its educational, instructive, productive and economic nature. In it, all the practical activities of the rest of the disciplines or subjects must be harmoniously integrated, in addition to developing technical professional skills and, in particular, consolidating those that must be worked directly in teaching. These activities are considered as a modality of practical training that, as organizational forms, contains study practices for the systematization and generalization of skills, and work practice to promote proper mastery of the modes of action that characterize professional activity.

As stated by the Ministry of Higher Education (2018), in Ministerial Resolution No.2, Regulation of Teaching and Methodological Work, article 137:

> The work practice is the organizational form of work teachers that aims to promote a domain suitable for students, the modes of action that characterize the profession through participation in solving the problems more

> general and frequent present in the professional or social setting in which they are inserted and, at the same time, promote the development of values that contribute to the formation of an integral professional, suitable for their future performance in society (p. 44).

The analyzes carried out in this research, based on the use of materials and methods, allowed to conclude that an adequate system of principles, scientific ideas and stages allow to project, organize, execute and evaluate the development of practical training in University-Company integration, in the careers of Bachelor of Mechanical Education and Bachelor of Electrical Education of the Faculty of Technical Sciences, at the University of Pinar del Río "Hermanos Saíz Montes de Oca".

This scientific result contributed to the training of a competent professional, in keeping with the requirements of the established model.

The scientific novelty of the proposed result was evidenced, given in the elements that from the theoretical, practical and technical point of view integrate it and that strengthened the knowledge related to the subject under investigation in students, teachers and specialists, from the perspective of a training with the University-Company integration.

The subject investigated is pertinent and current, as it responds to one of the recurring problems of university education: the initial and continuous training of professionals in the educational contexts of University and Business.

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