

**DEVELOPMENT OF DUAL LABOR TRAINING FOR STUDENTS IN MID-
LEVEL ELECTRICITY TECHNICIAN PROGRAM**

**EL DESARROLLO DE LA FORMACIÓN LABORAL DUAL DEL ESTUDIANTE
TÉCNICO MEDIO EN ELECTRICIDAD**

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ABSTRACT

This study proposes developing a dual labor training for students in mid-level electricity technician, program based on a dual labor formation model, in which, teaching and work are implemented together allowing to fulfill their tasks and responsibilities. To fulfill the purpose, methods such as observation, interviews, and surveys, analysis-synthesis, inductive-deductive reasoning, document review and systemic approach, pedagogical tests and the pedagogical pre-experiment were applied to verify the research hypothesis. The results obtained through the implementation of the strategy shows its relevance and positive transformation achieved on teachers, students and tutors, which contribute to improving the quality on training the professional skills of mid-level electricity technicians in the municipality.

KEYWORDS: professional skills; labor training; labor performance; labor qualities

RESUMEN

Se elaboró una estrategia para el desarrollo de la formación laboral dual de Técnico Medio en Electricidad sustentado en un modelo de formación laboral dual donde se conjugan docencia e inserción laboral para el cumplimiento de sus tareas y ocupaciones. En la investigación se aplicaron métodos de investigación tales como la observación, entrevistas y encuestas, análisis-síntesis, revisión de documentos, enfoque sistémico, pruebas pedagógicas y el pre experimento pedagógico para constatar la hipótesis de la investigación. Los resultados obtenidos mediante la implementación de la estrategia dan muestra de la pertinencia y las transformaciones positivas alcanzadas en docentes, tutores y estudiantes, lo que permite elevar la calidad en la formación de las cualidades laborales de los Técnico medio en Electricidad del municipio Holguín.

PALABRAS CLAVES: habilidades profesionales; prácticas laborales; desempeño laboral; cualidades laborales

INTRODUCTION

Technical and Professional Education (henceforth TPE), from its inception, emerged to address social problems through training competent professionals. Its curricula and programs for various specialties have been modified according to social needs and technological transformations, with the aim of generating technical skills in students for work (Tapia, 2022). The relevance of this modality provides substantial information that prepares students for the labor world, significantly increasing their technical competencies and vocation (Barbotó et al., 2024).

Educational policies consider it important to frequently review educational content, with the aim of integrating a curriculum that addresses conceptual, procedural and attitudinal aspects in professional training in response to the demands of a dynamic and changing environment (Olán & García, 2022).

The Cuban model of Technical and Professional Education, shared between the polytechnic school and the workplace, which currently grounds the training of mid-level professionals, demands a review of its didactic-methodological projection of the training process, as the work context gets more prominence each day in the Teaching-Learning Process (Aguilar et al., 2021).

That is why it is currently named, by the Third Improvement of Education in Cuba, as the Technical and Professional Education Level (TPEL) and its mission is assumed as: to train a patriotic, well-rounded, competent and broadly profiled mid-level professional who fully integrates into society and is an active agent of its improvement. New curricula and programs aligned with new social needs arise.

The Electricity specialty came under the Ministerial Resolution 92 of 2023. In this curricula, the graduate of the Mid-Level Electricity Technician has the social mandate to meet the demand for electrical technicians in the electro-energetic field across three basic sectors of society: residential, industrial and the national electric energy system; each with its own specificities, though without fully defined boundaries, which requires the development of a high-quality professional pedagogical process that enables students to learn quickly and precisely how to solve professional problems that arise in installation, design and repair processes (Torres et al., 2020).

Technical and technological education expands opportunities to get into the job market in a qualified manner across all socioeconomic levels (Romero & Franco, 2022).

In accordance with the above, and based on the social needs for training Mid-Level Electricity Technicians, a diagnostic study was conducted on the state of labor training for students of this specialty at Luis de Feria Garayalde Polytechnic Center in Holguín municipality, which allowed to verify the following shortcomings:

- ✓ Insufficient development of professional skills in students regarding the operation of electrical equipment and systems present in workplaces.
- ✓ Insufficient development of labor qualities: creative, sensitive, committed, persevering and innovative during the accomplishment of labor activities.

The diagnosis results on the state of labor training for students of the Mid-Level Technician in the Electricity specialty in Holguín municipality made it pertinent to conduct an epistemological analysis related to the approach to labor training in this specialty.

In the conception of labor training for TPE, established by Martínez (2014) from the Studies Center for Labor Training, and the theses by Concepción, Betancourt & Figueredo (2015); González & Alonso (2016); Rodríguez (2007); Sánchez et al. (2018); Núñez (2019) and Santiesteban & Betancourt (2020), results of labor training for mid-level technical students and skilled workers are proved, which facilitate teachers' work in forming labor qualities in learners. However, there is no in-depth study of the labor training of the Mid-Level Electricity Technician within a training process that combines teaching and workplace integration to solve a social problem.

The research reveals a contradiction that exists between the labor training that students should acquire in the different contexts of the educational institution and its annex classrooms, and the demands for their work performance in workplaces as future job positions; which reveals that currently there is no evident integrative process between the pedagogical and technological components during the development of the labor training process that facilitates efficient scientific-technical preparation of students (Leyva, Mendoza & Batista, 2020; Garzón, 2022), to face the accelerated development of science and technology according to the demands of the work context in workplaces and society's demands for development. It also shows that work practice, in Technical and Professional Education, is one of the new modalities of practical teaching that generates the highest level of confusion among managers, teachers and specialists of the workplaces (Mena et al., 2019).

The results obtained demonstrated the pertinence of investigating as a scientific problem the deficiencies in the labor training of the Mid-Level Electricity Technician student, which limit the fulfillment of their tasks and occupations. Consequently, the research set the objective of developing a strategy for the development of dual labor training for Mid-Level Electricity Technicians, based on a dual labor training model that combines teaching and workplace integration, contributing to the fulfillment of their tasks and occupations.

DEVELOPMENT

A distinctive feature of the current training process for the Mid-Level Electricity Technician lies in combining the content students receive at the polytechnic school and its annex classrooms with the practices of different subjects they must undertake in the context of industries, production centers and state institutions through labor training cycles, as established by the curriculum and required by the Third Improvement of Education.

This aspiration is affected by the deficiencies detected in the research development through the diagnosis, which hinder the objective of training a competent worker as one who performs with quality, efficiency, efficacy, creativity, entrepreneurship, teamwork and leadership, a labor activity or a set of them in an academic, labor, community, and/or family context, in which they demonstrate, through their performance, a legal, ideological, economic, energetic, environmental, scientific, technological, management, and general and integral basic formation that will allow them to achieve goals, objectives, solve a problem (social or professional) and/or produce material goods and feasible and pertinent services to address human needs of an individual and/or collective nature (Alonso et al., 2023).

For the study, the population consisted of 34 teachers, 30 production specialists and 64 students of the Mid-Level Electricity Technician specialty from the Luis de Feria Garayalde Center in Holguín municipality. A random sample was selected, formed by 17 teachers, 14 production specialists and 40 first-year students of

the Mid-Level Electricity Technician program, in a three-year training cycle, taking into account the characteristics of the subjects for the year and level of experience in the career and profession of selected teachers and production specialists, who could make a greater contribution to the research.

The scientific methods used for developing the strategy were as follows:

Interviews and surveys to diagnose the current state of labor training in Mid-Level Electricity Technician students; observation to verify the behavior of the labor training process of students during the combination of teaching and workplace integration; historical-logical to analyze the behavior of the historical evolution of the Mid-Level Electricity Technician specialty and determine its development trend; systemic-structural-functional for the elaboration of the strategy taking into account the components, as well as their coordination and subordination relationships; analysis-synthesis and induction-deduction to interpret data and results of the research process; hypothetical-deductive to verify whether or not the research hypothesis was met; pedagogical tests to verify the state of labor training of students; pedagogical pre-experiment to assess the effectiveness of the strategy in improving student labor training; percentage analysis to interpret the data obtained in the research and the sign test to verify the research hypothesis.

The strategy has been designed to be applied in a three-year training cycle, starting with the first year of the Mid-Level Electricity Technician specialty.

Its mission is to directly train all members of the pedagogical team in the conceptions of action contexts, to ensure work performance of students in all scenarios of action, and the fulfillment of their tasks and occupations once graduated. *The didactic structure of the strategy directions is based on the proposal by McPherson (1997).*

Didactic Structure Aspects

Organizational: preparation of teaching staff, specialists, tutors and students for the implementation and follow-up of the strategy.

Methodological: precision of the training process objectives in the study year; dual labor training of students based on work performance in the various contexts of action; incorporation of dual labor activity content in function of labor training based on two premises of the technician's occupational profile; integrated approach to subject work.

Evaluative: systematic evaluation of the process of incorporating dual labor activity in the different action contexts of the Mid-Level Technician in the Electricity specialty.

Directions conceived in the strategy aimed at developing the dual labor training of the Mid-Level Technician student in the Electricity specialty.

General Objective:

To transform progressively, the management styles of the labor training process for Mid-Level Technician students in the Electricity specialty, impacting dual labor training for the fulfillment of their tasks and functions; based on greater effectiveness of actions for planning, orientation, organization, execution, evaluation and control of methodological work of the pedagogical team, with attention to the principle of duality in the labor training process across the various contexts of action.

In order to contribute to the development of the dual labor training process for Mid-Level Technician student in the Electricity specialty, addressing the aforementioned shortcomings, the main directions to work on were determined:

- ✓ Training of coordinating guide teachers of Mid-Level Electricity Technician specialty.

- ✓ Training for teachers of the pedagogical team of each year of Mid-Level Electricity Technician specialty.
- ✓ Training for the leaders of youth organizations of each year of the Mid-Level Electricity Technician specialty.
- ✓ Training of the specialists from workplaces involved in the training process of Mid-Level Technician students in the Electricity specialty.

The mentioned directions allowed to impact through methodological actions on the shortcomings identified in this research, contributing to the improvement of the dual labor training process for Mid-Level Technician students in the Electricity specialty.

All work directions were structured with their objective, basis, actions, execution pathways and responsible person. A logic was established for their insertion and application in the selected educational institution.

The direction of Training for coordinating guide teachers of Mid-Level Electricity Technician specialty was aimed at training them in the direction of methodological work, in order to develop the dual labor training process through the integration of different subjects, workshops and annex classrooms of the level.

Training to teachers of the pedagogical team of each year of Mid-Level Electricity Technician specialty, as the second direction was aimed at preparing them for the progressive transformation of their modes of action in order to improve the dual labor training process for students of Mid-Level Electricity Technician specialty, based on the interdisciplinary nature of the subjects and their professionalization.

Training to leaders of youth organizations of each year of Mid-Level Electricity Technician specialty, as the third direction, was aimed at training group presidents and Base Committee Secretaries in the direction of the emulation program for the progressive transformation of their modes of action, in order to

improve the dual labor training process based on the unity of the agents and agencies involved in the process and the members of the pedagogical team.

The fourth direction, Training to specialists from the workplaces involved in the training process of Mid-Level Technician students in the Electricity specialty, allowed preparing the specialists of the workplace collective for the progressive transformation of their modes of action in function of the dual labor training process for Mid-Level Technician students in the Electricity specialty, based on the contents included in the curriculum to guarantee the fulfillment of tasks and functions of the technician's occupational profile.

The application of planned actions in each of the directions with the personnel selected in the sample made it possible, during the intervention, to make some adjustments that favored the proposal, with the aim of achieving greater results in the formation of labor qualities in students, which in turn contributed to the development of entrepreneurship actions (Bravo et al., 2021). Professional personnel of companies made significant contributions based on their experience and work with students during work practice.

To validate the proposal, 21 specialists were selected as experts, including methodologists of the TPE area from the Provincial Education Directorate, TPE area methodologists from the Municipal Education Directorate, guide teachers of the Electricity specialty, area heads of the Electricity specialty and tutors from the workplaces involved in the training process; as well as other teachers from the Luis de Feria Garayalde Polytechnic Center with experience in teaching and research.

The use of Torgerson Mathematical Model allowed operationalizing the variables to be used, such as premises, their content and pedagogical considerations to measure variables and the Delphi Method was used. All selected individuals showed a high competence coefficient (K).

The main concerns were fundamentally:

- ✓ The level of expectation regarding the pedagogical management of teachers and students.
- ✓ How to favor the motivational capacity of teachers and tutors from workplaces and motivate their students, so that they play a leading role in the dual labor training process.
- ✓ How to achieve attention to the individuality of teachers, tutors from workplaces, specialists and students to develop an effective conception of labor training during the dual labor training process (personal, emotional, intellectual and technological).

The proposal was validated through the application of scientific methods: pedagogical pre-experiment, pedagogical test and expert judgment, which generally demonstrated the qualitative transformations achieved in the training process of Mid-Level Technician students in the Electricity specialty, among which could be verified:

- ✓ In teaching and workplace integration activities, an increase in actions aimed at the relationship between instruction, education, development, and technology was observed, according to the needs of the workplace.
- ✓ Incorporation into the professional model of the labor qualities to be developed in the student, as well as their manifestation traits based on their occupational profile.
- ✓ The implementation of dual labor training managed to sensitize teachers, tutors and specialists to transform the training process.
- ✓ Labor tasks were designed for evaluations taking into account the behavior of labor qualities.

- ✓ The relationship between the improvement of labor qualities and local development was established due to the quality of services provided to society.
- ✓ Mid-Level Technician students in the Electricity specialty provided quality services with the implementation of technological advances from various workplaces.

In the investigative development and quantitative results analysis, transformations were verified during the application of the strategy that served as a measure of the contributions made and positive changes in the process of forming labor qualities in students.

Some of the results shown were:

- ✓ Mastery of electrical content was observed in the 22 activities observed (classes and work practices), representing 100%.
- ✓ Mastery of the psycho-pedagogical characterization of the student was observed in 18 teaching and workplace integration activities, representing 81.8%, while in 4 of them it was partially observed, representing 18.8%.
- ✓ An adequate incorporation of labor qualities into the content of Work Practices was verified in 17 of the teaching and labor activities carried out by students, representing 77.7%; and in 5 of them it was partially observed, representing 22.0%.
- ✓ Knowledge of the foundations presented in the dual labor training model was observed in 20 teaching and workplace integration activities, representing 90.9%; while in 2 of them it was partially observed, representing 9.0%.

- ✓ In 19 teaching and workplace integration activities, the application of strategy actions was observed, taking into account the relationship between instruction, education, development, and technology, representing 86.6%, while in 3 it was partially done, representing 18.8%.
- ✓ In teaching and workplace integration activities, labor qualities were considered in 18 of them in the evaluation processes, alternating teaching and workplace integration, 81.8%; in 4 it was partially observed, representing 18.8%.

The qualitative transformations achieved in the training process of Mid-Level Technician students in the Electricity specialty are showed, demonstrating the scientific novelty of the contributions obtained in the research.

The following are highlighted: incorporation into the professional model of the labor qualities to be developed in the student, as well as their manifestation traits based on their occupational profile.

Furthermore, a new labor quality to be developed in the Mid-Level Technician student in the Electricity specialty is proposed: ecologist, not contemplated in the theoretical conception of labor training.

CONCLUSIONS

In current training context for Mid-Level Electricity Technician students, preparation of teachers, tutors and specialists to foster the development of dual labor training for students from pedagogical practice is a significantly valuable aspect. The proposal demonstrates that, from the actions organized in four directions, the preparation of the teacher, tutors and students is enhanced to a greater degree and offers new work alternatives for dual labor training of Mid-Level Electricity Technician student in accordance with their job placement and social needs. The results obtained through the implementation of the strategy demonstrate its relevance and the positive transformations achieved in teachers,

tutors and students, which allows for enhancing the quality in the training of labor qualities for Mid-Level Electricity Technicians in Holguín municipality.

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