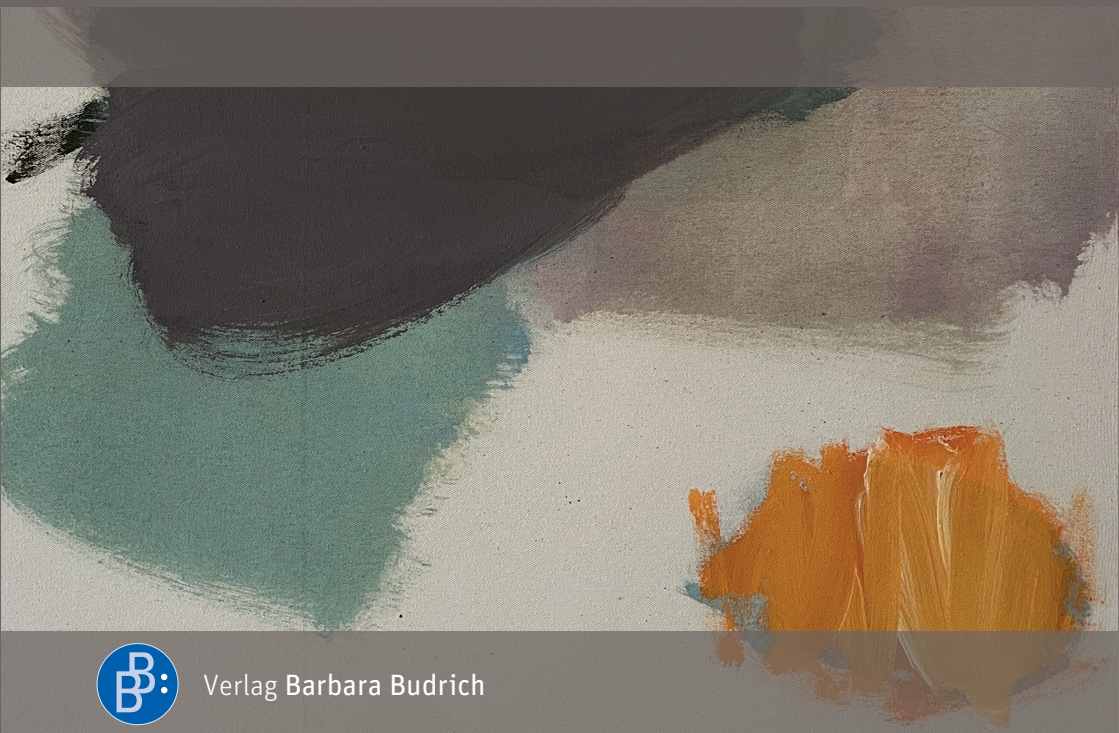
Irina Rommel
Dietmar Frommberger
Daniel Láscarez Smith (eds.)

Costa Rican Technical and Vocational Education and Training

Development, Challenges, and Research Perspectives



Verlag Barbara Budrich

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Verlag Barbara Budrich
Opladen • Berlin • Toronto 2025

With funding from the:

Federal Ministry
of Research, Technology
and Space

This book is available as a free download from www.budrich.eu (https://doi.org/10.3224/84743145).

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Stauffenbergstr. 7 | D-51379 Leverkusen | info@budrich.de | www.budrich.eu

ISBN 978-3-8474-3145-9 (Paperback)
eISBN 978-3-8474-3282-1 (PDF)
DOI 10.3224/84743145

Verlag Barbara Budrich GmbH
Stauffenbergstr. 7. D-51379 Leverkusen Opladen, Germany
86 Delma Drive. Toronto, ON M8W 4P6 Canada

A CIP catalogue record for this book is available from Die Deutsche Nationalbibliothek (The German National Library) (https://portal.dnb.de)

Cover design by Bettina Lehfeldt, Kleinmachnow – www.lehfeldtgraphic.de
Picture credits: lehfeldtmalerei.de
Editing by Máiréad Collins, Belfast, UK
Typographic editing by Anja Borkam, Langenhagen – kontakt@lektorat-borkam.de

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Foreword

Vocational education and training in Costa Rica is diverse. There are different lines of tradition and different current developments. Similar to the situation in many other countries in Central America and around the world, vocational education and training in Costa Rica moves between a convergence with the secondary education and higher education system on the one hand and company-based human resource development on the other.

A key challenge is to develop reliable vocational education and training programs that systematically combine school-based and company-based learning. A further challenge lies in reaching a political agreement on an accepted model of vocational education and training. The attractiveness of vocational education and training for young people can be increased, and the willingness of the economy to cooperate can be expanded, with functioning dual pathways.

Vocational education and training in Costa Rica thus contributes to the qualification of skilled labor and to improving the transition from school to employment. Vocational education and training therefore also contributes to the development of opportunities and social integration.

This publication takes a look at vocational education and training in Costa Rica in all its diversity. The academic contributions provide insights into the basic structures of vocational education and training and present and discuss selected research findings. The book is a result of the work in the CoRiVET project, which was funded by the German Federal Ministry of Education and Research (BMBF) and focused primarily on the further development of teachers and trainers in and vocational education and training research in Costa Rica.

Dietmar Frommberger, Osnabrück, May 2025

Irina Rommel & Dietmar Frommberger

Technical Vocational Education and Research in Costa Rica - Development, Challenges, and Research Perspectives

Keywords: Technical Vocational Education and Training, Teacher Education, Research, Professionalization

Abstract

This contribution serves as an overview to the topic of Technical and Vocational Education and Training (TVET) and TVET research in Costa Rica. It offers a description and analysis of important current developments and challenges. This includes, among others, the institutionalization and promotion of TVET research, the adaptation of dual vocational training models to the Costa Rican context, and the broader policy and governance frameworks that shape these processes as well as aspects of TVET teacher qualification and its needs in Costa Rica. We also refer to the initiative CoRiVET – Costa Rican Vocational Education and Training, funded by the German Ministry of Education and Research (BMBF). The final section provides a summary and outlook, pointing toward future areas of research and strategic action.

1. Introductory Aspects

TVET in Costa Rica has gained significant attention across social, political, and economic spheres. This attention is linked to numerous reforms, restructuring efforts, and adjustment processes currently unfolding in the country. Notably, the implementation of a dual training system, the development of vocational teachers and trainers, and the growing research needs in this domain have become increasingly relevant. As a result, it is not surprising that the enhancement and strengthening of the TVET system in Costa Rica, along with the establishment of a dedicated research discipline, have been central to ongoing international cooperation between Costa Rica and

Germany. Specifically, principally efforts have been made in the project CoRiVET – Costa Rican Vocational Education and Training, funded by the German Ministry of Education and Research (BMBF). In general, it can be said, that Germany and Costa Rica have a long-standing interrelation in cooperation in TVET and TVET research with different institutions, stakeholders, and goals. Mainly, recent activities from the German government e.g., BMBF and GoVET (German Office for International Cooperation in Vocational Education and Training) and research institutions like the University of Osnabrück focused on the implementation of dual TVET structures, teacher education in TVET, and TVET research.

Nevertheless, like many other countries, the Costa Rican TVET system is facing challenges. These challenges include the urgent need to expand coverage substantially and align the supply of vocational education and training with both current and future labor market demands (CONARE, 2021). Furthermore, many formal job positions remain unfilled due to businesses' difficulties in finding highly qualified technicians. Approximately one-third of businesses in the industrial sector report that technicians are the most difficult candidates to recruit (Maravalle & González, 2023). A recurring issue in public and private discussions is the limited number of graduates in technical disciplines, while at the same time, the demand for a skilled labor workforce is increasing (Álvarez-Galván, 2015). As a result, the low vocational educational level proves to be an obstacle to development, as it limits the modernization of productive activities and the creation of higher-quality jobs, making it difficult to systematically reduce inequalities such as poverty and social exclusion (PEN, 2021). In this manner, TVET has become a strategic initiative in the Central American region, and in Costa Rica in particular, aimed at improving the low vocational educational levels of the majority of the economically active population and providing the workforce needed for productive transformations that require high levels of specialized knowledge (PEN, 2021; Rommel & Vargas Mendez, 2022).

Furthermore, due to the different reports about the TVET system in Costa Rica and its challenges (see Àlvarez-Galvan, 2015), Costa Rican TVET is struggling with vocational teacher qualification, a lack of practical training in TVET programs and missing research efforts. Although TVET is considered as an important and valuable alternative to enable the young population to enter the labor market, TVET research has not yet gained enough relevance to bring research efforts to the forefront (Alvarado Calderón & Mora Hernández, 2020). Furthermore, in Costa Rica, a sufficient supply and appropriate qualifications of TVET represents one of the major challenges for the system and therefore for the provision of technical skills (Álvarez-Galván, 2015). Not all TVET teachers have sufficient technical and professional pedagogical competencies. Therefore, improving professional development of TVET teachers is recognized as important action area for strengthening national

TVET (Álvarez-Galván, 2015). In this case the professionalization of TVET teachers, who are essential actors contributing to the development of workforce skills and thus to the economic progress of the country (Grollmann, 2009), becomes crucial for the quality of TVET.

The discussion about TVET has led in recent years to comprehensive reforms and efforts in Costa Rica, such as the implementation of a National Qualifications Framework for TVET (NQF-EFTP-CR), the Dual Training Act, and others. In this context, a brief introduction to Costa Rica's TVET system will be provided, followed by a discussion of measures, perspectives, and challenges.

2. Aims and Structure of the TVET System

In Costa Rica, TVET is defined as an educational domain designed to equip individuals with the knowledge, skills, competencies, and attitudes required to navigate a dynamic and ever-changing environment. This should be achieved through the provision of structured and comprehensive vocational education and training programs that foster active and responsible participation in both society and the workforce. A key component of its objectives is the promotion of values such as understanding, respect for human rights, inclusivity, equity, gender equality, cultural diversity, lifelong learning, and the cultivation of a sense of community coexistence, as is articulated by the National System of Technical and Vocational Education and Training (SINEFOTEP, 2022).

TVET in Costa Rica is provided by various Institutions like the National Learning Institute (INA) and the Ministry of Public Education (MEP), but also by private educational providers as well as higher education institutions that offer TVET education and more. In summary, the Costa Rican education system provides TVET through three main modalities and levels:

- **Secondary (formal) education**: Technical schools that offer the title of "technical diploma," under the authority of the Ministry of Public Education (MEP).
- **Non-formal education**: Various diploma programs and technical careers, managed by the National Learning Institute (INA) and public and private post-secondary institutes, such as the College of Limón (CUNLIMÓN) or the College of Cartago (CUC).
- **Higher education**: Universities such as the National Technical University (UTN) and the Costa Rica Institute of Technology (TEC) (UTN, 2020; Rommel & Vargas Mendez, 2022).

According to the modalities there are specific key characteristic of TVET in Costa Rica that can be described with the strict division into a formal and a

non-formal system. The main distinction between the two systems of non-formal and formal, lies in the fact that the formal system leads to a qualification that enables progression within the formal education system, whereas the non-formal system does not provide access to further (academical) formal education (Camacho-Calvo, 2022). Formal TVET is offered by professional technical colleges (Colegios Técnicos Profesionales, CTPs) under the MEP and is classified as technical education (Educación Técnica) at the upper secondary education level (SEC II). These programs are predominantly school-based and correspond to Level 4 (from a total of 5 levels) of NQF for TVET in Costa Rica. The programs of the MEP cover fields such as agriculture, commerce, services, and industry (Álvarez-Galván, 2015). Graduates of CTPs in the formal system obtain both a vocational education and training degree and a general education diploma, which grants them university entrance qualification (Camacho-Calvo et al., 2019; Rommel et al. 2024b).

Non-formal vocational training is provided by INA under the name Formación Profesional (Vocational Training) and are located on level 1-3[1] of the NQF for TVET in Costa Rica. The question why INA belongs to and is defended as a non-formal TVET system can be described as followed. INA was established in 1965 as a vocational educational institution independent of the formal system, structured with an autonomy and flexibility that is unusual in Costa Rica, and characterized by strong communication with the labor market (Article 2 of the Organic Law of INA, 1983; INA, 2018). The establishment of INA can be traced back to the initiative of a group led by the Minister of Labor and Social Welfare. This initiative aimed to provide vocational training opportunities for thousands of young individuals with limited economic resources and restricted access to the formal education system. Simultaneously, a key objective was to foster the country's economic development by adopting an import substitution model. This strategy necessitated rapid industrialization, which, in turn, required a technically skilled labor force—something Costa Rica lacked at the time. Consequently, the country sought to build an industrial foundation and strengthen its domestic consumer market. The policies implemented during this period were driven by the broader aim of promoting and developing Costa Rican society (Casanova, 1997). To this day INA offers both initial and continuing education and training in TVET in about 240 training courses in industry, farming, livestock, and commerce and service (Àlvarez-Galvan, 2015), in addition to other services such as the accreditation of vocational educational institutions and the

1 In general, it can be said, that the provided TVET offers of the non-formal system of INA are located under the formal programs of MEP, whereby the degrees of university TVET programs are the highest and at level 5. The levels of the NQF for TVET in Costa Rica provide a structured division of degrees in TVET regarding time of vocational education and training, the level of competences to be achieved as well as the entry requirements.

certification of competencies in the so called non-formal TVET system in Costa Rica.

Since the 1990s, various reform initiatives have increasingly emphasized the importance of practical training and hands-on experience within TVET programs. A key driver of this shift has been the introduction of the National Qualification Framework, which all programs are required to follow. Additionally, both the INA and the MEP offer dual VET programs in selected professional fields.

3. Current Developments, Challenges and Perspectives of TVET and TVET Research

3.1 TVET Teacher Education

The role of teachers in TVET, as well as their qualifications, is often insufficiently recognized. According to Grollmann (2008), two fundamental issues characterize the discourse on TVET teachers and their qualifications: the low status of TVET itself and the challenge of advancing the professionalization of TVET teachers. When discussing professionalization, various characteristics and focal points can be derived from the concept of professional knowledge. More broadly, Hesse (1979) defines professionalization in the context of occupational sociology as a systematically structured model for the qualification and exchange of labor. This model links specific, often monopolized labor services with particular—typically heightened—qualification requirements, along with relatively high prospects for income, self-sufficiency, reputation, and influence. Its primary purpose is to serve the interest in the effective utilization of labor (cited in Meyer, 2018). The discourse surrounding the professionalization and the role of TVET teachers in the country thus raises the question of how TVET teacher education, the required qualifications, and expectations are shaped.

In many Latin American countries, there is a significant gap in teacher education programs specifically designed for TVET (World Bank, ILO, UNESCO, 2023). In Costa Rica, the qualification of TVET teachers largely follows an academic-theoretical approach (Guzmán, 2011), but also a non-academic pathway by recruiting practitioners. The entry requirements for these pathways differ across institutions and are influenced by the educational background and professional experience of the candidates. These varying entry requirements reflect the specific conditions and standards set by institutions offering TVET programs. Consequently, there is considerable heterogeneity in

requirements, limiting teacher mobility and exchange across institutional boundaries and arise the question of the level of standardization (Rommel et al., 2024c). This brings into discussion the understanding and needs of professionalism and required professional knowledge for TVET teachers. Meyer (2018) in that context explains, that professional knowledge, as a form of expert knowledge, comprises several components. These include academic knowledge, typically acquired through university education, as well as traditional knowledge associated with professional practice, such as experiential and everyday knowledge as well as problem-solving and interpretative knowledge. These distinct layers of knowledge are key characteristics of professionalization and professional expertise. It refers to the extensive competencies associated with a profession, ranging from academic qualifications to individual skills acquired through practice.

The OECD (as cited in Álvarez-Galván, 2015) notes that teachers in the MEP lack sufficient pedagogical training, focusing more on academic content rather than practical teaching skills. While the MEP emphasizes academic training for its teachers, the INA places more value on professional work experience and provides targeted pedagogical training through its own programs (Álvarez-Galván, 2015). As a result, TVET teachers enter the profession through different qualification pathways, holding varying qualifications—from vocational or academic credentials in the relevant technical field to pedagogical degrees or other forms of teacher preparation.

However, this leads to the assumption that a lack of standardized qualification requirements across institutions like INA, MEP, Don Bosco, and private TVET providers impedes teacher mobility and exchange and the level of standardization of qualification pathways and required skills and training. Therefore, the OECD recommends harmonizing these qualification standards to enhance teacher professionalism and mobility within Costa Rican TVET (Álvarez-Galván, 2015; Láscarez-Smith & Baumann, 2020; Rommel et al., 2024c).

One of the main challenges in Costa Rica remains the lack of focus on technical and pedagogical qualifications for TVET of many TVET teachers (Álvarez-Galván, 2015). Moreover, recent discussions on the qualification of TVET teachers in Costa Rica emphasize the lack of standardization in teacher training, particularly regarding the recruitment requirements of TVET providers (Rommel et al., 2024b). The lack of standardized and unified entry requirements hinders the consistency of teachers' qualifications and the professionalization of the field. Therefore, it can be concluded that, to date, there are no common standards—such as specific competencies—that define the qualifications necessary for the professionalization of TVET teaching (Rommel et al., 2024c), and by extension, the role and significance for the TVET system itself across the institutions. Consequently, enhancing the professional development of TVET teachers is widely recognized as a crucial

area for strengthening the national TVET system (Álvarez-Galván, 2015, cited in Rommel et al., 2024c). For this reason, teacher training in TVET is gaining increasing attention in the ongoing debate surrounding TVET in Costa Rica.

3.2 Dual VET in Costa Rica

According to Láscarez and Schmees (2021), Costa Rica's employment system struggles to integrate young people into skilled jobs. In response to high youth unemployment, the government aims to both expand job opportunities for skilled workers without higher education and align vocational education more closely with labor market needs. Inspired by dual systems in countries like Austria, Switzerland, and Germany, several pilot projects were launched between 1991 and 2000 in Costa Rica (Mittmann, 2001). Since that time many efforts have been made to foster dual VET offers in the Costa Rican system. For example, a series of policies have been defined, and various institutional structures have been established, shaping the current form of dual VET in the country with significant efforts taken for years by both the INA and the MEP, in collaboration with German organizations such as GoVET and the University of Osnabrück, to strengthen the dual vocational education system in Costa Rica.

In 2019, the Costa Rican Congress passed a law to implement a dual apprenticeship structure in the TVET system. This was the result of decades of discussion on the design of TVET in the country. The law, presented as a breakthrough, was intended to respond to the growing problems caused by the high rate of people not in education, employment, or training and to counterbalance the highly confrontational attitudes of employers and workers (Schmees & Láscarez Smith, 2024). The implementation of the Dual Apprenticeship Act of 2019 brought significant changes, such as providing employers with greater flexibility, replacing the salary requirement with a scholarship system funded by the INA, and ensuring that employers benefit from reduced accident insurance costs through the INA. Nevertheless, it can be argued that to date the passing of the law is an important legal step and is helping to standardize Dual VET, the impact of that law according to its implementation and conduction into the practice is still an ongoing process.

To support Dual VET meeting the technical and vocational training demands of Costa Rica's population and regions, the INA and the MEP dedicated their efforts between 2020 and 2021 to developing a second proposal for the implementation of dual vocational education and training in the country (Camacho, 2023). In recent years, the discussion surrounding the implementation of dual programs in Costa Rica has gained increasing attention. Alongside this discourse and the effort to dualize certain TVET

programs, there is also a debate highlighting the absence of dual TVET programs that adequately address the specific needs of the Costa Rican context, as these programs have been based on foreign models (Camacho, 2023). The government of Costa Rica took into consideration the recommendations of the OECD, among others, and consequently determined that the INA and DETCE-MEP[2] initiated the implementation of two dual vocational education and training pilot plans, one for each institution. The execution of the two pilot plans concluded in 2019. To this day, according to the German Office for International Cooperation in Vocational Education and Training (GOVET), a total of 335 individuals have completed their training, with the majority having received instruction at level 1 of the NQF for TVET through courses offered by INA. The MEP has 18 graduates, all of whom are classified at level 4 NQF. Additionally, approximately 200 apprentices are currently enrolled in various dual VET programs (GoVET, 2024).

Nevertheless, Schmees and Láscarez (2024) argue that referencing the German dual apprenticeship system may be problematic, given that dual structures have been part of the Costa Rican TVET system for decades but have not been successfully implemented due to country-specific challenges. In this context, increasing attention is being paid to how dual training programs are implemented in practice, how various stakeholders participate in these initiatives, and what fundamental challenges can be identified in the process of implementing such programs in Costa Rica. This requires further and comprehensive research, as well as collaboration between policymakers, practitioners, and researchers within the country itself.

3.3 TVET Research in Costa Rica

TVET research is marked by a heterogeneous landscape of actors, disciplines, and topics, resulting in a broad and increasingly differentiated field (Pätzold & Wahle, 2013). It focuses on education and training phenomena linked to occupational contexts and the acquisition of (vocational) qualifications. Specifically, it examines the conditions, processes, and outcomes of acquiring professional and general competencies within cultural, political, social, and historical frameworks (Lauterbach, 2008). The research spans structural aspects of TVET systems, educational transitions, and comparative studies, as well as micro-level issues such as teaching, learning, and innovation processes (Euler, 2018).

2 Dirección de Educación Técnica y Capacidades Emprendedoras, in Englisch Department of Technical Education and Entrepreneurial Skills

TVET research serves diverse functions: it describes and typologizes phenomena, explores motivations and causalities, forecasts developments, and develops theory-based practical concepts (Euler, 2018). It draws on multiple disciplinary perspectives—including education, psychology, sociology, economics, and didactics—each grounded in distinct traditions and epistemologies (Eckert & Tramm, 2004). This disciplinary diversity is mirrored by the variety of institutions engaged in TVET research, ranging from universities to national and international organizations such as Germany's Federal Institute for Vocational Education and Training and Cedefop (Böhle, 2013). From a sociology of science perspective, disciplines can be understood as "communication communities of specialists" (Stichweh, 1984), institutionalized through university chairs, academic programs, and the recruitment of junior scholars into professorships (Reinisch, 2009). In Germany, for instance, TVET research is academically supported by the sub-discipline of TVET research within the educational sciences (Frommberger & Schmees, 2024,). This field is marked by established university chairs, vocational teacher education programs, a specialized research community, scholarly journals, and structured support for early-career researchers. The development of TVET studies in Germany, for example, is closely linked to the professionalization of vocational teachers and is considered a fully institutionalized academic discipline, in line with Clark's model of scientific institutionalization (Clark, 1972, as cited in Reinisch, 2009).

TVET research in Costa Rica is a comparatively young academic field, emerging in the early 2000s. Over the past decade, initial progress has been made, evidenced by a growing number of researchers and publications—particularly on the TVET system and dual vocational education—some of which have gained international visibility. Nonetheless, empirical studies reveal persistent research gaps that should guide the formulation of a future research agenda (Rommel et al., 2024a). The field remains underdeveloped, and its academic and policy relevance is not yet fully consolidated. Baumann and Láscarez Smith (2020) describe Costa Rican TVET research as still in its formative phase.

While the Costa Rican discourse on TVET includes typical elements such as expressed needs for vocational education research, existing programs in vocational teacher education, and some academic research efforts, no specific scientific focus related to TVET has been promoted or finally institutionalized, either at universities or at institutions addressing TVET-related issues. Based on a study carried out by Rommel et al. in 2024 it can be shown that, TVET research in Costa Rica in the context of articles and publications between January 2000 and May 2023, focused on the main topics of the TVET system and dual VET. This reflects the growing interest in both topics in Costa Rica from both the academic and business sectors, especially in dual VET since 2019, with the business sector showing greater interest in applied research that

allows them to learn about alternative solutions to their problems with skilled human resources at the technical level.

In summary, since 2020, research activities in the field of TVET in Costa Rica have shown noticeable growth. This is reflected in an increasing number of publications, the rising academic qualification of authors, and the expansion of the researcher community. Most peer-reviewed contributions originate from Costa Rican scholars affiliated with public universities, as well as researchers from European institutions, particularly in Germany and Switzerland. Although Costa Rica has four academic journals that occasionally publish TVET-related articles, their primary focus remains on general education. To date, no specialized research institute or university center exclusively dedicated to TVET exists in the country. TVET research in Costa Rica is still fragmented. Institutional cooperation is limited, and a coherent national research network is in its formative phase. To this day, TVET institutions in Costa Rica often operate in isolation— "like islands"—highlighting the pressing need to maintain dialogue among researchers, as this remains a major challenge for the further development and institutionalization of the field (Rommel et al., 2024a).

4. Conclusion

The described challenges and developments surrounding the Costa-Rican TVET system outline the fundamental challenges, needs, and potentials associated with TVET in Costa Rica, as well as the corresponding research needs. In recent years, both national stakeholders and international cooperation partners have undertaken considerable efforts to address these challenges and to strengthen TVET and TVET-related research in the country. These efforts encompass the promotion and adaptation of dual vocational education models, the professional development and qualification of vocational teachers, and the institutional support for the establishment and expansion of a sustainable TVET research infrastructure. Overall, this reveals three fundamental key topics that affect the Costa Rican TVET system, namely the qualification of skilled workers to meet the demands of the labor market, the qualification of teachers in the TVET sector and the adaptation, implementation and consolidation of efforts to introduce dual VET. At the same time, it raises the question of research efforts and how TVET research itself is implemented in Costa Rica and what the current status of TVET research as a discipline is.

In this context, a wide range of thematic focal points can be identified, many of which may be addressed within the scope of academic research. On the one hand, research itself is a central subject of analysis; on the other hand, attention is also directed towards aspects such as the implementation of dual

training modalities, political initiatives, and the actors involved, including their significance and roles within the system. Additionally, topics related to pedagogical qualification, didactic models and theories in vocational teacher education, as well as the design of teaching and learning processes, are also of considerable importance.

In this context, this book offers a comprehensive overview of current research to different topics surrounding TVET in Costa Rica. The contributions span a wide thematic spectrum—from teacher education, pedagogical skills and theories in teaching, policy initiatives, and the interrelation of practical and theoretical training in Costa Ricans TVET. By doing so, it seeks to contribute to the academic discourse and support the ongoing professionalization and further development of the TVET system in Costa Rica and its research efforts.

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The Role of Public Policy in Technical Vocational Education and Training: Implications for Costa Rican Socio-Economic Development

Keywords: Public Policy, Policy Theories, Technical and Vocational Training, Socioeconomic Development

Abstract

The Technical Vocational Education and Training (TVET) policy in Costa Rica has been influenced by the country's shifting development models and their ideological and material conditions (Láscarez-Smith, 2023). Under the neoliberal model of Costa Rica, the role of the state has been redefined, limiting its ability to build alliances between state and non-state actors within the TVET system (Arias & Romero, 2019; Contreras, 2023; Mercado, 2023). This has contributed to a persistent mismatch between the skills of the workforce and the evolving demands of industry, hindering employment opportunities and the nation's socio-economic development (OECD, 2025).

This article, through a literature review, examines the trajectories of public policies in TVET and their impact on Costa Rica's socio-economic progress from 2016 to 2024. It employs case studies to identify practices, strategies, and discourses reflected in public policies (Moriarty et al., 2019). The analysis draws on specialized search engines, scientific journals, and the institutional repositories of international organizations and Costa Rican institutions related to the selected case studies.

The findings suggest that current TVET policies in Costa Rica, which prioritize the state's role in serving specific economic sectors, risk perpetuating socio-economic inequality. Public actions in TVET between 2016 and 2024 have not adequately addressed structural issues, particularly those affecting vulnerable populations in contrast to higher-income groups. This imbalance limits the potential of TVET to contribute to equitable socio-economic development.

The article concludes that a more scientifically grounded approach to TVET policy could enhance public debate and policymaking, supporting Costa Rica's socio-economic, technical, and scientific advancement.

1. Introduction

Public policies are shaped by social, political, and economic phenomena that are framed by institutional systems that seek to regulate power relations between state, social, and market actors (Pino, 2017; Frick, 2018). Today, the scenario where public policy converges is characterized by a globalized and largely deregulated economy, where regional political blocs have a growing impact on institutional dynamics, and where civil societies are increasingly active participants in political processes (Hernández et al., 2021). This context transforms the traditional foundations of public policy analysis and requires constant adaptation to understand new global structures and dynamics (Fontaine, 2015).

As a concrete example, Costa Rica, in the last 50 years, has experienced different ways of managing public affairs due to the change from the Keynesian-rooted import substitution industrialization model to a neoliberal state in the 1980s (Arias & Romero, 2019; Valverde, 2015). Before the change of economic model, Costa Rica had interesting developments related to public policy for Technical Vocational Education and Training (TVET). For example, the National Education Plan (MEP, 1972), which came into effect in 1973, sought to strengthen the Costa Rican education system to make it more accessible, inclusive and relevant to the social and economic needs of the time with very specific proposals: expanding access to education, modernizing educational infrastructure, updating curricula by reinforcing key areas such as science, mathematics and technical studies, promoting literacy, strengthening teacher training and promoting technical and vocational education.

The Centro de Investigaciones y Perfeccionamiento para Profesores de Educación Técnica (CIPET)[1] was also created; land was acquired to expand the infrastructure of Agricultural Technical Institutes; Law 5202 was passed, reforming Article 78 of the Political Constitution, establishing a new structure for the Costa Rican education system: initial education, basic general education, diversified education (technical education) and higher education. It creates the National Commission for the Coordination of Technical Education comprising the Ministry of Public Education (MEP), the National Learning Institute (INA), and the Technological Institute of Costa Rica (ITCR)

1 It is currently the Centre for Pedagogical Training and Educational Technology of the National Technical University, where there is a Chair of Technical Vocational Education and Training.

(Alvarado et al., 2016; Constitutional Reform Article 78, 1973). In general terms, in the late 1970s and early 1980s, education policy sought to be an instrument to mediate, in a democratic manner, the resolution of social inequalities and the evolution of the political system (MEP, 1981, p.10 cited in Alvarado et al., 2016, p. 145).

Since the entry of the neoliberal economic model, policy conditioning has been strongly influenced by normative elements with global solutions to address various problems and needs, which were proposed by large transnational organizations such as the International Monetary Fund (IMF), the World Bank (WB) and the European Organization for Economic Cooperation and Development (OECD) (Camacho et al., 2022). This happened in Costa Rica as well as in other countries in the Central American region where they adopted different recommendations from these international bodies.

This period of transformations was implicitly and explicitly nuanced by public structural adjustment policies, derived from the approval and signing of the Structural Adjustment Programs (SAPs) I (SAP-I) in 1985, SAP-II in 1989 and SAP-III in 1994 (Lizano, 1990; Láscarez-Smith, 2023). In the context of the neoliberal state and under the slogan of restructuring the economy, it was necessary to create specific policies and programs to support the achievement of these objectives (adequate use of the factors of production: labor, land, capital and technology). This led to the consolidation of international markets as the main driving force (Vargas-Solís, 2024). State intervention played a key role in this process, mainly in projects such as free trade zones, temporary imports, export contracts, the promotion of banana plantations and the tourism law. In other words, the logic was not to promote national production in order to substitute imports and supply the domestic market, but rather to force the country to compete in international markets (Lizano, 1999).

In this new political and economic scenario, the TVET structures that had been built from the perspective of the previous development model (60s and 70s), suffered strong criticism in the face of the discourse of modernization and its capacity to respond to state decisions after the SAPs (80s and 90s) (Láscarez-Smith, 2024). In this sense, Costa Rica's integration into the international market in the face of unfavorable competitive conditions fostered a robust national industry under the import substitution model, reflecting, for the business sector, an inefficient TVET with little socio-cultural value (Láscarez-Smith, 2024; Camacho Calvo et al., 2024). The participation and consolidation of economic and social sectors at both the national and international level were crucial in this process. These sectors played an important role in defining and delimiting the socio-labor and productive challenges facing the country at different levels (local, regional, national or global), while at the same time establishing mechanisms and instruments to guide the transformation of the new economic model in Costa Rican society and economy (OCDE, 2025).

In this way, this article opens the debate on the construction of public policies for TVET and its role in Costa Rican socio-economic development. It mainly presents some perspectives on governance and the roles of state intervention in the context of TVET, which, in the Costa Rican case, is configured around a series of political decisions with the participation of state and non-state actors that involve shifts of power in various directions, upwards (international actors and organizations), downwards (regions, cities and communities) and outwards (corporatization, privatization).

In order to guide the development of this analysis, a research question was formulated: How could public policy for TVET, at its different levels, be an obstacle or an opportunity in the socio-economic advancement of Costa Rica? To this end, a general conception of public policy is addressed, the fundamental considerations in the planning and implementation of public policy are characterized, and the public policy instruments available to Costa Rican TVET from 2016 to 2024 are presented. Finally, the main conclusions derived from the analysis are presented.

2. Paths and Challenges of Socioeconomic Development in Costa Rica

Although, over the years, the economic model was successful in attracting foreign capital and boosting exports, mainly in the free trade zones in Costa Rica, it also generated a dualized economy with major structural problems that have negatively affected systems such as the labor market, education, public finances and, therefore, the distributive equity of development (Vargas-Solís, 2024). After 50 years, issues such as access, coverage, and social justice in the Costa Rican education system continue to be topics of discussion on the current political agenda.

The State of Education Program (PEN, 2023) asserts that Costa Rica presents a setback in educational access and quality in large segments of the population, mainly associated with political decisions, historical lags and the Covid-19 crisis. Educational deficiencies at different levels, including at the technical education level, have led to significant gaps in areas such as access, relevance and quality of education in areas such as access, relevance and quality, which have an impact on the country's development (PEN, 2023; OCDE, 2025). For example, according to the National Institute of Statistics and Census (INEC), the average level of schooling of people aged 15 and over has not varied significantly over the last 10 years, according to per capita

income quintile. This could reflect a stagnation in the educational and social mobility of these people, as a result of structural inequality.

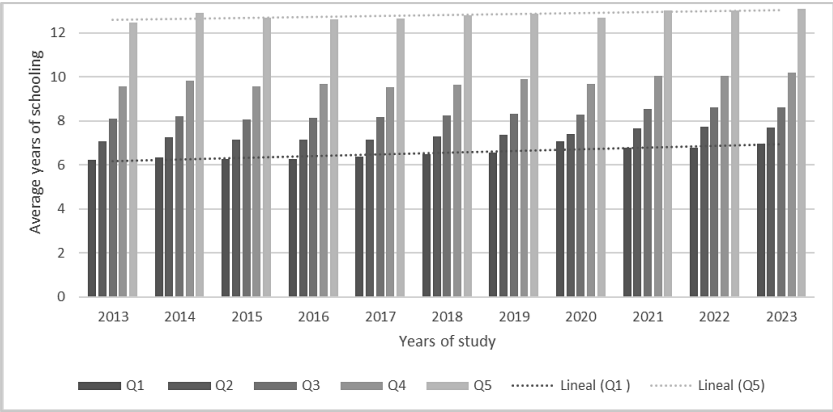

Figure 1. Time series of average schooling of persons aged 15 and over in Costa Rica by per capita income quintile

Note. Own elaboration based on INEC data (2023)

Although the educational attainment levels in formal technical education with respect to persons with a full or incomplete qualification have shown an increase over the last 10 years, the year-on-year comparisons do not show an increasing trend, but rather an average decrease by 2023 (see Figure 2). The average even shows a decrease for the year 2023 (see Figure 2), which is partly justified by the crisis generated by COVID-19, but also by deficiencies in policies and investment directed at the Costa Rican TVET system (PEN, 2023).

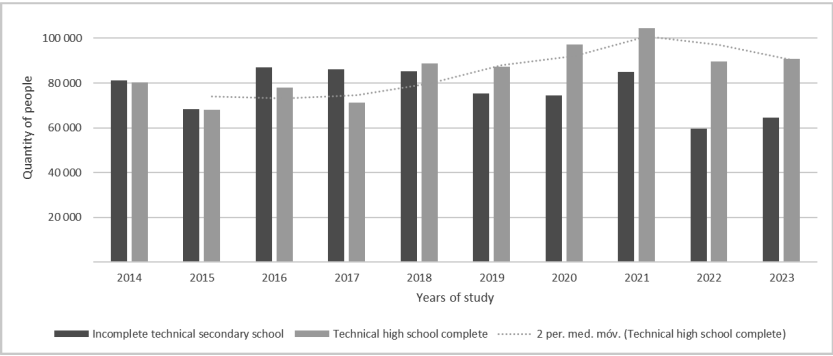

Figure 2. Level of technical education complete and incomplete

Note. Own elaboration based on INEC data, (2023)

Another highly relevant aspect is the demographic change that Costa Rica has undergone in recent decades, which has generated a significant reduction in the number of young people and an increase in the adult population, turning the country into an aging nation (Láscarez, Vargas and Baumann, 2020). Along these lines, there is a high demographic dependency, which refers to the ratio of the under-15 and inactive population to the labor force. This condition redefines the needs of the education system, the labor market and social dynamics, challenging policies and their role vis-à-vis the Economically Active Population (EAP) as a relevant factor for socially just development. The EAP, mainly in the per capita income quintiles, has an increase in dependency (mainly economic and care) of people under 15 and over 64 years of age. In comparison between the first and fifth quintile, dependency doubles (see figure 3).

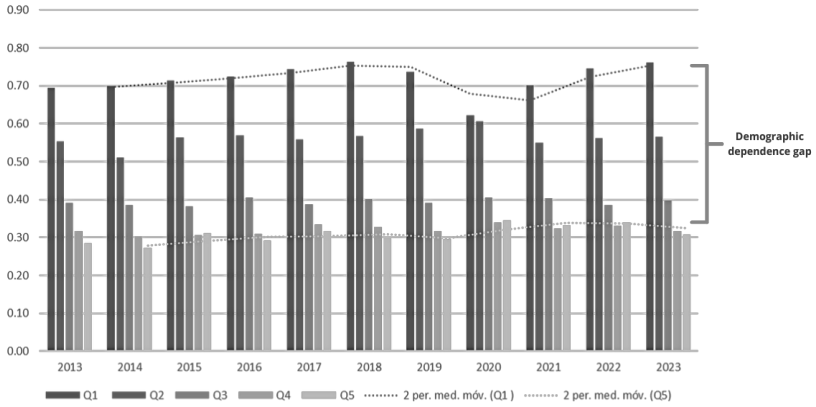

Figure 3. Time series of demographic dependence between quintiles by per capita income

Note. Own elaboration based on INEC data (2023)

Another example is that inequalities between urban and rural areas are still perpetuated, disaggregated unemployment, mainly among young women, among others (INEC, 2024; Rivera-Alfaro, 2024), these figures show the need to incorporate policies that have a greater impact on the reduction of structural gaps, mainly aimed at the most vulnerable populations.

In relation to the market, Costa Rica maintains a dual economic structure, characterized by the coexistence of a small group of large, highly productive multinational companies, mainly oriented towards international markets, together with a large majority of small and medium-sized local companies (SMEs), whose focus is limited to the domestic market and which face

significant difficulties in expanding and accessing export markets. This dual configuration has been identified as a determining factor in the low levels of labor productivity that persist in the country (OCDE, 2025).
For example,

> *"one of the limitations on the country's development is that there is little cooperation between the business sector and public or private educational or research centers in Costa Rica, and what cooperation there is is mainly for training purposes".* (OECD, 2025, p. 108, translated by author)

Specifically, the OECD report, 2025, states that:

> *... the education system has struggled to keep pace with the growing demand for professionals with advanced technical and high-tech skills, resulting in a significant skills shortage, which now poses a critical threat to the attraction of FDI to Costa Rica and to its ability to maximize the benefits of trade. More generally, the education and training system faces structural challenges that prevent many Costa Ricans from obtaining transversal skills to support lifelong learning. (...) It is key to increase the number of technicians and graduates in STEM areas and to expand digital and English language skills in order to create a qualified workforce capable of promoting the country's integration into global value chains, while attracting investment from high-tech industries with high added value.* (p.112, translated by author)

In other words, Costa Rica faces multiple challenges related to the performance of the education system and the gap between the job offer and the skills of the population in search of work. A significant proportion of people do not have the skills required by the labor market, therefore TVET plays a key role in this response (Fuchs, 2021). Despite the implementation of wide-ranging public policies, gaps remain in the precise definition of the mechanisms and processes necessary for their effective implementation. (OECD, 2025; PEN, 2023; INEC, 2023)

3. Theoretical References: Public Policy in the Educational Sector

In democratic political systems, public policy is focused on the problems that stakeholders believe require the most public attention (Head, 2022). Public policy debates that influence agenda-setting essentially focus on analyzing the nature and urgency of policy problems, as well as on determining the most appropriate strategies to address them and develop effective policies. In this

process, three fundamental and closely interrelated dimensions become relevant: scoping problems, formulating viable solutions, and mobilizing support for prioritizing concrete actions (Crowley, Kay & Head, 2020; Kingdon, 1985; Haven-Smith, 1990). However, there is a significant disconnect between the objectives formulated at the macro level in public policies and the real behaviors of individuals at the micro level. Although this phenomenon is not new, it has so far been barely addressed in the field of Technical and Vocational Education and Training policy (Schmees & Grunau, 2025).

Part of the need to increase analysis and studies on public policies in TVET stems from the fact that technical and vocational education is particularly exposed to the pressures derived from the neoliberal approach, to a greater extent than other levels of the education system. This is because the institutions that make it up have less autonomy compared to universities or schools, and their aims are commonly conceived as being primarily oriented towards preparing individuals to enter the labor market (Wheelahan & Moodie, 2025)

Although, from the traditional perspective, public policy formulation follows a sequence that includes the identification and definition of a problem, the incorporation of the proposal in the political agenda, the design of the policy, its implementation and, more recently, its evaluation (Lasswell, 1936; Höchtl, & Schöllhammer, 2016). This approach integrates key actors, who provide specialized information and exercise advocacy power in the process, as well as involving the allocation of institutional resources to ensure its implementation (Camou & Pagani, 2017). Under this perspective, the state materializes through institutions that take various forms, designed to guarantee governance, promote development and ensure a distribution of social surplus from a tripartite vision: the market, civil society and the state (Cicogna, 2020; ECLAC, 2014).

In this way, the role of the state determines, to a large extent, the roles played by other social actors, their level of participation and influence in decision-making and the political conflicts that are generated around social problems (Lindvall & Rogers, 2023). For example, the role of the state can vary according to Meny and Thoenig (1992) in three groups: the first group places the state with a social focus and a functionalist sense to attend to social demands and needs, privileging the individual and society; the second group positions it as an instrument at the service of a social class or specific social groups; and the third group proposes an intermediate point or balance between the state and society (neo-corporatist and neo-institutionalist theory: approaches centered on communities, subsystems and policy networks).

Approaches can vary, and generate new dynamics of interaction between society and government, which are based on networks of actors as the basis of governance (Frick, 2018). According to Mariñez (2011), more participatory approaches could facilitate greater institutional democratization and flexibility

in public management, which in turn would enable a new form of legitimization of public action, since they imply the inclusion of new actors with their own legitimacy, interests and concerns, as well as the creation of spaces for the debate of social problems, which would lead to institutional redesign. Approaches with less participation would generate effects contrary to this.

Currently, the perception of the state and society has changed, the ways of solving structural problems are permeated by economic liberalism, the social values of liberal democracy and the weakening of the state, as well as the new conceptions of the individual in a highly digitalized world, with great economic and social inequalities, exposing the need for rethinking such as social justice and sustainable development (Camou & Pagani, 2017; Mercado, 2023; Aguilar, 2023; Sousa Santos, 2023; Contreras, 2023; Chraki, 2020). Some authors argue that one cannot speak of a single science for public policy, but that a distinction should be made between political science (with its theories of power) and public administration (with its theories of administration) (Sartori, 2006; Cairney, 2012; Cairney, Sabatier & Rhodes, 2012). For others, the problem lies in the separation between theory and practice, i.e. while significant efforts have been made to advance the analysis of public policy through theoretical production around power in the decision-making process, the analysis of the interaction of actors has remained virtually stagnant (Camou & Pagani, 2017; Fontaine, 2015; Cairney, Sabatier & Rhodes, 2012; Dente & Subirats, 2014; Cardozo, 2012).

Research related to education policy has been no exception, due to the persistence of implicit assumptions linked to rationality, positivism and reductionist views of evidence, which omit to consider the crucial role that process, decisions, actors and power dynamics play in the creation, understanding and experience of public policy (Douglass & Anderson, 2018; McGrath & Ramsarup, 2024). Thus, in recent years, the value of conducting various empirical and theory-based public policy research has been recognized in order to simplify the complexities of power and actor dynamics and thus, in some way, understand the interactions in decision-making and aspects related to its components or lack thereof in particular contexts (Crowley et al., 2020; Cairney, Sabatier & Rhodes, 2012; Camou & Pagani, 2017).

These contexts are distinguished by the presence of a specific set of ethical ideals, principles, doctrines, myths or symbols associated with a social movement, institution, class or broad group, which provide a vision of how society should be structured and propose a political and cultural framework oriented towards a particular social order (Sartori, 2006; Douglass & Anderson, 2018, Allais & Schöer, 2024). For example, Wheelahan & Moodie (2025) argue that public vocational training schools should not be conceived merely as providers of educational services, but as state institutions that play a fundamental role in the implementation of public policies in the field of TVET.

The existence of strong vocational centers, adequately financed and managed with public resources, is a necessary —although not sufficient— condition to guarantee a quality technical and vocational education offer that responds effectively to social, economic and productive demands.

4. Methodology

The article was developed from the case studies of public policy in the Costa Rican context. This type of methodology recognizes that science is not created in a vacuum and demonstrates the need to pay attention to the political and cultural context, together with the social and ethical concerns that influence the production, negotiation, and reception of science in specific cases. (Moriarty, et. al. 2019)

Likewise, the analysis is carried out from a rhetorical approach, that focuses on the close examination of well-chosen cases — often referred to as "representative anecdotes" or case studies — that allow for a nuanced understanding of contextual and situated meanings. Such insights are typically inaccessible through more abstract or decontextualized analytical approaches (Prelli, 2013).

The specific cases analyzed are: the design approved of the Dual Education Law of Costa Rica, the National Qualifications Framework for TVET, the Reform of the Law of the National Learning Institute, and the National Policy on TVET.

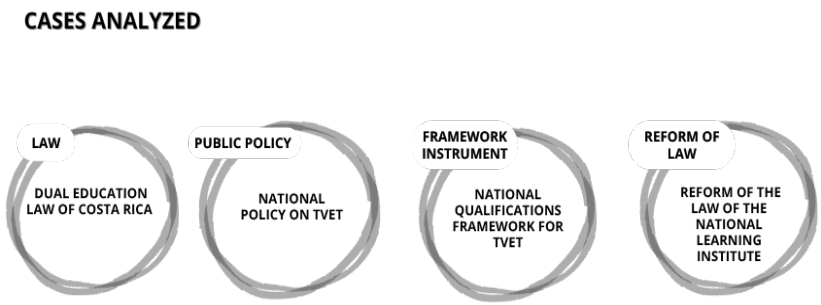

Figure 4. Cases analyzed

Note. Own elaboration

For the literature review and documentary analysis, specialized search engines, digital scientific journals and websites of specialized international

organizations as Scielo; Redalyc; DOAJ (Directory of Open Access Journals), Scopus and Taylor & Francis were accessed; as well as institutional repositories in Costa Rica related to the selected case studies, specifically, the Information Repository of the National Planning System, the Costa Rican Legal Information System, the Inter-institutional Commission for the Implementation and Monitoring of the MNC-EFTP-CR (CIIS), and the National System of Technical and Vocational Education and Training (SINEFOTEP).

The analytical process was carried out through the triangulation of theories which involved analyzing the data set by combining theoretical foundations of public policy, public policy instruments of Costa Rican TVET and empirical data between 2016 and 2024. The limitations of the study are that it only has a theoretical perspective and information from secondary sources and did not address other sources of information such as interviews with key actors that could contribute to other levels of understanding of the conclusions obtained. Likewise, it only addresses policies, laws and framework strategies in their approved designs and not in their implementation.

5. Technical Vocational Education and Training (TVET) System in Costa Rica

TVET systems address various theoretical approaches that may represent different levels of macro, meso, and micro knowledge. For example, what is involved in professional learning and its occupational context (Schmees & Grunau, 2025). Along these lines, Láscarez-Smith (2023) explains that within the TVET system in Costa Rica there are two educational modalities, Educación Técnica (formal), which is responsible for training for work within the formal system and which provides students with general and specialized knowledge to perform in a specific profession (including technical education offered by the MEP and higher technical education offered by institutions such as the TEC and the UTN), and Formación Profesional (non-formal), which provides training for work in the non-formal system, with greater curricular flexibility and more time spent learning in companies, and is offered in Costa Rica mainly by INA and other private institutions.

From this perspective, as defined by UNESCO (2012; 2016), the formal education system is characterized by being institutionalized through public organizations and private bodies that are recognized by national and international education authorities to continue educational trajectories. Whereas, the non-formal education system is institutionalized by an education provider that offers its learners a certification of qualifications, not necessarily

formally recognised by national or sub-national education authorities, and does not necessarily allow continuation to other levels of formal study.

However, although historically both modalities have been differentiated by their objectives, learning orientations, reputation and interests, financing structures and the expectations of the employer sector (Láscarez-Smith, 2023), the vision as a TVET system places them within the same context (social, cultural, economic, labor, political), recognizing the articulation and permeability between the programs offered, the mapping and linkage with the different actors that are related to this system, the laws, regulations and policies that regulate it, the efforts made to outline strategies and joint work routes that allow for progress in central issues such as research with an emphasis on TVET, and the generation of qualitative and quantitative data necessary to guide decision-making processes.

6. Results: The Design of Public Policy in Technical and Vocational Education and Training in Costa Rica: Approaches and Challenges

In the TVET system, other systems such as the educational, labor, political and economic systems converge, so that multiple actors interact in its structure at the macro, meso, and micro levels (Rommel & Vargas, 2022). According to Schmees & Grunau (2025), it is essential to incorporate the perspectives of micro-level actors when designing public policy strategies in the field of Technical and Vocational Education and Training (TVET), considering both their options and the logic that guides their actions, with the aim of achieving significant impacts at the macro level. Likewise, it is necessary to adopt an educational approach that values the mentality and development of the student as an end in itself, and not merely as a means to serve collective objectives or higher interests. In this sense, social demands should be integrated at a later stage, so that an adequate balance is achieved between individual aspirations and social needs. That is to say, part of the driving factors that must be considered for the improvement of the education system are the approaches of the whole system; human capital; governance and the bridges between the macro and micro levels; as well as the availability of resources (Barrenechea et al., 2023).

The diversity inherent in this network of actors implies a plurality of interests, motivations and objectives. In this sense, Láscarez-Smith (2023) points out that there are different levels of participation, which offers multiple opportunities for both scientific analysis and policy development. This perspective becomes particularly relevant in national contexts, such as the

Costa Rican case, where modern TVET structures, along with their functions and objectives, have been defined relatively recently, exposing the need to rethink the modern paradigm of public administration and public policy. From this perspective, Cicogna (2020) argues that public policies constitute specific bureaucratic actions that require circulatory networks of authority, information and resources to guarantee the functioning of the state apparatus and its effective management, for example in the establishment of strategies (path to follow), plans (specifications of form and required resources), and operability (programming of activities).

The design and implementation of public policy, in this sense, depends to a large extent on the ideals and motivations of the actors that shape these systems, which can be oriented in different directions, such as a traditional-bureaucratic approach (Weberian model) or a rights-based approach, where public policies are designed so that people can enjoy access to their rights, and so that these actions succeed in promoting justice, equity and participation (Cicogna, 2020). In the case of Costa Rica, the transfer of competencies and resources through public interventions has been procedural, structural and legal-administrative in nature (Ministerio de Planificación Nacional y Política Económica, 2016). This process has led to the displacement of power towards non-governmental institutions or actors, which have acquired a status of quasi-autonomous dependencies within different levels of government, assuming the responsibility of redefining the implementation of public policies through the influence of economic development and ideological business schemes such as neoliberalism and its constituent components (free market, foreign investment, among others) (Morales & Blanco 2017). An example is the "public-private" alliance that began to replace the conventional model of educational policy design with new policies that responded to the SAPs and the economic crisis that the country was going through between the 80s and 90s, with repercussions on Technical Education, going from training people for the agricultural sector to training for agribusiness and interests linked to international exports. Furthermore, education policy changed its raison d'être from education for social mobility and access to opportunities to prioritizing productivity (Alvarado et al., 2016).

Some of the relevant aspects of these transformations in Costa Rica were the opening of the private sector and the integration of economic policy with social and environmental policy, the creation of a free trade zone with the United States and Mexico, the use and conservation of the environment, the promotion of small and medium-sized enterprises (SMEs), regional commitments (Central American) to promote economic and social development as well as the regional promotion of science and technology, and the entry of the INTEL Company, creating the demand for manufacturing based on medium and high technology (demand for technical and university profiles) (Monge, 2008).

In this context, the Education Policy Towards the 21st Century (1995 - 2005) was designed to strengthen technical and scientific, sports and cultural education as a way to stimulate the comprehensive development of students (Alvarado et al., 2016). However, by the beginning of the 21st century, the effects of short-term planning and the limitations of the opportunities and stability of the economy in the long term generated a national debt for the design, implementation and evaluation of public policies that were adapted to the challenges that the country was facing (PEN, 2001; PEN, 2002). At the time, the unemployment rate, disaggregated mainly by characteristics such as women, youth, and rural areas, increased. Over the years, it was identified that the limited articulation between the various actors that make up the Costa Rican education system significantly restricted the capacity to address social problems and generate effective discussions around possible solutions (PEN, 2023; OCDE, 2025).

In addition, the scientific development of TVET in the country remained at an incipient stage, and did not achieve effective integration between science and policy (Rommel, Angles & Frommberger, 2024; Schmees & Grunau, 2025). This has affected Costa Rican public education policy because, as mentioned by (Mariñez, 2011), these public instruments must transcend the theoretical realm towards the demand for specific skills on the part of the actors involved. Thus, those who participate in their design, implementation and evaluation must have in-depth knowledge of the problems, solutions and objectives to be addressed, as well as clarity about the scope and limitations of their role (Montoya, 2017). Under this logic, the limited theoretical and practical maturity with respect to the issues that encompass Costa Rican TVET generates challenges to reach higher levels of specialization and political incidence. In this context, from 2016 to 2024, five public policy instruments have been approved to guide the Costa Rican TVET system. These cover different levels of decision-making: two executive decrees, one law, one law reform and one long-term strategy. These instruments design and their main purposes are presented below:

6.1 National Qualifications Framework (NQF)

The steps for its creation began in 2015 and involved the organization of the system following the recommendations of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Labour Organization (ILO) and the Organization for Economic Co-operation and Development (OECD). It is presented as an instrument that categorizes and standardizes qualifications and competences

> *"associated from a set of technical criteria contained in the descriptors, in order to guide training; associate occupations; and facilitate the mobility of people at different technical levels; according to the dynamics of the labor market"* (MNC-EFTP-CR, 2019, p. 51, own translation).

It groups technical careers into five levels (Técnico I (Educación general básica), II (Educación general básica), III (Educación general básica), IV (Educación general básica and Educación diversificada) and V (Bachillerato en Educación Media and Diplomado/Técnico Superior Universitario), defining for each of them official qualification standards (i.e. what a graduate should know and do on graduating from the career according to the demands of the labor market). It also establishes the educational and employment routes for people to continue their studies.

As described by the drafting committee of the MNC-EFTP-CR (2019), the main benefits associated with this structure translate into greater articulation and cooperation between the actors of the TVET system, the establishment of parameters for the training and assessment of competences in accordance with the levels of qualification and their availability for the employer sector, and also the definition of routes for training and insertion in the labor sector. This demonstrates a vision (according to the classification of Meny and Thoenig, 1992) of the role of the state as an instrument of service to a specific group, in this case, the labor market and the employer sector.

Main obstacles and opportunities:

- Obstacles: for the system to be effective, high levels of cooperation between multiple actors (educational institutions, private sector, government) are required. This coordination is not always easy, especially in contexts where there are diverging interests or a lack of institutional coordination, as in the case of Costa Rica. Currently, in 2025, the MNC-EFTP-CR does not have any studies that allow us to assess the effects and impact it has had in the country, in terms of employability, generation of changes in learning environments, facilitation of the mobility of people at different technical levels, among others.
- Opportunities: The MNC-EFTP-CR could help to bridge the gap between educational provision and labor market demand, ensuring that Technical and Vocational Education and Training (TVET) graduates have the skills that the productive sector really needs, and the labor market, promoting: public-private partnerships, as well as spaces for tripartite social dialogue. This could improve the governance of the TVET system and its efficiency. On the other hand, it could define clear educational and labor trajectories, allowing people lifelong learning and upward social mobility.

6.2 Law 9728. Dual Technical Education and Training

In 2019, Law 9728 on Dual Technical Education and Training in Costa Rica was enacted, which is presented as a voluntary, comprehensive, practical, formative, continuous, permanent, open and non-exclusive technical education and vocational training strategy that harmoniously integrates the education system and allows students to be trained in two learning environments: an educational centre and a training company, sharing the responsibility for the training process, using their material and human resources (Art. 2).

Educational institutions in the formal sector, such as the Ministry of Public Education (MEP), and in the non-formal sector, such as the National Learning Institute (INA), have incorporated some degree programs under the dual education modality into their training offer. However, although Law 9728 regulates aspects related to the rights and duties of people who choose to pursue this mode of study, in practice, educational centres and companies have been the focus of economic and ideological debates on its implementation. Among the main issues discussed are: the contractual relationship between the student and the company (in Costa Rica, the student does not become a worker, but continues as a student), the role of teachers and mentors and their training processes, the conditions of the physical space and equipment required in the companies to carry out the training, the real capacity of the productive sector to cover costs (such as social charges), the responsibility for the remuneration of apprentices and the economic contribution to the Special Scholarship Fund, among others.

These discussions take on particular relevance in the Costa Rican context, where the business park is mostly composed of small and medium-sized enterprises (SMEs), which represent between 95 % and 97 % of the country's productive sector. Although these companies could benefit from dual training processes by strengthening their productive and competitive capacities, it is not yet clear how they will absorb the human resources and economic demands that are necessary to comply with the legal provisions governing Law 9728.

Within this framework, ideological debates have been generated on the state's position vis-à-vis different stakeholders such as the business sector, chambers and trade unions, especially on how it should be implemented in order to guide and strengthen the country's development strategy. In this case, the state continues to play the role of an instrument at the service of specific social groups to shape dual training. Five years after the law was passed, many companies still consider it costly to incorporate students into their production processes. The lack of cost-benefit studies that demonstrate the real results of incorporating these educational modalities has generated barriers to the legitimacy of the law and its economic and social repercussions. These

tensions highlight the need for scientific studies that provide up-to-date, objective and relevant information for decision-making.
Main obstacles and opportunities:

- *Obstacles:* students are not considered workers, which generates uncertainty about labor rights, benefits and responsibilities of companies and students. The training processes for company tutors and teachers responsible for guiding the apprentice are not sufficiently developed or standardized. This can affect the quality of practical training and coherence between educational environments. The lack of empirical data on the economic and social impact of the dual model limits the legitimacy and acceptance of the law. This generates mistrust in the productive sector and slows down implementation. The law is perceived as an instrument at the service of particular interests, which polarizes the debate.
- *Opportunities:* Dual training can improve the productivity of SMEs by enabling them to draw on young, skilled talent, tailored to their needs. It enhances the development of internal capacities, especially in sectors where it is difficult to attract qualified personnel. Strategic alliances are created between educational institutions and companies, which can lead to innovation projects, professional internships and greater alignment with the demands of the labor market. Facilitating the incorporation of companies, especially SMEs, opens the door to: tax incentives; subsidies to cover training and technical assistance costs and mentor training. On the other hand, the recognition of the need for objective studies can stimulate the production of applied research, impact studies and evaluations of public policies that better guide the implementation, or non-implementation, of dual training.

6.3 Reform of the INA Law

The National Apprenticeship Institute (INA) is an autonomous entity that was created by Law N. 3506 of 21 May 1965, reformed by its Organic Law N. 6868 of 6 May 1983 and last modified in 2021, with the reform of Law 9931 called "Strengthening vocational training for employability, social inclusion and productivity in the face of the industrial revolution 4.0 and the employment of the future" (Láscarez-Smith, 2023).

The INA promotes the training of people around the needs of three different productive sectors: agriculture, industry and commerce, through short and long-term careers, with which it seeks to boost economic development and contribute to the improvement of the living and working conditions of the

Costa Rican population through training, education, certification and accreditation for productive, sustainable, equitable, quality and competitive work. This is evident in Article 2 of this new reform, which refers to the purpose of the INA: "To promote, develop and improve transferable skills that strengthen the ability of people to find, maintain and improve the conditions for quality work or for entrepreneurship and business development (...)" (Ley de Reforma del INA, 2020, art. 2, own translation).

In principle, the 1965 law sought the design of training and vocational training programs to favor, as a priority, the increase of family income of low-income population groups and people in vulnerable conditions, that is, it prioritized a State with a social focus and a functionalist sense to meet the demands and social needs, giving priority to the individual and society. In contrast, the 2021 reform included a new focus and role of the state as an instrument of service to specific social groups, prioritizing employability and labor market demands by strengthening the INA's capacity to respond to the changes of the 4.0 revolution, transforming the recruitment of its teachers through greater administrative flexibility, scholarships to study in other institutions if the INA does not offer programs that the labor market demands, and incorporating employability issues and business development as central objectives (INA, 2021).

Main obstacles and opportunities:

- *Obstacles:* The transition from an inclusive social model (focused on low-income and vulnerable people) to a focus on employability and the labor market can generate tensions and inequality in access. There is a risk of neglecting historically vulnerable sectors, as the prioritization of market-oriented employability could sideline unprofitable programs. The greater flexibility in hiring can bring risks of precarious employment for teachers and instability in the continuity of training programs if staff are hired under less stable arrangements, which can impact on the quality of education and training. Dependence on other institutions for training can lead to the possibility of a recognition of internal limitations. That is to say, an outsourcing of responsibility instead of strengthening one's own offer. This can lead to fragmentation in training and make it difficult to coordinate programs. In addition, structural transformations and the new approach can provoke internal resistance from staff, unions or social actors who defend more social models.
- *Opportunities:* Effective management of change is needed to avoid blockages or loss of legitimacy. By incorporating business development and entrepreneurship as a strategic axis, an entrepreneurial culture is promoted that can boost the economy, especially in key productive sectors. This can favor the productive diversification and economic self-sufficiency of trained people. The

possibility of funding training in other institutions broadens the educational options available to beneficiaries, without them having to depend exclusively on the training offered by the INA. It can improve geographical coverage and the availability of technical specialties.

6.4 National System of Technical Vocational Education and Training (SINEFOTEP)

Decree No. 43481-MEP-MIDEPLAN-MICITT-MTSS entitled Sistema Nacional de la Educación y Formación Técnica Profesional (SINEFOTEP) of 2022, is created as a body of maximum deconcentration of the Ministry of Public Education and its scope refers to:

> *"(...) the processes inherent to technical and vocational education and training, whether formal, non-formal or informal, developed by the country's public or private entities and organizations, productive sector bodies and social actors aimed at both promoting and developing the skills required by people for life and the world of work, through coordination, articulation, social dialogue and international cooperation."* (Decreto Ejecutivo N.° 43481-MEP-MIDEPLAN-MICITT-MTSS, 2022, para. 22, own translation).

Its overall objective is to "coordinate, from a systemic approach, the actions carried out by the parties involved in TVET, through the management of processes that allow the establishment of timely, relevant, adaptable, quality and impact; in an equitable, inclusive and sustainable manner that responds to the needs of the economic and social context" (Decreto Ejecutivo N.° 43481-MEP-MIDEPLAN-MICITT-MTSS, 2022, páara. 39, own translation).

This decree encourages the articulation and linking of different actors (academia, trade unions, business chambers, ministries, etc.) in working groups and tripartite dialogue spaces for the construction of strategic instruments such as, for example, the Strategic Plan for Technical Vocational Education and Training in Costa Rica and its implementation. Under this logic, the government fulfils the neo-institutionalist function based on subsystems and policy networks.

However, this political initiative is weak in its sustainability in terms of the principle of hierarchy of norms, as it is a decree and not a law. Furthermore, it is a body without its own budgetary content that would allow it to guarantee the operationalization of concrete actions over time in accordance with its competencies. This implies greater dependence on the availability of resources

from other bodies, as well as the political will to include its actions in the public agenda.
Main obstacles and opportunities:

- *Obstacles:* SINEFOTEP was established by decree (No. 43481), which means that it lacks the binding force and legal stability of a law. This makes it more vulnerable to changes in government or political priorities, as a decree can be modified or repealed relatively easily. The organization does not have its own budget allocation, which limits its operational capacity and its ability to implement specific actions. This makes it dependent on resources that can be managed or allocated from other ministries, organizations or international cooperation. It involves multiple actors (ministries, business chambers, unions, etc.), which can generate bureaucracy, delays and conflicts of interest. It requires efficient coordination mechanisms to guarantee the effectiveness and coherence of policies and programs.
- *Opportunities:* SINEFOTEP proposes a systemic coordination that allows aligning efforts of all TVET actors (formal, non-formal, and informal), which can avoid duplication of actions and promote productive synergies. It encourages the participation of academia, trade unions, business chambers and ministries, which promotes a tripartite dialogue and the agreement of more democratic and consensual policies. These spaces can facilitate the social legitimacy and acceptance of the policies and plans formulated. The structure allows for the management of international alliances that can contribute technical and financial resources, as well as best practices from other countries that have already consolidated robust TVET systems.

6.5 National Policy on Technical Vocational Education and Training (PNEFTP, 2023-2033)

In 2023, the National Policy on Technical Vocational Education and Training 2023-2033 (PNEFTP) was approved with the aim of promoting employability, sustainability, entrepreneurship, and upward social mobility for the economic and social development of the country's regions.

The design of this policy was seen as a breakthrough both for the TVET system and for education policy in general. It was elaborated in a participatory manner, involving the sector's key institutions and actors. It included a participatory diagnosis, which was complemented with statistical and qualitative data, various bibliographical references and the holding of

workshops and working groups with public and private actors to identify needs and the target population.

The PNEFTP is presented as a policy with a state vision, which defines its strategies and action plan on the basis of an articulated work between the institutions of the TVET system, that is, through a neo-institutionalist state role.

However, some aspects of the policy show inconsistencies. Despite the ambition of its objectives, indicators and targets, and the defined strategic axes (Quality, Relevance, Research and Learning Pathways for Inclusion), the policy does not adequately address complex variables such as gender, regionalization, and coverage. These omissions could hinder the effective achievement of the objectives and the expected impact. The lack of depth in its approach reflects an unclear methodology and the absence of philosophical and ideological discussions in its formulation, which could have facilitated a more comprehensive and context-specific approach.

In general terms, the effort made in the design of the policy is recognized, as it has strategic and operational lines of action, but the integration of other levels of governance in its construction is questioned, as well as the lack of clarity regarding the methodology used in the diagnostic phase and the lack of rigor in the monitoring and evaluation proposal. In other words, the PNEFTP is limited in its ability to better approximate this complex understanding of Costa Rican public action and, therefore, its design does not make visible proposals on how problems and needs closely linked to its central theme can be solved.

Main obstacles and opportunities:

- *Obstacles:* The policy does not comprehensively address sensitive issues such as: gender equity in access to and permanence in TVET; regional inequalities, which particularly affect rural or less developed areas; and expansion of coverage for historically excluded or vulnerable populations. Although a participatory diagnosis was carried out, the methodology used is questioned due to the lack of rigor in the collection and analysis of data, as well as the absence of a philosophical and ideological discussion that would enrich the policy's approach and conceptual framework. This can weaken the technical soundness and the strategic foundation of the policy. There is little coordination with subnational or local levels of governance, and although the objectives and goals are ambitious, it is not clear how the actions to achieve them will be operationalized, hindering effective implementation in the regions.
- *Opportunities:* The PNEFTP is presented as a public policy with a state vision, which ensures its continuity over time beyond political cycles. In other words, it allows for strategic planning for the medium and long term. This strengthens the neo-institutionalist governance of

TVET in Costa Rica. The policy prioritizes issues relevant to the economic and social development of the country, so it could promote employability and training relevant to the current labor market and sustainability, to align TVET with environmental and technological challenges. If the weaknesses identified (such as regionalization) are addressed, the PNEFTP could contribute to equitable regional development and strengthen human capital in the regions, enhancing their local competitiveness. The PNEFTP can be a key instrument for managing international cooperation, attracting development funds and technical assistance and strategic alliances to modernize TVET and adapt it to the challenges of industry and climate change.

7. Conclusions

In Costa Rica, TVET has gained more and more presence and prominence over the last 40 years, bringing together various social, trade union, business, and political actors in debates for the development and strengthening of this system and its impact on the country's development. In addition, progress has been made in significant contributions such as the National Qualifications Framework, Law 9728. Dual Technical Education and Training, the INA Reform, the creation of the National System of Technical Vocational Education and Training (SINEFOTEP) and the National Policy on Technical Vocational Education and Training (PNEFTP, 2023-2033).

Despite this, progress in terms of public policies for TVET has been slower than expected, and the tendency to import and adopt state models that reproduce instruments that serve specific social groups and perpetuate prevailing structural conditions such as the structural gaps between the poorest and richest quintiles continues. It is concluded that Costa Rica's TVET-related policies, by prioritizing the role of the state in serving specific economic sectors, risk perpetuating socioeconomic inequality. Public actions in TVET between 2016 and 2024 have not adequately addressed structural issues, particularly those affecting vulnerable populations in contrast to higher-income groups. This imbalance limits the potential of TVET to contribute to equitable socioeconomic development. Specifically, it was found that Law 9728 is a key instrument for the articulation and modernization of technical and vocational training in Costa Rica. However, it faces obstacles in implementation, social inclusion and flexibility to respond to dynamic changes in the world of work. If these challenges are managed properly, the system has high potential to improve the employability and competitiveness of Costa Rican human capital. Law 9728 faces structural, economic and ideological obstacles, but it also generates great opportunities to strengthen the EFTP

system and the economic development of the country. The key is to overcome the identified barriers through effective public policies, social dialogue and solid empirical evidence.

The INA is in the process of institutional modernization, with a new role that prioritizes employability and the demands of the labor market over a more social historical approach. This transformation offers opportunities for innovation and greater competitiveness, but faces obstacles in terms of equity, internal management and technological adaptability.

In the case of SINEFOTEP, it is an innovative proposal that seeks to coordinate and articulate the TVET system in Costa Rica to make it more relevant, inclusive and adaptable. However, it faces significant challenges of sustainability, financing and legal legitimacy, which must be addressed to guarantee its impact and long-term permanence.

Finally, the PNEFTP 2023-2033 represents a significant step forward for the development of technical and vocational education and training in Costa Rica, but its success depends on correcting weaknesses in methodology, governance and inclusive approach. If it manages to overcome these obstacles, it could become a powerful tool for improving employability, social inclusion and regional development.

The construction of public policies requires scientific contributions for decision-making based on rigorous data and information; otherwise, both the systemic vision and the contributions that could be generated by multidisciplinary teams specialized in these issues are restricted. This, in turn, hinders the development of a critical and analytical debate on the conceptual and practical logic of the policies designed for Technical and Vocational Education and Training (TVET). This situation is framed within a context of transformation of state intervention processes and the adoption of new development models characterized by greater flexibility and participation. In this scenario, various actors- political, economic, academic, and civil society, among others-must assume a more active role both in the identification of prevalent problems and needs and in the definition of alternative solutions. To be effective, these alternatives need to be formalized through public policies that are clear, justified, operational and inclusive.

Consequently, it is recognized that, throughout its history in the field of TVET, Costa Rica has made various efforts to implement public policies aimed at creating opportunities and reducing social and economic gaps through education. However, these efforts have been insufficient to achieve the stated objectives. The change in the economic model initiated in the 1980s, combined with public policies that lack a coherent articulation and a medium- and long-term strategic vision, has negatively affected the development and expansion of this system and its contribution to socio-economic growth.

Adopting a scientific and empirical approach to the analysis of this field would be essential to provide a deeper insight into the progress made and its

potential to solve existing problems. Such an approach would not only contribute to improving the social perception of TVET and its link to the labor market, but would also strengthen the sector's capacity to respond to contemporary challenges. In addition, a stronger orientation towards scientific research could significantly enrich public policy debates and decisions, fostering the country's technical, scientific and socio-economic progress.

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National Qualifications Framework for Technical Vocational Education and Training the Costa Rica: theoretical and practical foundations, projections and challenges

Keywords: National Qualifications Framework, Technical Education and Vocational Training, Curriculum, Qualification Standards, Challenges Costa Rica

Abstract

Qualifications Frameworks (NQFs) represent an essential tool for defining qualifications and structuring educational provision. Qualification standards integrate competences and learning outcomes that respond to the demands of the sectors and technological transformations, in order to offer relevant training to the student population. This contribution describes the National Qualifications Framework for Technical Vocational Education and Training of Costa Rica (NQF-TVET-CR), in order to identify the requirements, challenges, and projections derived from its implementation in the Costa Rican context. It also analyses how this Framework contributes to continuous improvement, innovation, quality, and significant changes in the country's Technical Vocational Education and Training (TVET).

Furthermore, it highlights the fundamental role of the NQF-TVET-CR in the improvement of learning spaces and its impact on the socio-labor environment of the country, particularly for the benefit of students. For this purpose, an analysis and documentary review of various national and international manuscripts related to the topic was carried out. In addition, the linkage of this NQF with public and private organizations was examined to determine its impact, benefits, and relevance in the field of TVET.

For these purposes, substantive aspects of Critical Theory were considered as a referential framework to promote and develop transformations in learning spaces and training processes. In conclusion, the contribution addresses the current challenges, projections, and changes needed to position TVET in Costa Rica.

1. Introduction

Qualifications frameworks (NQFs) emerged in 1960 with the aim of standardizing learning outcomes and benefiting student populations, but were consolidated in 1980 in Europe and began to spread to other countries in 1990. In this context, the five most long-established frameworks are those of Scotland, South Africa, the United Kingdom, New Zealand, and Australia (Marchant, 2023).

In Costa Rica, the National Qualifications Framework for Technical Vocational Education and Training (NQF-TVET-CR) was created in 2016 with the purpose of responding to national requirements regarding the regulation of the educational offer, the positioning of technical programs, the articulation between sectors, among others. Its development was also aligned with the recommendations of the International Labor Organization (ILO), the Organization for Economic Cooperation and Development (OECD) and others (NQF-TVET-CR, 2019).

According to the guidelines of these bodies and the official document of NQF-TVET-CR (2019), the expected benefits for the country are to promote articulation processes, foster inter-institutional cooperation and cooperation between social actors, establish qualifications and competences, develop relevant training and enable new opportunities for employability. In addition, the NQF-TVET-CR aims to meet national demands in terms of conceptualization and characterization of TVET programs, regulation of supply in the national socio-educational context and reconfiguration of the profiles of TVET graduates.

From this perspective, the NQF-TVET-CR establishes technical levels, descriptors and qualifications and positions TVET as an innovative, contextualized and relevant educational option. Therefore, it assumes the objective of contributing to socio-economic and educational development and generating more opportunities for student populations; however, its full implementation requires a joint effort, commitments, policies, and strategic actions that drive substantive reform and significant change in TVET.

Currently, the NQF-TVET-CR faces important limitations due to its legal and administrative structure, as it operates under a decree and has no financial resources or infrastructure of its own. Moreover, its non-binding character for educational organizations makes it difficult to implement effective solutions to persistent problems, such as the lack of alignment between TVET and the requirements of the labor sector, the need to strengthen technological competencies in student populations, and the differences between rural and urban areas of the country (National Council of Rectors, 2023).

Despite these limitations, one achievement of the NQF-TVET-CR is the creation of spaces for dialogue and collaborative construction between

representatives of the public and private sectors. This has enabled greater recognition of the needs of the productive sphere, the domestic market and global trends. In this sense, the ILO (2022) asserts that the frameworks provide a space for meeting and social dialogue between the different actors involved in TVET.

In this context, this contribution seeks to broaden the discussion on the challenges and projections that emerge from the NQF by taking the case of Costa Rica as an example. To this end, it describes their impact on the TVET system, on the development of student training, as well as on the updating of TVET programs. In addition, it explores key proposals and initiatives for the sustained improvement of TVET in the Costa Rican scenario.

For these reasons, the methodology consisted of the review and documentary analysis of theoretical proposals from public and private organizations, as well as national and international entities that address the management of TVET, as well as documents related to Critical Theory and qualification frameworks, in particular the Costa Rican Framework, in order to have more input for the approach and reflection in the essay.

2. Theoretical Perspectives

Qualifications frameworks (NQFs) are structures designed to organize and classify qualifications at different levels, based on the learning outcomes, skills and knowledge required for each level (Marchant, 2023). Their implementation is aimed at consolidating qualifications and competences, defining learning outcomes, strengthening the link with the world of work, developing qualification standards focused on quality and continuous improvement, integrating different knowledge in educational and socio-occupational profiles, among others.

In this context, the concept of competence is understood as a set of knowledge, skills and attitudes that enable the development of individuals, effective performance in specific activities, problem solving and adaptation to different social, labor and cultural spaces (Camacho, 2017), which is essential for understanding the scope and requirements of training processes in TVET.

When discussing this, the aims and goals in promoting competences in TVET, the role and the importance of teachers becomes evident. Therefore, training and updating of the teaching staff are key elements for the effective implementation of the NQF- TVET -CR. Aspects such as pedagogical mediation, educational assessment, and the competence-based approach are essential to adapt teaching and learning to a changing context. This is due to the relevance of the role of mediators in transforming TVET training processes

(Kumar, 2023). This to date is still a challenge the Costa Rican system has to considered.

2.1 Critical Theory as Rethinking Criteria for TVET

Critical Theory promotes the analysis of multiple possibilities for transforming TVET and fostering learning environments focused on personal development. Furthermore, a Critical Theory vision of knowledge constitutes fundamental theoretical frameworks for rethinking TVET. By considering cultural and social specificities of each context, these approaches underline the importance of designing educational initiatives that integrate local and global perspectives. In this sense, an NQF has the potential to strengthen the relationship between theory and practice and to foster meaningful learning; however, for this to be feasible it is necessary to articulate the different structural and pedagogical levels, as well as to consider local economic development, culture, gender relations, the labor market and socio-labor trajectories.

In the case of Costa Rica, these aspects need to be further developed, as there was and still is a lack of clear educational policies and planning with a local focus. Adorno (1998) warns that "the school has an immanent tendency to establish itself as a sphere with its own life and its own legislation" (p. 77). It is therefore essential to chart new paths that allow for the reconstruction of existing structures and the re-signification of perspectives, beliefs and discourses that predominate in the educational and socio-cultural contexts of the country.

In this sense, Morales (2014) proposes five cores of analysis that underpin the Critical Theory of education: the role of teachers as agents of change and transformation of learning spaces; informed criticism of actions and practices that perpetuate inequalities and inequities; the importance of democratizing educational training processes and empowering students in the acquisition of learning; openness to dialogue and critical reflection; as well as, the drive to emancipate people so that they become aware of their reality and act accordingly. Adorno (1998) argues that a true democracy can only exist if it is made up of emancipated individuals, since its realization depends on a society made up of free and autonomous people. This highlights the need to promote educational processes that foster both personal and social transformation and a main goal in educational processes, also in TVET in Costa Rica.

2.2 TVET Curriculum as a Critical Space

The TVET curriculum is configured as a space that interrelates the theoretical and practical aspects essential for the development of educational processes and technical, technological and life skills.

From a critical perspective, Mujica-Stach and Martínez (2020) the curricular approach enables the theoretical, methodological and practical aspects of education to be positioned as a tool for tackling social problems, by promoting social transformation and the emancipation of people. In this sense, the constitution of the NQF-TVET-CR as a reference for the educational offer of technicians in the country allows for the training of people with knowledge, skills and attitudes that respond effectively to the demands of the socio-productive sector. It also contributes to the strengthening of socio-occupational profiles and the full development of students, by establishing direct relations with the different productive sectors and proposing competences, learning outcomes and strategies aimed at responding to current challenges.

The NQF-TVET-CR arises in a context of social and productive transformations, marked by the incorporation of technology in all areas, which poses the challenge of professional updating, the acquisition of new skills, the creation of innovative careers, the generation of new training routes, the consolidation of networks and alliances with national and international actors, the specialization of human talent, and the transformation of spaces for the construction of knowledge.

Therefore, the design, implementation and evaluation of new educational curricula in TVET will require also from teachers innovative skills and capable of leading significant transformations in education, which also leads to the discussion of future roles and importance of TVET teachers. Teachers with these abilities will make it possible not only to respond to the demands of the socio-productive environment, but also to reconstruct and strengthen professional profiles, based on the demands of a constantly changing world and a reconversion of careers.

For such purposes, the Qualification Standards (QS), as a formal and descriptive instrument, was created within the NQF-TVET-CR. These QS consider the fundamental elements for curriculum design in TVET, in any modality, since they facilitate the development of educational programs. In addition, the QS promote relevant training programs that respond to the country's socio-productive demands, changes in the educational context, technological advancements, the requirements of various disciplines, and the acquisition of knowledge related to environmental, ethical, teamwork, occupational health, and quality issues, among others.

3. Costa Rica's TVET and its NQF-EFTP-CR

3.1 Context of Costa Ricans TVET and its NQF- TVET CR

TVET in Costa Rica has undergone a significant evolution from its beginnings in the 19th century to the present day. Initially, technical training focused on craft education, adapting to the needs of a predominantly agricultural economy. The post-colonial era is characterized by the need to institutionalize formal and informal learning processes. Over time, not without social conflicts and structural contradictions, the legal foundations of the non-formal and formal TVET system were created, as well as mechanisms of articulation with higher education (Láscarez Smith, 2023).

Moreover, in response to the demands of modernization and economic diversification, TVET became institutionalized, especially during the 20th century, with the creation of specialized educational institutions and the implementation of public policies aimed at strengthening technical training. This development has been fundamental in articulating education with the demands of the labor market, contributing to the social and economic development of the country.

However, TVET policies have been subject to multiple challenges among social actors from trade unions, employers, students and education representatives (Láscarez & Schmees 2021; 2023) because there has not always been consensus on the ends and means of system development, e.g., the competency-based model, the type of governance, dual apprenticeships, then the institutional restructuring of the National Apprenticeship Institute (INA) and the NQF- TVET -CR.

Faced with such a dynamic and changing national and international panorama, it is necessary to have a relevant educational offer that is aligned with the demands of society and the current scientific and technological revolution, which leads to the rethinking of curricula, technical competences, graduate profiles, educational resources, training methodologies, educational modalities and so on.

This becomes relevant in the context of the Report on Technical Vocational Education and Training and Sustainable Human Development in Central America and the Dominican Republic: Priorities for Action 2023, which notes that Costa Rica has been making changes and adjustments to the educational offer to meet the demands of the sectors and promote a generation of new careers (National Council of Rectors, 2023).

The report notes that TVET curricula have been transformed to adapt to the sectors of the national economy; however, is an unfinished effort and represents a major challenge for developing countries such as Costa Rica. Despite progress, structural limitations within the Costa Rican education system persist, such as inequalities in access, gaps in the quality of training between rural and urban areas, and limited linkages with emerging sectors of the economy (National Council of Rectors, 2023).

For all of the above reasons, the implementation of the NQF-TVET-CR is of crucial importance, since it aims to train people comprehensively, to regulate the educational offer, to redesign curricula, to position TVET at the national level, to define the profile of the TVET graduate, to create more educational options in dual, virtual and hybrid modalities, and to promote the collection of statistical data on TVET. It also aims to establish alliances between national and international TVET peers, promote articulation between the different levels of qualification and integrate technology into educational spaces.

The NQF-TVET-CR introduces an important innovation in Costa Rica by establishing five levels of qualification, which represents a valuable effort to organize and characterize TVET provision. Historically, TVET has been provided by various academic entities, which set out programs, requirements, courses, qualifications and fees, in many cases without any kind of regulation, monitoring and adequate evaluation. This lack of cohesion of the system has hindered its alignment with the social and productive needs of the country.

The five technical levels defined by the NQF-TVET-CR establish clear parameters for entry and qualification requirements, as well as ranges of training hours (this being the most relevant element), the QS in the consolidation of curricula and the interconnection of formal and non-formal education. Furthermore, it facilitates the creation of articulated training paths and educational programs with coherent learning outcomes. Also, each level has its own descriptors associated with the four main areas of knowledge (knowing, doing, being and living together), which makes it possible to recognize the scope, position the technician in the labou market and establish a specific exit profile (NQF-TVET-CR, 2019).

Costa Rica has more than 330 QSs in areas such as administration, technologies, and tourism, and more than 450 educational offers from public and private organizations aligned with the Framework (NQF-TVET-CR, 2025). However, the implementation of technical programs outside these standards persists, this could be due to the absence of a law formalizing the NQF-TVET-CR, although it is supported by executive decrees such as Nº 39851-MEP-MTSS (2016) and its reform in 2018. Hence, the need to strengthen the current legal framework to ensure the effective implementation of the NQF-TVET-CR and boost TVET.

The NQF-TVET-CR is related to SINEFOTEP, which was created by Decree Nº 43481-MEP-MIDEPLAN-MICITT-MTSS (2022). This system articulates efforts between educational, social, and productive actors, promoting relevant technical competences through international coordination and cooperation. However, achieving an effective linkage of actors requires strengthening research, developing community projects, improving graduate follow-up, promoting inclusive strategies that benefit society, among others.

Therefore, every institutionalized and political effort converges in the need to contribute substantively to the quality of education and the well-being of citizens, through a wide offer of technical programs, as well as more employment options and incentives; however, it is necessary to continue promoting cooperative work, knowledge exchange and inter-institutional research to achieve common objectives and to project new actions in favor of TVET and students.

TVET in the country is led by a set of actors with strong professional links, who are involved in various academic activities and commissions. These actors contribute to the design of reference documents, the carrying out of studies and projects, the production of scientific publications, the organization of academic activities, the construction of QSs and the establishment of international alliances. This network of connections facilitates the opening of spaces for dialogue and the generation of inter-institutional synergies, a key aspect for the strengthening and development of TVET in the country and the positioning of the Framework.

Finally, the NQF-TVET-CR faces limitations such as having greater participation of representatives from the public and private sectors, consolidating the certification of competencies, designing more qualification standards, promoting social mobility and strengthening links with the business sector. These challenges go beyond the scope of the NQF-TVET-CR and require a joint commitment from the different entities for the socio-economic and educational growth of the country.

3.2 Costa Ricans Qualification Standards (QS) and its Relation for the NQF- TVET -CR

Qualification Standards (QS) support the consolidation of a TVET educational offering focused on quality, relevance, and timely responsiveness to the socio-labor context. For this reason, the development of QS involves analytical and evaluative work regarding the various technical specialties, emerging changes in the labor market, and the specific characteristics of productive sectors.

In this context, it is essential to have a formal instrument that offers a contextualized understanding of the NQF-TVET-CR and the QS, general

competences and specific competences, technical and transversal learning outcomes, knowledge, performance and product for the certification of individuals, as well as other substantive aspects of the design and supply technical programs, is of great importance for the country.

These QSs are developed with a medium-term projection, which gives flexibility to respond to the dynamics of scientific and technological progress and the reconfiguration of jobs.

Also public and private educational organizations as well as representatives from different sectors of the country participate in the construction of QSs, ensuring that the final product is timely, innovative and adapted to the national context; however, the challenge of broadening participation and involving other key social actors remains, as highlighted by the European Centre for the Development of Vocational Training (CEDEFOP, 2014) national qualifications frameworks are specifically operational when they are known and understood by the end users, including students, teachers, families and enterprises. This knowledge and ownership are essential to maximize their impact and relevance in the socio-educational context.

Costa Rica's QS are linked with the country's National TVET Policy (2023), which emphasizes the relevance of developing knowledge that facilitates timely integration into the labor market; therefore, curricula focus on a practical training approach and seek actions for the well-being of citizens.

The QSs acquire great relevance, given that prior to their implementation the country did not have this type of resource for standardization, curriculum design, and the promotion of TVET provision. Clearly, provided that the right conditions are created, these QSs facilitate articulation, the recognition of prior knowledge, the positioning of educational modalities, such as dual education and the inclusion of new technical careers, in order to improve the quality and relevance of national TVET.

Consequently, the ILO (2022) points out that international NQFs have generated various inputs and resources for their effective implementation, such as guides, procedures, forms and others, which enable the recognition of prior learning, the certification of competences, the determination of standards, the construction of professional and occupational profiles, the assessment of educational programs, and others. These resources benefit users and position the frameworks in the different countries.

Clearly, the promotion of the NQF-TVET-CR and the construction of timely national QSs contribute to the achievement of the objectives of the National TVET System (SINEFOTEP) by positively impacting the teaching and student populations; however, the ILO (2022) notes that this "requires the consolidation of political, technical and operational conditions" (p. 32) and this is one of the current limitations of the Costa Rican framework.

In addition, the Analytical Inventory of Experiences in the Construction and Implementation of Qualifications Frameworks in Latin America (ILO,

2022) highlights the potential of these frameworks to articulate education and training systems, foster the quality of educational provision, promote mobility and lifelong learning and respond to the demands of the productive sector. These international frameworks facilitate the recognition of prior learning and qualifications in diverse contexts, strengthen the dialogue between the training and productive sectors, favor labor inclusion and promote curricular innovation based on learning outcomes.

From a critical perspective, the implementation of the NQF-TVET-CR represents a significant effort to generate a structural response to educational, social and labor demands. However, its effectiveness depends on the capacity to build a collaborative environment, which not only articulates educational and productive actors, but also ensures that the competences developed are truly relevant and adaptable to changes in the labor market and social needs. The effective management of the framework is a social commitment that goes beyond the creation of qualification standards, as it implies a continuous work of evaluation and adjustment that allows for innovation, educational quality and the generation of synergies between the different actors involved.

This transformation process is not a linear task, which is why it is important to consider the current socio-cultural, economic and technological reality; therefore, it is necessary to promote access to relevant TVET and to implement actions that promote relevance, equity and inclusion in socio-educational spaces. From this perspective, the social commitment to the effective and efficient management of the NQF-TVET-CR reflects an effort to promote quality, foster innovation, promote significant changes and improvements, favor collaborative work, generate synergies, create opportunities and value new training routes, among others.

4. Reflections on the NQF-EFTP-CR: Projections and Challenges in Costa Rican Context

The documentary analysis allows for an assessment of the projections, benefits and challenges associated with the implementation of the NQF-TVET-CR. This Framework has the potential to establish a regulatory structure that guides the creation of relevant educational offers and the promotion of diverse practices and strategies for linking with different sectors, in order to offer quality and innovative TVET.

The NQF-TVET-CR projections include the following:

- Strengthen its legal framework with a specific law that ensures its own resources, infrastructure, budget and human resources to position the NQF-TVET-CR by adding more educational organizations,

develop the objectives and goals of the strategic plan and have the necessary resources to move forward more effectively, including to respond to the emerging transformations in the labor field, among others.

- Promote inter-institutional collaboration with public and private entities to develop research, foresight studies, and innovative projects, with the purpose of having quantitative and qualitative statistical data for decision-making, the generation of qualification standards focused on current and future demands, the consolidation of academic proposals focused on continuous improvement, the realization of alliances and initiatives relevant to the work of TVET, and others.
- Consolidate key processes such as the articulation between educational levels, the certification of people's competences and the recognition of prior learning, with the aim of contributing to the country's TVET, in addition to fostering permeability, strengthening educational trajectories, boosting practices for the benefit of students, offering new opportunities for citizenship, and others.

In addition, the Costa Rican NQF faces some structural challenges such as:

- Need for legal support in order to promote the integration of TVET organizations in the country, to have the required resources, to have a relevant impact on the socio-educational and economic growth of Costa Rica, to respond to the demands of the productive sectors, to meet the challenges linked to technological transformation and so on.
- Need for specialized and trained human resources in key areas, with the aim of generating research, prospective studies and academic initiatives, as well as increasing the number of qualification standards produced annually.
- Incorporate advanced technologies to automate processes and facilitate access to NQF-TVET-CR services, with a view to improving response time, addressing the queries raised, offering more effective services, making the work of the Framework's human talent more concrete, maximizing the use of resources, among others.
- Broaden its scope at national and international level, promoting the creation of cooperation networks between TVET actors in different countries, in order to carry out academic exchanges, generate research processes, build value proposals, enable effective dialogue channels, position the NQF-TVET-CR, generate alliances with international peers, share good practices and lessons learnt, develop transfer and dissemination processes, and so on.
- Design Qualification Standards in emerging areas and areas of high labor demand, with the goal of expanding the number of QSs in less time, to include more representatives of the productive sectors, to

generate more careers and educational offers aligned with the NQF-TVET-CR, to promote the training of technical, technological and life skills, and others.

- Need to generate precise indicators (qualitative and quantitative) for the evaluation of the socio-educational and political impact of the NQF-TVET-CR, in order to recognize the progress, results and opportunities for improvement associated with the implementation of the Framework in the country, as well as to propose relevant and effective changes for TVET.
- Promote academic activities and spaces for dialogue with key actors in TVET in order to position TVET and the NQF-TVET-CR, as well as to socialize the results of research and projects developed by educational organizations.

The NQF- TVET -CR represents a commitment of the country and an inter-institutional project, which favors student populations, educational organizations, social and productive sectors. For this reason, it focuses its work on the improvement of TVET, the characterization of technicians, the link with the different sectors of the economy, the achievement of new offers, the opening of socio-labor opportunities, the transformation of learning spaces, the integration of other educational modalities, among others.

5. Conclusion

The NQF-TVET-CR presents a series of benefits for educational organizations, latent challenges, structural gaps and future projections, since it is the first time that Costa Rica has a structure that organizes and regulates the supply of TVET. Therefore, one of the main contributions is to align the training of people with the demands of the labor market, improving the quality and relevance of TVET to strengthen and promote the economic, educational, and social development of the country.

Despite its achievements, the NQF- TVET -CR faces structural challenges that limit its scope and effectiveness, for example, the need for stronger governance to ensure efficient inter-institutional coordination and the active participation of the productive sectors in the definition and updating of professional profiles, as well as in the design of QS.

Furthermore, it is crucial to invest in educational infrastructure and to establish continuous monitoring mechanisms to assess the impact of the Framework on the development of human talent and its insertion in the labor market. In addition, it offers refresher courses to the TVET teaching

community to help consolidate innovative learning environments that support the development of technical and life skills.

Moreover, collaboration with the business sector remains a key priority, as productive sector actors must play a more active role, not only in the identification of competences and design qualification standards, but also in the evaluation of the results produced by the Framework, ensuring relevance and adaptability to market dynamics.

In addition, it should be noted, that the first generation of the NQF-TVET-CR has a nine-year history and is therefore in a consolidation phase; however, the work done is very important for Costa Rica, as well as to the contribution and commitment of public and private educational organizations.

For this reason, the NQF- TVET -CR seeks to contribute to the development of the country by generating QS that responds to the demands of the different sectors and to the relevant and innovative training of students, with the aim of offering educational opportunities linked to the reality of the labor market, and of influencing the quality of Costa Rican education.

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Claudia Hunink

Duality in Vocational Education and Training as a Panacea for Structural and Social Challenges in the Labor Market? – A Perspective of Costa Rican Stakeholders in VET

Keywords: Duality, Dual VET, Stakeholder, Vocational Socialization

Abstract

In reports by supranational organizations such as the OECD and UNESCO, the dual vocational education and training system is highlighted particularly positively. It is seen as having the potential to reduce the, often high, youth unemployment rate, and produce skilled workers, thus strengthening the economy. It is against this background that the Costa Rican government has integrated dual training programs into its existing formal vocational system. However, the term 'duality', which often has positive connotations, is not self-explanatory. This article therefore focuses on understanding how the stakeholders in Costa Rica perceive dual vocational training and what expectations they associate with it. An analysis of the empirical material collected shows that the ambitious overarching goal of increasing economic productivity is questioned by the majority of stakeholders. However, a significant number of actors familiar with dual vocational training believe that it produces better qualified specialists. Furthermore, it is expected that cooperation between school and company as learning venues will support young people in their transition to the labor market. However, apprentices in the field of web development are required to work from home. This makes vocational socialization in the company more difficult, which contradicts the core of duality. Therefore, the fundamental question arises as to what extent the stakeholders have internalized the idea that vocational socialization is at least as relevant, if not more relevant, than the acquisition of professional skills.

1. Introduction

De Ibarrola (2016) notes that in some countries in the Latin American region, such as Brazil and Mexico, vocational training programs referred to as dual have been implemented with varying degrees of success. The reason for such implementation attempts is that dual VET is currently regarded as a panacea for structural and social issues in the labor market (Álvarez-Galván, 2015; OECD, 2019; UNESCO, 2019).

In Costa Rica, there have been previous attempts to establish dual VET (Láscarez Smith, 2023; Marín Hernándenz et al., 1998). The most recent initiative by the Costa Rican government to implement dual VET dates back to 2016. Consequently, a bilateral agreement on international VET cooperation between the Costa Rican and German governments was concluded in 2019 (GOVET, 2019). In the same year, the legal framework for dual vocational training was established by Law No. 9728 (SCIJ, 2019). Following the successful pilot phase, the process of integrating dual training programs into the existing Costa Rican vocational training system was initiated (Láscarez Smith & Baumann, 2020). These programmes are classified into three principal sectors (Rommel & Vargas Méndez, 2022): the non-formal sector at the National Apprenticeship Institute (INA); the upper secondary level at the level of the Ministry of Public Education (MEP); and the tertiary sector at para-universities and universities. However, dual VET programs have thus far been offered primarily by the MEP and INA.

Given the promising global potential of dual VET as asserted by various actors, institutions, and other entities, this contribution addresses the following research questions:

How do Costa Rican stakeholders perceive dual vocational training after its implementation? What expectations are associated with dual vocational training?

The aim is to identify and critically examine the expectations associated with dual vocational training in Costa Rica, and to what extent these expectations align with or diverge from the promises associated with such training models.

The significance of Costa Rican vocational training system is elaborated in the theoretical contextualization section. Subsequently, the concept of duality is discussed in terms of its possible interpretations. The following subchapter presents an analysis of the current interpretation of dual vocational training in Costa Rica, along with an examination of the challenges that prevail. The fourth and fifth sections outline the methodological approach and the sample of the study, before presenting and discussing selected results. Finally, the conclusion and outlook for future research in this area are presented.

2. Theoretical Contextualization

2.1 The Role of Vocational Education and Training in Costa Rica

In the context of highly unequal societies in the Global South, the significance of VET is often constrained by a number of factors. It is frequently regarded as the second-best option after general education (including higher education) (Allais, 2020; Clement, 2014). According to Allais[1] (2020), the tendency towards negative social perceptions of VET in former colonies has deep roots in the history of colonialism.

Costa Rica was once a Spanish colony and the social inequalities from the colonial era continue to influence the country to this day. These manifest themselves, for example, in the high income inequality[2] (OECD, 2023). As part of the broader Latin American educational expansion, a formal vocational training system was also implemented in Costa Rica during the 1950s (Peters, 2012; Beirute Brealey, 2018; Camacho Calvo, 2024; Peters, 2012). The objective of the government has been to integrate socio-economically vulnerable social groups into the labor market (Beirute Brealey, 2018). However, the goal of social transformation has been undermined by the liberalization efforts in the region since the 1970s (Katz, 2024). The persistent and, in some cases, accelerating inequality in the Global South has resulted in a competition for educational certificates. This has, in turn, reinforced the social preference for general and tertiary education qualifications, while simultaneously stigmatizing and systematically weakening vocational education and training, which has had also a detrimental impact on economic development (Allais, 2020; Beirute Brealy, 2018).

In fact, Costa Rica's economic development is currently facing challenges due to a shortage of skilled labor (Unión Costarricense de Cámaras y Asosiaciones del Sector Empresarial Privado [UCCAEP], 2021) and simultaneously elevated youth unemployment rates. In the age group 15 to 24, the unemployment rate among young people stands at 34.2% (Instituto Nacional de Estadística y Censos [INEC], 2022). Beirute Brealey (2018) attributes this paradox to the fact that the potential of VET as a mechanism for improving the employability of young people in the country is not being fully exploited. In the light of these observations, it appears that the Costa Rican

1 Allais's research focuses primarily on South Africa and other African countries.

2 Costa Rica currently has the highest income inequality in the OECD. However, it is important to note that many countries in Latin America are not members of the OECD. In a Latin American comparison, Costa Rica therefore fares much better.

system of vocational education is facing challenges and that the goal of integrating vulnerable population groups into the labor market is only partially being achieved. Therefore, Álvarez-Galván (2015) makes several recommendations in the OECD report on strengthening the vocational and training system and the labor market in Costa Rica, some of which relate to the implementation of dual vocational training. In the wake of the report's release, the previous Costa Rican government sought to implement dual vocational training (Camacho Calvo, 2023; Láscarez Smith & Baumann, 2020).

2.2 Interpretations of the Duality Concept

A number of countries, including Germany, Switzerland, Austria, Denmark, and the Netherlands, have developed robust and culturally embedded VET systems that produce a considerable number of students and graduates at the upper secondary level (Allais, 2020; Gonon, 2014). Some of these systems are also corporative qualification systems, which rely on collective cooperation between employers' associations, trade unions, and the state for the planning and implementation of qualifications in initial and continuing vocational education and training. Germany is one such country, and the respective VET programs are managed, provided, and financed by companies, trade unions, and the state. Moreover, training occurs both in vocational schools and at the workplace in the company, which is why this form is also referred to as dual VET (Frommberger et al., 2024). In accordance with this model, the transition into the German labor market for school leavers ideally takes place via two thresholds: the first relates to the transition from school to dual VET, while the second threshold relates to the transition from VET to employment (Georg & Sattel, 2006).

In reports by supranational organizations such as the OECD, UNESCO, etc., dual modes of vocational education and training are particularly positively highlighted. These modes are said to have the potential to reduce the, often high, levels of youth unemployment, produce well-trained skilled workers, and, as a consequence, strengthen the economy (Álvarez-Galván, 2015; OECD, 2019; UNESCO, 2019).

In the context of international VET cooperation, the German dual vocational education and training is frequently discussed in the context of successful export strategies (Euler, 2019; Gonon, 2014). However, for several years, there has been a shift away from the concept of complete VET exports (Gessler et al., 2019). Therefore, the transfer of complex VET systems from one country to another is not a viable option, as it would require a complete system adaptation in the receiving country. Historical evidence indicates that such attempts are destined to fail (Euler, 2019; Gonon, 2014).

The reasons for the lack of success of such transfer attempts are numerous and complex, and therefore difficult to fully comprehend. However, the most frequently cited cause is the historical political, legal, and institutional differences between the countries that provide and those that receive the VET programs (Euler, 2019; Gonon, 2014). In addition, the negative perception of VET in many countries is a significant contributing factor (Allais, 2020; Clement, 2014; Euler, 2019; Gonon, 2014). The final aspect, though equally significant, is that certain concepts associated with dual vocational education and training, such as the *Beruf*[3] *and, Meister*, are deeply rooted in the German-speaking world and a strong cultural foundation there. Therefore, these concepts cannot simply be translated or conveyed lexically into other language and cultural areas (Clement, 1999).

A comparable phenomenon can be observed with regard to the concept of *duality*. As Gonon (2014) and de Ibarrola (2016) observe, in some countries outside the German-speaking area, there is a discussion of dual VET programs. However, according to Gonon (2014), the respective understanding of duality differs considerably from the original concept. The term original is not clearly defined here. In essence, the concept of duality can be applied to the institutional structure of a VET system in a comprehensive manner. The levels in question pertain to the following: governance (the interaction of state and economy in the regulation of VET), learning venues (company-based training and school-based training), and didactics and curricula (linking school-based and company-based learning processes). In sum, the aforementioned levels correspond to a comprehensive understanding of duality, whereas a narrower understanding includes the didactic and curricular dimensions of VET, as well as the integration of company-based work and training phases (Euler, 2019).

Gonon (2014) characterizes the narrower understanding of duality as the core of the dual system, namely, the combination of theoretical learning at school and practical learning in the real work processes of the company. In this context, however, it is important to critically examine the growing significance of learning venues, such as inter-company vocational training centers (ÜBS) and digital learning platforms, in Germany. This shift has led to a deviation from the original conceptualization of duality (Kutscha, 2022). Nevertheless, the concept of duality persists, presumably because it is anchored in the *central core of social representations*[4] (Abric, 1993). Another potential explanation is that duality has become a kind of trademark (Gonon, 2014).

3 "A Beruf is understood to be a pattern of work skills (labor force pattern) based on socially legitimised knowledge and qualification standards, characterised by a role-typical combination of knowledge, skills and abilities and oriented towards the expectation of being able to take advantage of employment opportunities" (Kutscha, 2008, p. 2, translation by author).

4 Social representations are stable and unstable, rigid and fluid, etc., which is why Abric (1993) divides them into a central core and peripheral elements. The peripheral elements refer to those aspects of social representations that are characterized by flexibility and mobility. Consequently, peripheral elements are directly related to an individual's experiences and form an interface

2.3 Development of Costa Rican dual VET

In 2016, a bilateral agreement was reached between the governments of Costa Rica and Germany at the level of international VET cooperation (GOVET, 2019). The implementation of dual VET was primarily driven by the Costa Rican government, employing a top-down approach. Its formal institutionalization occurred in 2019 through the enactment of Law No. 9728 (Camacho Calvo, 2023; Láscarez Smith & Baumann, 2020; Láscarez Smith & Schmees, 2021; SCIJ, 2019). The Costa Rican dual VET system is structured around the fundamental principles of duality and is defined by law (SCIJ, 2019, Art. 1, translated by author):

> *[...] vocational training in the dual modality, [is] understood as that educational modality that enables the apprentice to be trained in two learning environments, namely in a technical vocational training institution and in a training company that uses its tangible and human resources to implement this modality regulated by law.*

Nevertheless, the Costa Rican government initially seemed to strive for a more comprehensive understanding of duality, as it sustained a trialogue within the context of a round table[5] with representatives of employers and employees. However, this initiative ultimately faltered following the transition in government (Láscarez Smith & Schmees, 2021, 2023). The failure may have been attributable to the fact that the decision to implement dual training programs was primarily at the discretion of the state. Furthermore, the inherent conflicts of interest between the parties involved appear to be irreconcilable.

At present, the corporate sector[6] is also somewhat disinclined to provide training opportunities, although the reasons for that are not fully understood. For example, the difficulty of integrating further potential training companies may be related to the prevailing organizational culture. In essence, school-based training programs or *on-the-job training* are the predominant forms of training globally, including in the Americas (and thus also in Costa Rica) (Clement, 1999; Euler, 2019). Furthermore, engaging with the business sector has proven to be a significant challenge, potentially due to its fragmentation. Despite the Costa Rican Union of Chambers of Commerce, Industry, and

between the outside world and the central core. At the same time, they act as a protective shield that protects the central core from change to a certain extent. For example, repeated experiences or profound influences that deviate from the central core can change it. In general, however, the central core of social representations is characterized by relative stability (Clement et al., 2021).

5 Further information on the round table in Costa Rica can be found in the publications by Láscarez Smith and Schmees on this topic (Láscarez Smith & Schmees, 2021, 2023).

6 "The business sector includes not only companies in the strict sense, but also institutions such as chambers of crafts, chambers of industry and commerce, or employers' associations that primarily work for companies" (Pollert et al., 2016, p. 50).

Services (UCCAEP) being regarded as the political voice of the business sector, membership in the umbrella association is optional (Láscarez Smith, 2023). The association currently has 48 members, including chambers of commerce, free trade zones, and other entities (UCCAEP, n.d.). Additionally, Costa Rican companies are present in both the informal[7] and formal sectors. Furthermore, a divide can be observed within the country, whereby the economically strong center – home to the free trade zones – resembles 'islands of modernity' (Katz, 2023, p. 9). This stands in contrast to the economically challenged periphery (Arce Brenes & Villalobos Chacón, 2021; Rivera, 2022).

The structure of the private sector labor movements, which are organized in a manner analogous to trade unions, is similarly heterogeneous. It is important to make a distinction between the solidarity-based movements, the cooperative movement and trade unions. Despite a lengthy and tumultuous history, the red trade unions in the private sector currently occupy a weakened position (Rojas Valverde, 2012). This has grown historically and can be partly attributed, at least in part, to the systematic dismissal of unionized employees (Thannhäuser, 2020). However, the role of the associations of solidarity movements[8] should also be considered in this context, which contribute to a generally anti-union discourse in Costa Rican society (Valverde Rojas, 1993).

In contrast to their counterparts in the private sector, public sector teacher trade unions are characterized by a notable degree of strength. However, the attitude of two teacher trade unions – the *Asociaci*ón Nacional de Educadores (ANDE) and the *Asociaci*ón de Profesores de Segunda Enseñanza (APSE) – was already strongly opposed to the introduction of the dual VET programs, as evidenced by demonstrations and also in cultural artifacts such as caricatures (Asociación de Profesores de Segunda Enseñanza [APSE], 2019; Asociación Nacional de Educadores y Educadoras [ANDE], 2023). The concern was that shifting a significant proportion of training to companies would result in large-scale teacher dismissals, the exploitation of students in work environments, etc. (APSE, 2019; ANDE, 2023; Hunink, 2024). However, the public sector trade union landscape is not ideologically homogenous, even with regard to dual VET. For example, the teachers' union *Sindicato de Trabajadoras y Trabajadores de la Educación Costarricenses* (SEC) recognized the potential of dual vocational education and training from the outset and advocated for its implementation (Hunink, 2024; Sindicato de Trabajadoras y Trabajadores de la Educación Costarricenses [SEC], 2022).

7 There is no generally valid and distinct definition of the term 'informal sector'. However, numerous publications describe various characteristics that characterize it, such as a lack of protection through labor and social legislation, the great importance of family labor, personalized business relationships with sometimes limited market access, a lack of written contracts, etc. (Overwien, 2002).

8 These are movements that consist of both employers and employees. However, the control and management of the associations lies mainly with the employers and employer-friendly employee representatives (Valverde Rojas, 1993).

In light of the aforementioned context, it seems reasonable to posit that the establishment of a more comprehensive understanding of duality may encounter significant difficulties, given the notable differences between Costa Rican and German structures. At present, some companies operate as training institutions, which represents the fundamental aspect of duality. Nevertheless, the winning of participating training companies tends to be gradual, which raises concerns about the long-term viability of Costa Rican dual VET. In light of these considerations, the MEP, in collaboration with the *CoRiCert* cooperation project[9], is developing a strategy with the objective of attracting additional training companies. Moreover, the MEP, which bears responsibility for the development of curricula, training plans, final examinations, etc., is contemplating the involvement of additional stakeholders in dual VET processes. Nevertheless, it remains uncertain whether and to what extent greater involvement will occur (Hunink, 2024).

3. Methodological Approach

This study employs a qualitative research methodology. The study pursues a multidimensional approach to data collection and analysis, utilizing triangulation techniques. The objective is to gain a comprehensive understanding of the perceptions held by stakeholders in Costa Rica regarding dual VET (Flick, 2011; Rothbauer, 2008). Consequently, in conjunction with the gathering empirical data, a comprehensive literature review and document analysis were conducted (Hoffmann, 2018). Specifically, data from the National Institute of Statistics and Census (INEC), meeting protocols from various ministries, legal texts, and scientific articles are also considered. In addition, cultural artifacts[10] such as caricatures are examined, as they permit an alternative approach to the cultural context[11] (Hunink, 2021; Lueger, 2010; Lueger & Froschauer, 2018).

In the context of empirical data collection, guideline-based expert interviews are conducted in accordance with the approach outlined by Meuser and Nagel (1991, 2009). The interview guide serves as a point of reference,

9 This article is the result of the scientific monitoring of the project Development and Testing of Models and Instruments for Examination and Certification in Dual Vocational Training Programs in Costa Rica (funding code: 01BW22003C), which was financed by the Federal Ministry of Education and Research (BMBF).

10 Cultural artifacts are objects that have been modified or created by human action and have thus found their way into the social world (Lueger & Froschauer, 2018). They are interesting in that they "[...] objectify social relationships and social conditions [...]" (Lueger, 2010, p. 92, translated by author).

11 For pragmatic reasons, the analysis of cultural artefacts occupies a marginal position.

ensuring thematic comparability, while also allowing narrative elements. In this context, the term “expert” is used in a more restricted sense, referring to individuals who possess specialized but not exclusive knowledge.

From March 2023 to January 2025, participatory observations were regularly carried out as part of virtual meetings with the MEP to exchange views on the strategic direction of dual VET, on average once a month. Furthermore, periodic meetings were held with other key stakeholders, including trade union representatives, employers, representatives of the chambers, teachers from vocational schools, apprentices, UTN personnel and the Technical Working Group of the Advisory and Funding Committee for Dual Vocational Training (Equipo Técnico de la CAP). In addition, three delegation trips to Costa Rica took place in the course of 2023, with observations made during various meetings and events with the following actors:

- MEP departments: General Directorate for Quality Assessment (DGEC), Directorate of Technical Education and Entrepreneurial Skills (DETCE), Directorate of International Affairs and Cooperation (DAIC)
- National Technical University (UTN)
- Trade Union of Education Workers (SEC)
- German Chamber of Commerce Abroad in Costa Rica (AHK)
- German Embassy in Costa Rica
- Business associations and chambers: Information and Communication Technologies Chamber (CAMTIC), Chamber of Industry, Costa Rican Chamber of the Food Industry (CACIA), Costa Rican Union of Chambers and Associations of the Private Business Sector (UCCAEP)
- Free Trade Zone Associations: Association of Free Trade Zone Companies (AZOFRAS), Coyol Free Zone, America Free Zone (AFZ)
- Teachers' professional association Colypro
- Training companies: SMC Ltd. Costa Rica, Accenture, Kaizen
- Don Bosco educational center
- INA headquarters in Uruca
- Commission for Dual VET (CAP)

The on-site visits to Costa Rica proved to be particularly fruitful for the study, enabling *face-to-face* exchange with various stakeholders. Through regular exchange in person and in a virtual space, an attempt was made to avoid an ethnocentric perspective, i.e. the phenomenon of *cultural bias* (Jammal, 2003).

In addition, group discussions were conducted with an audio recording device during the 2023/24 school year. However, due to a malfunction of the audio recording device, the analysis of the group discussion with teachers and

coordinators at the CTP Atenas vocational school is based on memory. Moreover, the discussion with the web development students was conducted twice (June and September) due to the initial circumstances not being conductive to an open discussion. Accordingly, the data was subsequently collected again in a more familiar setting. The transcribed audio material was subject to analysis using QDA software[12]. An abductive approach was selected, with the coding paradigm adhering to the tenets of Grounded Theory Methodology (GTM). The methodology is distinguished by its openness to the diverse array of materials and its emphasis on interpretative knowledge. Furthermore, comparisons were made within and across cases (Heiser, 2018; Strauss & Corbin, 1996). In the context of this collection, the three categories of *duality as a key to entering the world of work, professional socialization through duality* and *duality as a tool for increasing economic productivity* are discussed in detail.

4. Sample

The group discussions were conducted in June and September 2023 in person at the CTP San Pedro de Barva and CTP Atenas vocational schools, which are part of the MEP. The discussions concentrated on apprentices, teachers and coordinators of the first generation of *técnico* IV level in the dual vocational training programs, in the disciplines of electrical engineering and web development at the MEP. The dual VET program is taught at both educational institutions in the evening. At CTP Atenas, eight teachers and coordinators from the electrical engineering field participated, while at CTP San Pedro de Barva, seven teachers and coordinators from the web development field were involved.

In addition to the teaching staff and coordinators, the 18 trainees took part in the group discussions. The participants are distributed across a total of six training companies. All of the trainees in the inaugural cohort of dual VET at the *técnico*-IV level are of legal age, and a number of them have familial responsibilities. The majority of them come from socio-economically disadvantaged family backgrounds. Consequently, this cohort of individuals is reliant on the legally enshrined scholarship remuneration, given that the Costa Rican dual VET does not provide for a training allowance. As a consequence of the fact that the scholarship payments were delayed, three of the original 21 trainees had to withdraw from the program.

To gain a broader perspective on the prevailing interpretations of duality, additional interviews were conducted with experts from the fields of science,

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business, and the INA. The data collection period spanned from February to May 2024, during which time 12 individuals engaged in virtual interviews. Due to theoretical saturation, six of the transcribed interviews were subjected to a more in-depth analysis. The experts have special knowledge about dual vocational training at the INA, having been instrumental in the planning and operational implementation of the programs for an extended period. The experts interviewed include teachers at INA, Costa Rican scientists, those responsible for organizing and designing dual programs at INA, and representatives of the business sector. The experts possess a range of specialized knowledge, including expertise in the structural, organizational, and legal aspects of the dual training programs at INA, as well as proficiency in scientific discussions and communication processes with the participating companies.

5. Presentation and Discussion of the Results

The empirical study indicates that the concept of duality, when known, is subject to wide range of interpretations. Furthermore, there is a spectrum of opinions, associations, and other considerations regarding the potential efficacy of dual VET programs. The following section presents these interpretations, which are derived directly from the aforementioned data.

5.1 Duality as a key to entering the world of work

As previously stated, the implementation of dual VET was a project of the previous government, although the concept of duality is not immediately apparent. This was also evident during meetings with various VET stakeholders. A lack of a clear definition has resulted in a multitude of disparate interpretations of the concept of duality. Concurrently, it is clear that specific associations, expectations, etc. are associated with the term within the MEP and across various institutions. For instance, it is anticipated that dual vocational training will enhance the employability of young people. Firstly, working in a company's actual working environment enables young people to develop the professional competencies that are in demand in the labor market. Secondly, the apprentices have gained initial access to the labor market by completing an apprenticeship in the company, which is seen as an advantage because it can facilitate subsequent employment:

And in addition to learning, in addition to training, obtaining a technical qualification, to stay, to stay working in the company is an incentive (INA_E4, Pos. 172-174, translated by author).

The assumption that dual vocational education and training will facilitate a successful transition to the world of work is a viewpoint that is held in common by the first-generation apprentices who were interviewed. The group discussions revealed that the majority of apprentices had previously attempted to gain employment. However, they had not been successful in this regard, which is why they elected to pursue for dual VET:

"Yes, perhaps one should add that, for example, it is much easier or would be much easier to gain access to the labor market through such a [dual] program than through university, [...] [for example, if] you have a university degree and apply to a company but have no work experience, and you are young, and then [the decision-makers in the company won't let you in], but how are you supposed to gain work experience? Dual vocational training] opens doors." (CTP Atenas_Alumnos, Pos. 37-42, translation by author).

The above quote indicates that the apprentices in question do not even perceive academic degrees as a guarantee of a successful transition into the labor market. The apprentices cite their youth and lack of work experience as the primary reasons for their exclusion from the world of work. However, due to their socio-economic background, the majority of the interviewees were compelled to contribute to their family's income at an early age through the provision of labor. However, such informal experiences appear to be of no consequence in the Costa Rican labor market. It seems plausible to suggest that only *formal* work experience is capable of achieving an adequate exchange value in the labor market. This is a view held by the young people themselves, who believe that this is something that can only be gained through dual VET.

The tense situation on the Latin American labor markets is not a new phenomenon for the demographic cohort commonly referred to as *youth*. However, it has serious effects on both the economies and the people affected. In this regard, Hopenhayn (2008) has observed a paradox in the Latin American region, whereby younger generations are more involved in the established processes of formal knowledge acquisition than older generations, yet are simultaneously excluded from the world of work. The specific reasons for this phenomenon are manifold and extend beyond the structural challenges of the labor market. This is particularly evident when one considers the simultaneous articulation of the lack of skilled labor in Costa Rica. It is therefore necessary to subject the concepts of youth, NEET[13] (Not in Education,

13 In the Spanish-speaking world, this group is referred to as *ninis*. The problem with this concept is that, on the one hand, it focuses exclusively on gainful employment, while excluding care

Employment or training) and generation to critical reflection. In essence, these concepts serve to homogenize individuals with different lived experiences and circumstances, who nevertheless fall within the same age range (Bourdieu, 1993). The concept of youth can give rise to prejudices and negative attributions within a society. This appears to have been a consistent phenomenon throughout history; as Aristotle (384-322 BC) is said to have made the following observation about young people:

> *I have no hope at all for the future of our country when our youth becomes the men of tomorrow. Our youth is unbearable, irresponsible and terrible to look at* (Aristotle in Mienert, 2010, p. 27).

In light of the aforementioned negative attributions and the associated exclusion from the labor market, it is possible to view youth as a *stigma* (Goffman, 2018). Nevertheless, the apprentices anticipate that they will successfully transition into the world of work despite their relatively young age, due to the formal work experience they gain through dual VET. Accordingly, it can be argued that participation in dual VET represents a strategy for *stigma management*, facilitating the transition into the world of work. After all, the practical component of their training provides an opportunity for young people to demonstrate their commitment and responsibility. Additionally, they can cultivate connections and networks that are relevant to the labor market. Due to their age, social background, and other factors, they frequently lack these resources. Such networks, or "*building a social network*" (CTP Atenas_Alumnos, pos. 71, translated by author), appear to be extremely important in the labor markets of the entire Latin American region (Clement, 2017). This is also reflected in empirical studies on Mexico, for example. In this context, the phenomenon of *ritual kinship*[14] (apadrinamiento) is revealed (Clement et al., 2021; Hunink & Raesfeld, 2024; Hunink et al., 2024), as a kind of "symbolic extension of the family" (Hunink et al., 2024, p. 7) takes place in various areas of life, including the work environment.

work, for example. On the other hand, it follows the individualization narrative and places overall responsibility for the situation on the individual, ignoring external factors such as the labor market situation.

14 In this case, non-biological relatives, but friends, work colleagues, etc. take on sponsorships, for example at celebrations and other special occasions, but also with regard to work contexts.

5.2 Professional socialization through duality

During various events with different stakeholders, concerns were frequently expressed regarding the efficacy of dual VET programs in adequately preparing skilled workers for the current demands of the labor market. After all, apprentices spend a lot of time in companies, in which the working hours tend to be regarded as internships rather than training. In this context, the apprentices of the first generation in electrical engineering state that they perceive advantages in terms of their skills development compared to students in conventional full-time school-based programs. They ascribe this, among other factors, to the practical component of the program in the company:

> *[...] maybe we are going to have a better chance than them [in the normal modality], that is, sometimes I see that we are a bit more advanced in what they do, and we saw that they are doing something that we did three, four months ago, or we saw it in the company [...] not so much theoretical, but also practical* (CTPAtenas_Alumnos, Pos. 128-133, translated by author).

In addition to developing skills at a faster rate, the apprentices feel that they acquire soft skills that are relevant in the labor market, for example, through interactions with colleagues in the company. Furthermore, the group discussions indicate that they perceive a transformation of their personality:

> *Perhaps a part of the communication that used to be a bit more casual, not so professional, let's say in the work environment. But in this change of communication that has to be made because it has to be a bit more formal [...] it has been a process that we are still improving and that is what we are working on day by day* (II CTP San Pedro de Barva_Alumnos, Pos. 146-150, translated by author).

Additionally, the teachers interviewed at CTP Atenas have also noted that the apprentices demonstrate remarkable growth in their personal development through their genuine integration into the corporate environment. The teachers in the field of web development agree with this finding to a limited extent, given that the dual program for the apprentices is conducted exclusively within the home office. Consequently, the apprentices are somewhat isolated from the actual world of work. This raises the issue of whether the trainees develop the requisite sense of responsibility and soft skills. Accordingly, the teachers at CTP San Pedro de Barva recommend that the apprentices be permitted to spend time on the company premises during their block phases:

> *[...] I think that being in a company and developing within the company in person should be important [...] some students go online, they have the responsibility. There are others who say, oh, I don't get up, I log on later [...] I think that the face-to-face experience should be important [...] they*

do need to be there, even if it's only for one day every time they do an alternation [...] (CTP San Pedro de Barva_Educadores, Pos. 175-184, translated by author).

The teachers' demand for vocational socialisation on site in the training company is comprehensible. After all, as Meyer (2023) states, companies function as interactive working and learning environments and offer a setting for integration into teams, identification with colleagues and the learning of communication and conflict resolution strategies in a professional context. In the sense of duality, company-based learning is characterized by the close connection between theory and practice as well as the interlocking of working and learning and is also experience-, action- and competence-oriented. This gives apprentices the opportunity to help shape their work processes. A supportive work organisation contributes to linking individual competence and company development.

5.3 Dual training as a means of increasing economic productivity

In the discourse on dual VET, the potential to reduce the relatively high youth unemployment rate is frequently highlighted. Additionally, it is often emphasized that the dual modality produces better-trained specialists, which consequently increases the productivity of the economy. This anticipated causal connection also appears to be pervasive in Costa Rica, giving rise to discussions in a range of contexts. However, based on participant observations and document analysis, it is evident that dual vocational training is associated with various aspects and is not perceived as a comprehensive solution to the structural challenges of the Costa Rican labor market. The skepticism regarding this often-assumed causality is evident in a documented meeting of the Ministry of Labor and Social Security (MTSS) on the subject of the minimum wage:

[...] This document also covers Dual Education and here we have to understand what the origin of this is. The origin of this is to improve the technical, professional skills of the workers of this country, because it was always said that this is the big problem of productivity, when some of us know that this is not true [...] (Ministerio de Trabajo y Seguridad Social [MTSS], 2023, pp. 18–19, translated by author).

Consequently, this is not merely an interpretative or conceptual commentary on duality; it is also a pragmatic and political statement that discloses profound reservations about the intrinsic value of such programs. Furthermore, it

becomes clear that the attainment of the purported objective of enhancing economic productivity through the implementation of the novel training methodology is subject to scrutiny. This is evident when one considers the limited number of training companies and trainees currently involved, as well as the numerous structural factors, such as investment in infrastructure, the development of efficient corporate structures, etc., that influence a country's economic development.

6. Conclusion and Outlook

The formal vocational education and training system in Costa Rica was established with the guiding principle of integrating socio-economically vulnerable individuals into the labor market and strengthening it. However, the current paradoxical situation, in which there is a shortage of skilled workers coupled with high youth unemployment, suggests that this has not yet been achieved. In light of the numerous assertions regarding the potential benefits of dual VET, such programs were implemented in Costa Rica. However, the ambitious overarching goal of enhancing economic productivity is challenged by the majority of stakeholders. These doubts are reasonable, since a conglomeration of factors usually impacts the development of an economy. Furthermore, the number of apprentices and companies participating in dual vocational education and training is currently low, which means that any impact on the Costa Rican labor market is minimal, if at all. In addition, the recruitment of additional companies is proving to be a significant challenge, which could potentially lead to the erosion of Costa Rica’s distinctive approach to dual VET.

However, a considerable number of stakeholders familiar with dual VET believe that it produces better-qualified specialists. Furthermore, it is expected that this will serve as a foundation for a successful transition of youth into the labor market. The apprentices themselves espouse these expectations, and this is what motivates them to participate in the newly introduced programs. In essence, the initial transition from school to the world of work is initiated through practical work experience. Moreover, by engaging in practical work experience within the company, young people have the opportunity to demonstrate their vocational competencies and reliability as future employees. This could consequently result in a reduction in potential prejudice among the older generation against young people. However, in web development, the apprentices are scheduled to work from their home offices. This is diametrically opposed to vocational socialization in the sense of duality. Therefore, the fundamental question arises as to what extent the stakeholders have internalized the idea that vocational socialization is at least as relevant, if

not more so, as the acquisition of vocational competencies. Furthermore, it remains questionable whether the second transition from vocational education and training to the world of work is also successfully completed, and how subsequent employment relationships evolve. It is not possible to make any statements about the actual success of failure of dual programs in Costa Rica until qualitative and quantitative studies, ideally long-term studies, have been conducted on topics such as whether apprentices are hired by the company that trained them and the quality of follow-on employment. It is therefore essential to identify and pursue research desiderata on these topics in order to create greater transparency in this previously opaque area.

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Laura Madrigal Corrales

Challenges to Strengthen the Linkage Mechanisms between Technical Vocational Education and Training (TVET) and the Productive Sector in Costa Rica

Keywords: Technical Education, Vocational Training, Productive Sector, Labor Market

Abstract

This article examines the coordination and linkage processes between the Ministry of Public Education (MEP), the National Learning Institute (INA) and the business sector in Costa Rica. Using a methodological approach that combines a literature review and semi-structured interviews with experts, the mechanisms of interaction between technical training centers and the productive sector are analyzed, identifying structural and strategic challenges to optimize this relationship. The findings highlight the need to strengthen inter-institutional articulation through strategies that favor curricular flexibilization, as well as the capacity of TVET institutions to respond more quickly to the dynamics and demands of the labor market and society in general.

Furthermore, it emphasizes the relevance of carrying out prospective studies that allow for the adjustment of the educational offer to emerging trends, promoting the relevance and sustainability of training programs. The article also underlines the importance of incorporating principles of inclusion and equity in TVET, ensuring that vocational training not only responds to the demands of the productive sector, but also contributes to the achievement of broader objectives of social mobility and socio-economic development. In this sense, it is proposed that the strengthening of these linkage dynamics constitutes a fundamental axis to guarantee quality TVET, aligned with the needs of the local and global context, and committed to the construction of a more equitable and resilient social fabric.

1. Introduction

In Costa Rica, Technical Vocational Education and Training (TVET) institutions play a key role in training skilled technical personnel to meet the emerging and changing needs of enterprises. However, structural and operational conditions persist that hinder the alignment between educational offerings and the emerging needs of enterprises. These gaps, both in academic training and in adaptation to market demands, affect not only TVET institutions, but also the country's competitiveness, enterprises and the quality of life of graduates. This is because people face difficulties in finding well-paid jobs in their areas of training, which consequently translates into a lower competitiveness of the national economy due to unequal job opportunities and, therefore, a reduction in economic well-being and social mobility. (Consejo Nacional de Rectores, 2011, Láscarez Smith 2023).

The objective of this article is to analyze the linkage mechanisms between the Ministry of Public Education (MEP), the National Learning Institute (INA) and the productive sector, identifying the factors that hinder their relevance pertinence. On the basis of this analysis, ways of strengthening this relationship are proposed, in order to promote training that truly promotes social inclusion and mobility, and thus the socio-economic development of the country.

The text is structured as follows: the first section refers to the theoretical foundations for the study of the link between TVET institutions and the productive sector in Costa Rica, which includes the theory of social reproduction under the capitalist logic from the perspective of Pierre Bourdieu and De la Garza Toledo's critique of the neoliberal model that instrumentalizes education and suggests an understanding of education as a dynamic and non-linear process. The second section sets out the methodology used for the development of the article, which is part of a qualitative approach and is based on the use of techniques such as literature review and structured interviews with experts in TVET and the productive sector. The third section includes the main results based on a characterization of the TVET system and the productive sector in Costa Rica, as well as a description of the main mechanisms used by the MEP and the INA in their links with the Costa Rican productive sector.

Finally, a discussion of the main challenges for strengthening the link between TVET and the productive sector in Costa Rica is presented and conclusions are draw.

2. Conceptual Background

This analysis is based on the theoretical framework of Pierre Bourdieu's theory of social and cultural reproduction, which provides analytical tools to examine the dynamics of power and inequality in Costa Rica's educational and economic system. According to Bourdieu, social reproduction is an inherently unequal process in which social institutions, including educational institutions, operate under a capitalist logic oriented towards the reproduction of the labor force, while simultaneously contributing to the perpetuation of class hierarchies. This approach allows us to explore how the education system acts as an agent of legitimization and perpetuation of structural inequalities, particularly in contexts where historical and socio-economic inequalities prevail.

Bourdieu (1997) contends that educational institutions do more than merely mirror social inequalities; they actively contribute to their reinforcement. Their internal structures can restrict equitable access to knowledge, thereby solidifying pre-existing disparities. As Bourdieu emphasizes, the most these institutions can aspire to is to avoid amplifying inequalities or exacerbating the differences that already exist among the students they serve. From this perspective, the education system, far from being a neutral mechanism, fulfils a reproductive function by preparing individuals to play specific roles in the labor market that correspond to their position of social origin (Bourdieu & Passeron, 1964).

In Costa Rica, TVET has historically been seen as less prestigious educational path, often associated with disadvantaged groups such as orphans and low-income individuals (Láscarez Smith, 2024). This perception stems from TVET 's focus on preparing workers for low-paying jobs with limited social recognition, a legacy of colonial and neo-colonial labor tradition in Latin America. However, in recent years, the increasing importance of TVET calls for a reassessment of its role and social standing. This shift involves improving the quality of technical training and aligning it with labor market needs and country's social development goals. Bourdieu and Passeron (1964) emphasize that educational quality is the key to promoting social mobility, and should not be reserved for elites but made accessible to the most disadvantaged groups.

Thus, the contemporary challenge lies in transforming TVET into an engine of social equity, where vocational technical education is no longer seen as a subordinate space but becomes a key tool for social integration, the reduction of inequalities and the strengthening of sustainable economic development.

De la Garza Toledo (2006, 2013, 2022), in his studies on the sociology of work, employment and socio-economic dynamics in Latin America, addresses the asymmetries between the education system and the labor market. He

criticizes the neoliberal-utilitarian model that instrumentalizes education by subordinating it to the logic of the market, reducing its function to the preparation of competitive workers. From his perspective, it is necessary to adopt a broader understanding of social and labor processes, which considers not only economic factors, but also subjective factors and the interactions between the various actors.

The relationship between the education system and the labor market should be viewed as a dynamic process, rather than a rigid one. Education must evolve beyond merely responding to the demands of capital, embracing more holistic, critical, and flexible approaches that incorporate cultural and social dimensions. De la Garza Toledo 's (2013) analysis emphasizes that labor actors are active participants in the production process, not merely factors of production. Therefore, the TVET system should focus no only on developing technical skills but also on fostering competencies that encourage critical thinking, social cohesion, and equity. Educational institutions should be seen as spaces for mediation and transformation, capable of questioning and reshaping labor and social dynamics.

This theoretical positioning implies that TVET plays a role that is not only economic but also cultural, social and inclusive. This function must go beyond the demands of the labor market, facing social challenges that countries such as Costa Rica face, such as overcoming poverty, the fight against drug trafficking, inequalities, and the reproduction of social life in peace and democracy.

3. Methodological Strategy

3.1 Approach

The methodological approach employed in this article is qualitative in nature, as it allows for a deep and contextualized understanding of the dynamics and mechanisms that shape the relationships between TVET institutions and the business sector in Costa Rica. This approach facilitates the interpretation of the social and cultural meanings attributed by the actors involved, as well as the integration of their perspectives with the theoretical framework and the underlying structural dynamics (Hernández Sampieri & Mendoza Torres, 2028).

In this case, reference is made to the relationship between the coordination mechanisms of the MEP, the INA and the Costa Rican business sector. The importance of these mechanisms for the quality, relevance and effectiveness

of TVET programs, as well as the forms of participation of key actors that define the development of the supply, quality and infrastructure of TVET, are discussed.

The scope of this article is focused on identifying and describing the institutional mechanisms for linking with business, considering three levels: national, MEP and INA. It is based on the information provided on the websites of the institutions, official documents referring to the linkage mechanisms and, mainly, on the information obtained from the interviews. It is important to mention that the informants were carefully selected and included representatives of the institutions (MEP INA), representatives of the business sector and an external consultant. For the coding and analysis of the data, the category 'coordination mechanisms' was used at three levels: national, MEP and INA, and their respective descriptors (see Table 1). These categories were applied to both the interviews and the literature review.

Table 1: Categories of analysis and descriptors

Categories of analysis	Coordination mechanisms at national level, MEP level and INA level		
Descriptors	Main Features	Legal basis	Results and impacts

Note. Own elaboration (2024)

The analysis of the results in this study is based on the abstraction of the empirical data obtained through the interviews and comprehensive review of data and literature on linkage mechanisms. The analysis process seeks to generate a framework for understanding the processes of dialogue between education and business, particularly in the context of Technical and Vocational Education and Training (TVET).

3.2 Data Collection and Data Analysis

Data collection was conducted through an exhaustive review of studies and documents addressing the interactions between TVET and productive sectors, with a particular focus on initiatives implemented by the Ministry of Public Education (MEP) and the National Learning Institute (INA). The bibliographic search was carried out using scientific databases available at the National Technical University such as EBSCO, Dialnet Plus, ELIBRO, SCOPUS, as well as institutional repositories from the MEP and INA.

Some of the main documents that were reviewed are: The Law on Dual Technical Education and Training (2019), the Third Report on the State of

Costa Rican Education (2011), Glossary of Training and Vocational Training Services at the INA (2015), Study to Determine Training and Vocational Training Needs in the Construction Sector at the National Level (2008), National Qualifications Framework (2019), Recommendations for Research at the INA (2021), Regulations for Liaison Advisory Committees. (2021), Curricular Model for Vocational Training of the National Learning Institute (2023), Technical Assistance Service Procedures (2024), Feasibility Analysis for the Implementation of Dual Education: improvement proposals for the technical education system in Costa Rica (2017), Political Participation of Business Organizations in the Construction of the Technical Vocational Education System in Costa Rica between 1980 and 2021 (2023), Regulations of the: Regional Council for Linking with Business and the Community (CORVEC, 2018), Linking with Business and the Community (2019), Manual and Guidelines of the: Management of Coordination with Business (2022), National Policy for Technical Vocational Education and Training 2023-2033 (2023), Executive Decree No. 43481-SINEFOTEP: National System of Technical Vocational Education and Training (SINEFOTEP, 2024), Management Guidelines of the Regional Council for Linking with Business and the Community (CORVEC, 2024), General Regulations to the Law on Dual Technical Education and Training (2020) and Strategic Plan of the National System of Technical Vocational Education and Training 2023-2027 (2023).

In addition, seven structured interviews were conducted with experts affiliated with the MEP, INA, and the Costa Rican business sector. These interviews, carried out virtually using the Zoom platform, were designed to delve into the participants' experiences, perspectives, and specific knowledge regarding the articulation between TVET and the productive sector. Table 2 provides a summary of the profiles of the interviewees, who offered a comprehensive view of the challenges and opportunities in strengthening this strategic relationship.

Table 2: Information from interviewees

Position and institution or sector represented	**Date of the personal consultation**
Director of the Directorate of Technical Education and Entrepreneurial Skills of the MEP.	21-11-2024
Former head of the Vehicle Mechanics Nucleus, INA	14-11-2024
General Coordinator of the National Qualifications Framework for Technical and Vocational Education and Training of Costa Rica	19-11-2024
Consultant to the International Labour Organization (ILO)	18-11-2024
Coordinator of the Global Apprenticeship Network (GAN) Costa Rica and representative of the Business Sector before the Board of Directors of the INA	19-11-2024
Person in charge of the Strategic Planning Process of the Planning and Evaluation Unit of the INA.	03-12-2024
Human Talent Advisor of the Chamber of Industries of Costa Rica	20-11-2024

Note. Own elaboration (2024)

The document analysis was organized around the following analytical categories:

- a) coordination mechanisms between institutions and businesses,
- b) institutionalization of coordination;
- c) legal foundations of coordination mechanisms; and
- d) results and impacts of these mechanisms.

The data were coded manually, without the support of any software to process the information, and analyzed inductively, based on their organization into the categories outlined above. This methodological design seeks not only to identify patterns and trends in the relationship between TVET institutions and the business sector but also to critically examine the sociological and structural implications of these interactions.

The interviews were transcribed and analysed from the same categories used for the literature review. The information obtained from the interviews was complemented with the review of bibliographic sources to provide a more comprehensive and updated view of the challenges for strengthening the linkage mechanisms between TVET and the productive environment in Costa Rica.

4. Results

This chapter provides a description of the TVET system, its regulatory framework and the productive sector in the Costa Rican context. Subsequently, a description is given of the mechanisms used by TVET institutions to link with the productive sector. In this case, the information is presented at three levels: the first details the mechanisms at the national level, the second refers to the MEP level, and finally, the third level refers to the INA level.

4.1 Description of the Costa Rican TVET system and its Regulatory Framework

The National Policy on Technical Vocational Education and Training 2023-2033 defines TVET as an educational service that combines theoretical and practical knowledge to prepare people for the world of work. This system is structured in formal and non-formal modalities and has positioned itself as a fundamental pillar to promote equity, productivity, and sustainability in Costa Rica. It also contributes significantly to promoting equal access to education and the labor market, promotes entrepreneurship and decent work (National TVET Policy, 2023).

Formal education: at the public level includes the offerings of the Professional Technical Colleges (CTP) of the Ministry of Public Education (MEP), at the secondary level, and at the higher education level, institutions such as the National Technical University (UTN) and the Technological University of Costa Rica (TEC). It also integrates the offer of some private institutions, whose programs are recognized and approved by the MEP or accredited by the National Council of Higher Education (CONESUP).

Non-formal education: its main provider is the National Learning Institute (INA), through its short training and job training programs. In addition, there are private academies, centers and technical training institutions that operate without any type of official regulation and whose offer includes programs in various areas such as technology, health, gastronomy, beauty, tourism, among others.

According to Carla Rojas Benavides (2024), consultant for the International Labour Organization (ILO), a distinctive feature of the Costa Rican TVET system is the lack of articulation between the formal and non-formal sub-systems. This separation 'also generates differences in the way they are organized and, in the way, they detect needs' (personal communication, 17 November 2024). In addition to academic actors, the TVET system involves other essential social and productive actors. These include the productive

sector, students, business chambers and associations, professional associations, trade unions and civil society, among other actors that contribute to the process (Director of the Directorate of Technical Education and Entrepreneurial Skills of the MEP, personal communication, 21 November 2024).

Regulatory Framework of TVET

The regulatory and legal framework governing TVET in Costa Rica is underpinned by a series of foundational instruments that highlight its role in national development. The Political Constitution of Costa Rica establishes education as a fundamental right, emphasizing its centrality in fostering equity and social mobility. The Fundamental Law of Education (No. 2160) positions technical education as a strategic tool for driving the country's economic and social development. Complementing this, the Law on Dual Education and Training (No. 9728) and the Labor Code promote collaboration between employers and educational institutions to ensure the relevance, adaptability, and effectiveness of vocational training programs.

These legal provisions are reinforced by national strategies and policies that aim to modernize and strengthen the TVET system. The National Qualifications Framework aligns education with labor market needs, while the National System for Technical and Vocational Education and Training (SINEFOTEP) coordinates institutional collaboration. The National Employment Policy addresses skills gaps to improve employability, and the National Technical Education Strategy 4.0 aligns TVET with emerging industries. Finally, the Sustainable Development Goals (SDGs) offer a global framework for promoting inclusive, equitable, and sustainable development through TVET. This comprehensive regulatory and strategic framework underscores the critical importance of TVET as a driver of socioeconomic progress and a cornerstone of Costa Rica's efforts to build a resilient and inclusive labor market.

4.2 The Productive Sector in Costa Rica

The structural adjustment of Costa Rica's productive system, initiated in the 1980s, has resulted in a profound diversification of the productive matrix. This transformation has been driven by the promotion of non-traditional exports, the globalization of the services and manufacturing sectors, and the attraction of foreign direct investment through free trade zones. While these changes have successfully integrated the country into the global economy, they have also exacerbated economic inequalities, contributed to the persistence of

precarious employment and high poverty levels, and intensified the degradation of natural resources (Hernández González & Villalobos Salas, 2016).

In response to these transformations, the Ministry of Public Education (MEP) has structured its technical education programs around three main areas: agriculture, industry, and commerce and services, aiming to meet the demands of the productive sectors linked to these domains. However, the Director of the Directorate of Technical Education and Entrepreneurial Skills of the MEP, highlights that not all productive sectors are equally represented, due to the lack of a cohesive national business structure in Costa Rica (personal communication, November 21, 2024). This fragmentation is evident in the coexistence of companies of varying sizes—micro, small, medium, and large many of which operate outside formal business associations or chambers. This lack of coordination undermines the alignment between the educational and productive systems.

The National Training Institute (INA), on the other hand, organizes its training offerings based on segmented productive sectors, defined as "functional areas that share similarities, whether in the type of inputs transformed, the processes undertaken, the products generated, or the services provided" (INA, 2015, p. 19). The INA's training programs span 12 productive sectors, grouped into Training Nuclei, including agriculture, commerce and services, electrical systems, food industry, graphic industry, vehicle mechanics, metal mechanics, marine and fisheries, health, culture and crafts, material technology, textile and industrial clothing production, and tourism.

It is critical to note that, since the transition to an economic liberalization model in the 1980s, Costa Rica has not developed a cohesive and unified national productive sector. Instead, much of the country's economic growth has been closely tied to foreign direct investment and the needs of transnational and multinational corporations (Láscarez Smith, 2024). Consequently, in the context of TVET, discussions about productive sectors are often focused on transnational sectors, prioritising mainly on their demands, requirements, and expectations for coordination.

These dynamic raises important questions about the extent to which TVET can address national development goals when the productive sectors it seeks to serve are primarily shaped by external actors.

The challenge lies in reconciling the demands of the global economy with the need for inclusive and sustainable development, ensuring that Costa Rica's education and training systems contribute not only to economic growth but also to social equity and environmental sustainability.

4.3 Mechanisms for Linking TVET Institutions with the Productive Sector in Costa Rica

The linkage between TVET institutions and the productive sector in Costa Rica is a crucial component to guarantee the relevance and effectiveness of educational programs in the face of the demands of the productive sector, the needs of students, and the challenges imposed by a globalized environment. This process of interaction seeks to reduce the gap between the competencies and skills contained in the educational curriculum and the changing needs of companies, in order to improve the country's employability and competitiveness in the global arena.

Figure 1 illustrates the mechanisms identified. They are classified into three levels: country-level strategies, mechanisms of the Ministry of Public Education (MEP) and mechanisms of the National Learning Institute (INA). Each of the identified mechanisms is described in detail below. Table 3 shows a summary of the mechanisms identified, See the table in Appendix 1.

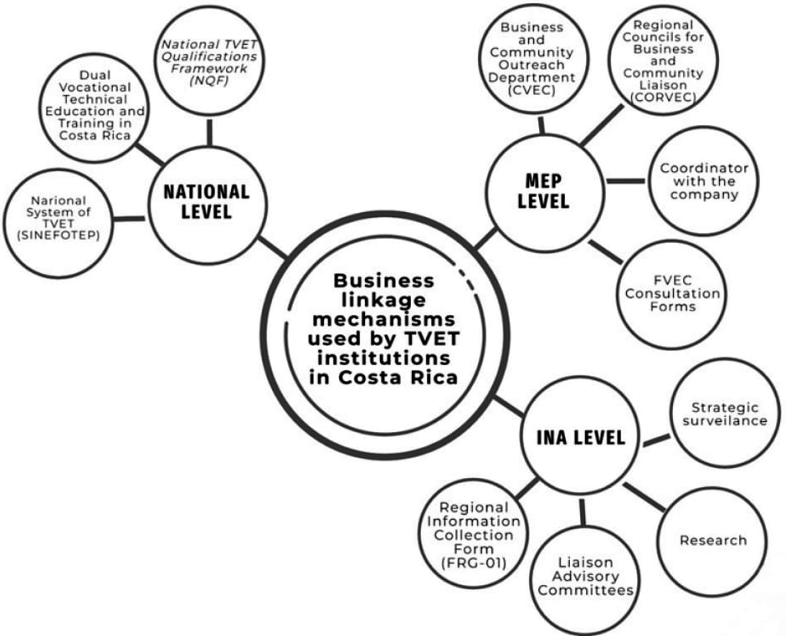

Figure 1. Business Linkage Mechanisms used by TVET Institutions in Costa Rica

Note. Own elaboration

4.3.1 Mechanisms for linking with businesses at the national level

4.3.1.1 National Qualifications Framework for TVET in Costa Rica

The National Qualifications Framework for Technical Vocational Education and Training of Costa Rica (MNC-EFTP-CR) is a nationally recognized structure that regulates the qualifications and competencies associated with technical programs and careers, based on five levels: Technician 1 (400-700 hours), Technician 2 (1200-1600 hours), Technician 3 (2300-2800 hours), Technician 4 (2840 hours) and Technician 5 (60 to 90 credits)[1].

This framework is based on specific technical descriptors that not only guide technical training but also link occupations and promote mobility across various qualification levels, aligned with the dynamics of the labor market (INA, 2018, p. 37). Its main functions include regulating and supervising the TVET, coordinating the subsystems that comprise the national TVET system, and integrating diverse occupational groups. These functions help to outline educational and career pathways that align with the demands of a constantly evolving labor market.

From a critical perspective, the director of the Directorate of Technical Education and Entrepreneurial Skills of the MEP (2024) and the Human Talent Advisor of the Chamber of Industries of Costa Rica (2024) argue that any process of articulation between TVET and the business sector must begin with the National Qualifications Framework (NQF), as it establishes standards in close collaboration with the productive sector, which is considered a strategic partner in the formulation of educational and training policies. However, although the NQF's primary objective is to ensure the continuous development of TVET by promoting its quality, relevance, and closer integration with productive sectors, significant gaps persist between educational offerings and actual labo market needs.

These discrepancies in the National Qualifications Framework (NKF) stem from its centralized nature, which limits flexibility to meet local sector needs, and the unequal representation of productive sectors in its design, reducing its inclusivity. Additionally, insufficient financial resources for monitoring technical programs quality worsen the issue. Therefore, for the NQF to succeed in linking TVET with the productive sector, a more dynamic, decentralized, and inclusive model is needed. This would allow quicker adaption to labor market changes and ensure broader sector coverage, requiring institutional

1 To learn more about the characteristics of each level of the NQF you can review the information in this link https://www.cualificaciones.cr/mnc/images/articulos/publicaciones/MarcoNacionalCualificaciones_v2_16092019.pdf f

restructuring and increased investment in resources for quality and relevance (Consultant to the International Labour Organization, 2024; Human Talent Advisor of the Chamber of Industries of Costa Rica, 2024; General Coordinator of the National Qualifications Framework for Technical and Vocational Education and Training of Costa Rica, 2024, personal communications).

4.3.1.2 National System of Technical and Vocational Education and Training (SINEFOTEP)

In 2022, through Decree No. 43481-SINEFOTEP, Costa Rica created the National System of Technical and Vocational Education and Training (SINEFOTEP) with the objective of coordinating and integrating efforts in technical education and training at the national level, adopting a systemic approach. This system brings together public and private actors, under the leadership of the MEP and the National Learning Institute (INA). Its main function is to update and align the educational offer with the demands of the socioeconomic context, fostering collaboration between the MEP, the INA, public universities, businesses and other key actors (MEP, 2024).

SINEFOTEP is governed by the National Council for Technical and Vocational Education and Training (CONEFOTEP), a policy-oriented collegiate body composed of representatives of various educational institutions such as the MEP, INA, TEC, UCR and UTN, and the National Council of Rectors (CONARE), in addition to the Ministry of Labor and Social Security (MTSS), the Ministry of Economy, Industry and Commerce (MEIC), the National Council of Private Higher Education (CONESUP), the Costa Rican Union of Chambers and Associations of the Private Business Sector (UCCAEP) and the Professional Association of Counselors. This governance structure ensures the representation of diverse sectors, improving the alignment of policies and strategies with the multifaceted demands of TVET (SINEFOTEP, 2023).

SINEFOTEP aims to position Costa Rica 's TVET system as a key driver of national development by promoting equitable access to quality education while meeting the evolving needs of the labor market. Its strategic plan for 2023-2027, aligned with CONEFOTEP 's roadmap, focuses on six key areas: TVET educational offerings, governance and policy articulation, teacher training and professional development, research and innovation, accreditation, and monitoring and evaluation. The goal is to align TVET with enterprise needs, ensuring education that meets labor market expectations and the challenges of global economic integration (SINEFOTEP, 2023).

4.3.1.3 Dual Education and Training in Costa Rica

In Costa Rica, Dual Education and Training was formalized in 2019 through the enactment of Law No. 9728, known as the Law on Dual Technical Education and Training, which established the legal framework for its governance and scope. This framework is further supported by the General Regulation to the Law on Dual Technical Education and Training (Poder Ejecutivo de Costa Rica, 2020) and the broader regulatory framework for TVET (Organización de Estados Iberoamericanos, 2024).

The primary objective of this educational modality is to promote comprehensive training that equips students with technical competencies and practical skills to facilitate their entry into the labor market (Legislative Assembly of Costa Rica, 2019). In this sense, dual education integrates theoretical learning in educational institutions with practical training in companies, which represents 70-80% of the total training time. Inspired by successful models, such as the German system, this approach seeks to harmonize political, social, and economic factors to ensure quality and relevance (Láscarez Smith, 2017).

4.3.1.4 Principles of dual education that contribute to linking with businesses.

The dual model offers an innovative framework aligned with the demands of the labor market, based on the following principles:

- Practical approach: training in real work environments, regulated and supervised by both educational institutions and businesses.
- Multisectoral articulation: promotes collaboration between the education and business sectors.
- Participatory governance: involves social and economic actors in decision-making processes (Legislative Assembly of Costa Rica, 2019).

In this context, the Advisory and Promotion Commission for Dual Technical Vocational Education and Training (TVET), led by the Ministry of Public Education (MEP), is responsible for facilitating dialogue between the educational and business sectors. Key activities include company visits to Germany, dialogue tables with dual TVET stakeholders, business forums, workshops, and training sessions (MEP, 2023b; OEI, 2024).

4.3.2 MEP mechanisms for linking with the Productive Sectors

4.3.2.1 Business and Community Outreach Department (DVEC)

The Directorate of Technical Education and Entrepreneurship of the Ministry of Public Education of Costa Rica has the Business and Community Outreach Department (DVEC) established by Decree No. 38170-2014. This department aims to strengthen the connection between the technical education system and the productive sectors of the country. To this end, it carries out systematic consultations with employers and analyses the needs of labor insertion and demand, in order to align the educational offer with the demands of companies and productive sectors. The actions of this Department are based on four strategic units, detailed in Table 3.

Table 3. Strategic units of the MEP's DVEC and their objectives

Strategic Unit	**Objective**
Research and information	To provide statistical information to sectors of society.
Linkage with the productive sector	Link the productive sector with professional technical colleges, in order to strengthen teaching and learning processes
Outreach and promotion	To direct the processes of promotion and dissemination of activities and achievements of the subsystem.
Link Management	To promote the participation of a collegiate body, of a consultative nature, which contributes to the achievement of the aims of education

Note. Data from the Ministry of Public Education (2022), management manual for the coordinator with the company

To achieve its objectives, the department operates on three fundamental pillars: direct communication among vocational and technical education institutions, linkage with the productive sector, and integration between technical education and society. Within this framework, the connection between technical education institutions, the Business Coordination Offices of each school, and the Business and Community Outreach Department (DVEC) is ensured.

The DVEC collaborates closely with the Steering Committees of the Regional Councils for Links with Business and the Community (CORVEC), providing guidance and support in the development and implementation of regional strategies for community and business engagement. This is essential for educational planning, curriculum updates, and the reorganization of the

vocational and technical education system, ensuring alignment with the evolving dynamics of the labor market and the broader demands of society.

4.3.2.2 Regional Councils for Links with Business and the Community (CORVEC)

The Regional Councils for Links with Business and the Community (CORVEC) are collegiate bodies created in 2010 by the MEP, with the purpose of improving the connection between technical education institutions and the productive sector in Costa Rica. Currently, there are 14 councils that bring together the 135 professional technical colleges (CTPs) of the different socio-economic regions of the country, which are determined by the Ministry of Planning and Economic Policy (MIDEPLAN) and by the density of institutions located by each Regional Education Directorate of the Ministry of Education (MEP, 2018).

In addition, the CORVECs, function as a liaison with the institutions that provide vocational technical education and the three departments that make up the Directorate of Technical Education and Entrepreneurial Skills (DETCE), namely: Technical Specialties (DET), Business Management and Cooperative Education (DGEC) and Linking with Business and the Community (DVEC), facilitating fluid and direct communication with vocational technical schools (MEP, 2024d).

The main functions of the CORVECs include coordinating with the Directorate of Technical Education and Entrepreneurial Skills (DETCE) to organize meetings on education and employment with the business sector, such as forums, seminars, and technical fairs. They also promote entrepreneurial skills among students, evaluate the relevance of educational offerings based on labor market needs, and design strategies to improve the academic and technical performance of institutions. Additionally, they consult with social and business actors to enhance labor market integration, training, and continuing education strategies (MEP, 2024d).

CORVECs stand out as a strategy to regionalize support for technical education, promoting more contextualized training that responds to the specific needs of each region of the country. This approach considers factors such as economic situation and geographical location. However, despite their relevance in labor intermediation, the strengthening of entrepreneurial skills and their consultative capacity, it is important to underline that CORVECs do not have a binding character in decision-making processes; their role is advisory and consultative; therefore, they only make recommendations (MEP, 2022).

4.3.2.3 The Coordinator with companies

The Ministry of Public Education (MEP, 2022) defines the figure of the Coordinator with the Company of a Professional Technical College, an Institute of Community Education (IPEC) or an Integrated Adult Education Centre (CINDEA), as the 'person in charge of coordinating, supervising, controlling and promoting the quality of technical education, through the design and execution of a process of linking and monitoring the demand of the productive sector' (p.47). The main objective of this process is to integrate the visions and needs of employers, young students and society.

The role of the coordinators with the enterprises is central to the success of the learning process and the administrative management. For this reason, it is important that the profile of the company coordinators combines technical competences, interpersonal skills and ethical qualities that allow them to establish an adequate interaction with students, graduates, employers, and civil society.

The coordinator's main functions include promoting the labor market integration of CTP graduates, participating in the Regional Council for Links with Business and the Community, establishing relationships with businesses and industry organizations, and managing activities like job fairs and vocational guidance. They also coordinate collaboration opportunities such as internships and professional practices, participate in regional business consultations, provide updated statistical data for decision-making, and conduct studies on labor insertion and job placement (MEP, 2022). Therefore, the person coordinating with the company facilitates the constant dialogue between the technical education institutions and the productive sectors.

4.3.2.4 Consultation Forms

In order to fulfil its responsibilities, the Business and Community Outreach Department (DVEC) has developed eight forms designed to collect essential data to facilitate decision-making at various levels of the Ministry of Public Education, such as the Directorate of Technical Education and Entrepreneurship, the Regional Education Directorates, and the administrations of the country's technical and vocational education centers. Some of these are administered via email, while others are conducted in person, and they are addressed to the business coordinators of the educational centers, the CTPs, and entrepreneurs. The MEP Linkage forms (FVEC) are:

- FVEC-1: Directory of Professional Technical Colleges, IPEC and CINDEAS
- FVEC-2: Technical Offer, Admissions and Dropout
- FVEC-3: Student Promotion and Human Talent

- FVEC-4: Interns and company supervisors job placement after professional internship
- FVEC-5: Directory of technical teachers by specialty
- FVEC-6: Labor Insertion
- FVEC-7: Quarterly Technical Performance
- FVEC-8: Consultation with entrepreneurs by Specialty and Modality[2]

4.3.3 INA mechanisms for Linking up with the Productive Sectors

From the interviews conducted with the person responsible for the Strategic Planning Process of INA's Planning and Evaluation Unit of the INA, and the former head of the Vehicle Mechanics Unit, it is clear that INA implements various mechanisms to align its vocational training offer with the needs of the productive sector. These strategies are required by the INA Quality System and focus on incorporating the requirements of the client, in this case represented by the business sector, in the design of courses, modules and technical assistance.

This linkage process is established with all companies, regardless of their size (micro, small, medium and large). However, according to government policies, priority can be given to MSMEs, since they have more limited resources and fewer possibilities to pay for training services than large companies. Among the mechanisms described are:

4.3.3.1 Strategic monitoring

The INA defines strategic monitoring as a process of observing, analyzing, and systematizing relevant information both nationally and internationally, which supports decision-making in areas such as research, curriculum design, and continuous improvement of educational services. (INA, 2023).

4.3.3.2 Research Area

The INA's curricular model has a research component that is part of the Strategic Planning Process of the Institutional Planning Unit (UPI). This area is made up of at least 12 people, who offer advice, monitoring, accompaniment and evaluation to the different Training Nuclei and Units that carry out pure or

2 To expand the information about the forms, you can consult MEP, 2022, pp. 105-106. https://www.mep.go.cr/sites/default/files/2023-10/14-manual-gestion-coordinador-noviembre-2022.pdf

applied, qualitative or quantitative research. This advice is provided during all stages of the research process, to one person or to a technical team of researchers defined by each Nucleus. To support this work, the institution has the Research Information System (SII), which provides support, guides and theoretical-methodological orientations for the adequate development of research (INA, 2021, M. Paniagua Sánchez, personal communication). Some of the research modalities highlighted are: Studies on the demand for professional education and training, Statistical Monitoring Services System (SEMS), Prospective research, and Impact evaluations.

4.3.3.3 Consultative Liaison Committees

The Consultative Liaison Committees advise the INA on design and definition of vocational education and training, and coordinate research with the Institutional Planning Unit (UPI). There are three types of committees:

1. **Productive Sector Committees** (or sectoral committees of the technical units): representing business and labor organizations for each sector.
2. **Regional Consultative Liaison Committees** (or regional committees): for each administrative region, integrating business, labor and community representatives.
3. **The SME Liaison Advisory Committee**: located at INA headquarters, it coordinating training activities for micro, small and medium-sized enterprises (art. 17). It is linked to the Development Banking System (SBD), which is a programme created in Costa Rica to facilitate the financing of small and medium-sized enterprises and productive projects (INA, 2017, in charge of the Strategic Planning Process of INA's Planning and Evaluation Unit of the INA, the former head of the Vehicle Mechanics Unit, 2024, personal communication).

4.3.3.4 Regional Information Collection Form (FRG-01)

It consists of a technical tool to collect information related to training and capacity building needs in the different regions of the country, whose objective is to align the training offer with local socio-economic and productive characteristics. These forms are received by INA's Regional Units, which enter them into the system in the form of an application and transfer them to the Technical Units so that they can proceed to implement a technical diagnosis to determine the needs and define the type of attention or service that can be provided (in charge of the Strategic Planning Process of INA's Planning and

Evaluation Unit of the INA, the former head of the Vehicle Mechanics Unit, personal communications, 2024).

For example, the alternative could be a Technical Assistance Service, which offers specific solutions to technical, administrative or productive problems of companies (guilds, associations, chambers) and institutions (INA, 2015, p.4). This procedure requires coordination between the INA teacher and the productive unit, through visits, the application of previous diagnoses and customized developments to respond to the specific needs of each company (INA, 2024).

5. Discussion

5.1 Key challenges in Strengthening the Link between TVET and the Productive Sector in Costa Rica

This section analyses the primary challenges identified by interviewees, encompassing both structural and operational issues within the Technical and Vocational Education and Training (TVET) system and its relationship with the productive sector. The responses underscore the urgent need to establish stronger coordination among educational institutions, businesses, and government actors, reinforcing a systemic vision. The analysis also incorporates a critical perspective, drawing on the theoretical frameworks of Bourdieu and De la Garza Toledo, to examine the influence of capitalist logic on social reproduction and the interactions among stakeholders within the system.

Fragmentation and Institutional Disconnection: The lack of institutional coordination in TVET leads to duplication of efforts and sub-optimal use of resources. To solve this problem, it is necessary to standardize methodologies for consultation with productive sectors and to establish system-wide indicators in order to generate actionable data for decision-making. Interviewees stressed the importance of creating synergies among TVET institutions to share best practices, establishing a centralized database or analytical unit to standardize variables and indicators, and harmonizing regulations across the system. Formalizing consultation structures is also crucial to prevent companies from being overwhelmed by isolated and redundant requests for information. In addition, collaboration with organizations such as the Costa Rican Investment Promotion Agency (CINDE) and business chambers is needed to optimise data sharing and improve student outcomes, especially in areas such as language acquisition.

Institutional Dynamism and Educational Flexibility: A major challenge identified by interviewees is the late institutional response to the demands of the business sector for qualified technicians and professionals. This problem is attributed to the rigidity and slowness of curriculum design processes, which hinder timely adaptation to changes in the labor market. In addition, the administrative bureaucracy of public TVET institutions is a major obstacle. To solve this, participants proposed adopting hybrid or bimodal educational methodologies, implementing micro-credentials, competency-based certifications and dual education models that allow for more agile responses to the demands of the productive sectors and to global trends such as Industry 4.0 and the expansion of artificial intelligence.

Quality and Relevance of Educational Offerings*:* There is consensus on the need to strengthen prospective studies to identify emerging trends and sector-specific demands. The proposed creation of a centralized analytical unit, as suggested by the person in charge of the Strategic Planning Process of INA's Planning and Evaluation Unit of the INA, the former head of the Vehicle Mechanics Unit (2024), could be instrumental in mapping market needs and anticipating future skills requirements. Furthermore, the National Qualifications Framework (NQF) is seen as a vital tool to organize and priorities the needs of the productive sector, provided it receives additional resources. Participants also underlined the importance of designing educational and vocational pathways that allow learners to progress to higher qualification levels, improving their professional profiles and increasing their chances of accessing better paid jobs. Bridging the gap between the qualifications of TVET graduates and the real demands of the labor market is essential to develop globally competitive professionals, able to contribute to companies of all sizes and locations.

Inclusion and Equity: Participants emphasized the importance of addressing gender gaps and unequal access to TVET in certain regions, especially in coastal and border areas. The low participation of women in STEM (science, technology, engineering and mathematics) fields was identified as a pressing problem, and specific initiatives to promote their inclusion were called for. To address regional disparities, it was proposed to expand hybrid and bimodal education models to provide greater access to technical training in underserved areas.

Engagement and Communication with the Business Sector: To improve collaboration with the business sector, it is necessary to foster a culture of engagement and improve communication channels. Participants suggested mass information campaigns with accessible language to raise awareness among businesses about their role in shaping TVET provision. In addition, the exchange of reports and proposals on educational outcomes could strengthen the commitment of businesses and other stakeholders frequently consulted by TVET institutions.

5.2 Critical Reflections on Systemic Barriers

The challenges identified reflect deep-seated structural problems in Costa Rica's TVET system, which, despite its achievements, struggles with inefficiencies in its functioning. These challenges are intrinsically linked to dynamics of power and social reproduction within a capitalist framework, in which the needs of business often take precedence over the working conditions and rights of workers. Delayed responses to business demands, institutional fragmentation and rigid educational structures exemplify a system influenced by dominant economic and political interests, echoing Bourdieu's concepts of cultural, social and symbolic capital.

From Bourdieu's perspective, the Technical Vocational Education and Training (TVET) system operates as a mechanism of social reproduction, where access to quality education and better job opportunities is strongly conditioned by people's social and economic origin. And while the certification of knowledge and skills within the education system enables the acquisition of symbolic value to legitimize people's position within social hierarchies and facilitate their mobility, the historical segmentation between TVET and academic education not only reflects but also reinforces class differences, relegating TVET to an inferior status and limiting the possibilities of social mobility for students coming from vulnerable areas. In this sense, the habitus institutionalized in the system perpetuates these distinctions, shaping expectations and consolidating the perception that technical education is only for those who lack the cultural capital necessary to excel in academic settings.

Consistently with this, processes such as curriculum design and consultations with businesses are shaped by these power dynamics, with stakeholders seeking to consolidate control over resources and decision-making. De la Garza Toledo highlights the importance of an integrated approach that not only addresses productive sector demands but also considers inequalities and the educational needs of individuals. Furthermore, gender disparities and unequal access to education in certain regions serve as mechanisms of social reproduction. From a Marxist perspective, these patterns reveal how educational structures perpetuate labor relations and production conditions that favors specific social groups while limiting opportunities for the most vulnerable.

Improving the quality and relevance of TVET offerings requires a profound transformation of the power dynamics underlying the educational system. Real progress will depend on processes of genuine articulation, strategic cooperation, and curricular flexibility that not only respond to productive sector demands but also promote greater equity and social mobility. This vision demands a TVET system capable of balancing the economic imperatives of

businesses with the broader goal of fostering inclusive and sustainable development.

6. Conclusion

The analysis highlights the existence of various mechanisms for collaboration between the Ministry of Public Education (MEP), the National Training Institute (INA), and the productive sectors. Key instruments include the National Qualifications Framework for Technical and Vocational Education and Training (MNC-EFTP-CR), which acts as an integrative axis for system stakeholders, the National System of Technical and Vocational Education and Training (SINEFOTEP), and the Dual Education and Training modality at the national level. At a more specific level, the MEP implements tools such as the Department of Business and Community Liaison (DVEC), Regional Councils for Business and Community Engagement (CORVEC), and Business Coordination Offices, while the INA leverages strategic monitoring, qualitative and quantitative research, Advisory Linkage Committees, and regional needs-assessment forms that align training programs with local socioeconomic contexts.

A critical observation is the lack of regulatory and formalization mechanisms. Many of the existing linkage tools used by TVET institutions lack specific legal foundations, which may undermine their effectiveness, stability, and long-term sustainability. Structural and operational challenges persist, limiting the efficiency of these mechanisms. These include the need for greater inter-institutional coordination, flexible curriculum structures, and more agile responses by TVET institutions to shifts in labor market demand. Additionally, a more inclusive approach is essential, prioritizing territorial and gender equity while addressing the power dynamics and social reproduction processes that perpetuate structural inequalities in access and social mobility. The productive sector must also assume greater shared responsibility, supported by initiatives that communicate the benefits and progress achieved through educational linkages.

In summary, the TVET system must transition towards a more dynamic, interconnected, and adaptive model capable of meeting both markets demand and social aspirations. Looking forward, further research is needed to analyze the permeability between technical training systems and the labor market, design educational pathways that promote social mobility in highly vulnerable contexts, and explore the role of public policies in reducing skill and employment gaps. These efforts aim to contribute to the development of an equitable, competitive TVET system within a rapidly evolving socio-political and economic landscape.

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Appendices

Appendix. Table 1. Business linkage mechanisms used by TVET institutions in Costa Rica

MECHANISMS OF LINKAGE WITH THE COMPANY	MAIN FEATURES	LEGAL BASIS
MECHANISMS FOR LINKING WITH THE COMPANY AT THE NATIONAL LEVEL		
NATIONAL TVET QUALIFICATIONS FRAMEWORK (NQF)	Management and registration of Qualification Standards Accreditation of curricula or educational programs of institutions and certification of standards of qualifications and competencies. (INA, 2018)	Conformed according to Decree No. 39851 MEP-MTSS and its amendment Decree No. 40874 MEP-MTSS, 2016
DUAL VOCATIONAL TECHNICAL EDUCATION AND TRAINING IN COSTA RICA	To promote comprehensive training that allows students to acquire technical and practical skills to facilitate their insertion into the labor market. (Legislative Assembly of Costa Rica, 2019). To link theoretical-practical training, from a systemic vision that allows for a real and effective articulation with the business sector. (Láscarez Smith, 2017)	Law No. 9728 on Dual Technical Education and Training, 2019 The General Regulations to the Law on Dual Technical Education and Training, Executive Branch, 2020
NATIONAL SYSTEM OF VOCATIONAL TECHNICAL EDUCATION AND TRAINING (SINFOTEP)	To generate quality learning processes that facilitate people with comprehensive training throughout life and allow the adequate transition to the labor market, considering the requirements of the country's social and productive sectors. (Law 9728, Art. 2)	Conformed according to Decree No. 43481-SINEFOTEP, 2022
MECHANISMS FOR LINKING WITH THE COMPANY AT THE MEP LEVEL		
BUSINESS AND COMMUNITY OUTREACH DEPARTMENT (DVEC)	Strengthen the connection between the technical education system and the country's productive sectors, through the collection and analysis of strategic data. (MEP, 2022)	Conformed according to decree No. 38170-2014.
REGIONAL COUNCILS FOR BUSINESS AND COMMUNITY LIAISON (CORVEC)	Improving the connection between technical education institutions and the productive sector in Costa Rica (MEP, 2018) Regionalize support for technical education, promoting more contextualized training that responds to the specific needs of each region of the country (MEP, 2022)	It does not have a specific legal basis

COORDINATOR WITH THE SCHOOL COMPANY	Coordinate, supervise, control, and promote the quality of technical education, through the design and execution of a process of linking and monitoring the demand of the productive sector (MEP, 2022)	It does not have a specific legal basis
FVEC CONSULTATION FORMS	To compile essential data that facilitate decision-making in various instances of the MEP, such as the DETCE, the Regional Directorates of Education and the administrations of the country's professional technical associations. (MEP, 2022)	It does not have a specific legal basis
MECHANISMS OF LINKAGE WITH THE COMPANY AT THE INA LEVEL		
STRATEGIC SURVEILLANCE	Observe, collect, analyze, and systematize relevant information about the environment at the national and international levels (INA, 2023).	It does not have a specific legal basis
RESEARCH	Offer advice, monitoring, accompaniment and evaluation to the different Training Centres and Units that carry out pure or applied, qualitative or quantitative research, such as: Studies of demand for training and vocational training, Statistics and Impact Evaluation, Prospective Research. (INA, 2015, 2021, Paniagua Sánchez, 2024, personal communication).	It does not have a specific legal basis
LIAISON ADVISORY COMMITTEES: PRODUCTIVE SECTOR, REGIONAL LIAISON AND SME LIAISON	To advise the INA in the definition and design of its vocational training and training offer. (INA, 2017 and M. Paniagua Sánchez Bonilla Herrera, 2024, personal communication)	It does not have a specific legal basis
REGIONAL INFORMATION COLLECTION FORM (FRG-01)	To compile information related to training and training needs in the different regions of the country in order to align the training offer with local socioeconomic and productive characteristics. (INA 2015, 2024)	It does not have a specific legal basis

Note. *Own elaboration (2024)*

Silvia Camacho-Calvo & Patrick McDonald

Measuring Education-Employment Linkage in the TVET Program of the Ministry of Public Education in Costa Rica: Colegios Técnico Profesionales

Keywords: TVET, Education-Employment Linkage, Colegios Técnico Profesionales

Abstract

The objective of this research was to determine how the education and employment systems are linked in the educational program of the Colegios Técnico Profesionales (CTP) of the Ministry of Public Education (MEP) in Costa Rica, as well as to compare the results obtained between 2019 and 2022 to determine their progress. The CTPs are an educational option of formal programs at the secondary level in the field of TVET in Costa Rica. They have a long history: between 1850 and 1950 the Costa Rican government already had an explicit interest in creating an educational route different from the academic, however not until 1956 was vocational education policy made official. This resulted in the creation of the first three vocational schools, which in the late 1970s became Colegios Técnico Profesionales. (Camacho, 2024b). The study uses the Education-Employment Linkage Index (EELI; Bolli et al. 2018), an instrument developed to measure the level and quality of interactions between the actors of the education and employment systems in Technical and Vocational Education and Training (TVET). The EELI survey was completed in 2019 by 30 actors, and in 2022 by 67 actors. Results suggest that there is an increase in the linkage between systems from 2019 to 2022. However, although there is a trend towards improvement in linkage, some reforms are still needed to cement the increases.

1. Introduction

The objective of this research was to determine how the education and employment systems are linked in the educational program of the Colegios Técnicos Profesionales (CTPs) of the Ministry of Public Education (MEP) in Costa Rica, as well as to compare the results obtained between 2019 and 2022 to determine their progress. CTPs provide one of two available formal TVET education programs in the Costa Rican system, and account for approximately one-fifth of upper-secondary enrollment (Caves et al., 2021; Camacho-Calvo et al., 2019). 56 specialties are offered in the three-year program, and while education is school-based, students are required to complete a practical training period before graduation.

The Colegios Técnico Profesionales in Costa Rica have a history of at least 100 years. Their predecessor was the transformation of the Hospicio de Huérfanos of Cartago in 1908 into the Escuela de Artes y Oficios Salesiana of Cartago, which was consolidated in 1931. This school was oriented to learning for work, specifically "individual, artisan or worker, of basic primary industry: food, sawmills, mechanical workshops, handcrafted furniture, printing, etc."[1] (Guzmán, 2011, p. 239).

In 1941, the first official TVET institution was created, the Industrial Technical School in Desamparados. This institution aimed to meet the needs of the new industries being created in the country at that time. The government needed vocational schools to meet the needs of the economic system and the emerging industry.

The operation of this industrial technical school was short, however, Mainieri (2009) and Camacho (2017) state that the regulations created for the operation of this school set the basis for the subsequent development of TVET in Costa Rica. Around the same time, the importance of having more TVET institutions, both public and private, was publicly discussed (Rojas, 1977). Thus, in 1948, two private schools were created, the first the National Technical School, which was intended to meet the needs of industrial activities, and the Industrial Training School, which was financed by the Chamber of Industries, which prepared people to assume positions in the Chamber's member companies (Rojas, 1977; Alvarado and Mora, 2020).

In 1949, the MEP created a Vocational Education Committee to study the training and labor needs of the economic system. This milestone set a precedent in the country concerning TVET at the secondary level. The Committee conducted some research that made important recommendations for the generation of public policies. These studies established that the educational offer in secondary education at this time was inadequate: it did not contribute to the social and economic development of the country, and there

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was a high drop-out frequency, because it did not respond to the interests of youth. The Costa Rican government responded by implementing a series of strategic actions for the creation of secondary educational institutions in the field of vocational training, as well as proceeding to implement training for the personnel for these institutions, even sending them to study abroad (Camacho, 2024b).

In 1952, the government carried out a pilot plan for TVET at the Liceo Joaquín Vargas Calvo (an academic high school), which provided the experience for the creation of the Colegio Vocacional de Artes y Oficios (COVAO) and the Colegio Vocacional Monseñor Sanabria. In 1956, the first TVET official curriculum was approved, which is taken as a milestone for the beginning of official TVET, since it granted public funding and set universal standards (Guzmán, 2011).

Subsequently, in 1957 the Fundamental Law of Education Law 2160 (Legislative Assembly, 1957) was approved, which gives legal support to TVET (Camacho, 2017). The law defines the purpose of TVET as "To form men and women for work, trained through the fundamental, artistic and scientific education that every good professional needs. In it, education by instruction will not be demanded so much as education by action[2]" (Rojas, 1977, p. 8). From there, number of Colegios Técnico Profesionales in the country grew.

By 1959, the country already had three vocational schools: Monseñor Sanabria, Carlos Manuel Vicente, and the Vocacional de Heredia, which offered educational programs in: General Mechanics, Automotive Mechanics, Joinery, Welding and Forging, Radio, Electricity, Plumbing, Technical Drawing, Education for Home and Administration. In addition, the first agricultural schools were opened, the aim of which was to provide youth who did not want to follow the academic pathway with an alternative at the secondary education level (Camacho, 2024b).

At the beginning of the 1970s, the National Plan for Educational Development was approved, in which the country formalized the change from vocational education to technical education. In 1978, the expected skill level of a qualified worker was raised to that of a medium-level technician, which allowed the professionalization of TVET in Costa Rica. In the 1980s, due to the economic crisis, the growth of CTPs slowed down; however, in the 1990s, they regained importance in the country's educational context (Camacho, 2024b).

By 1997, the MEP had 79 CTPs (Camacho, 2017), by 2001, 50,534 students were attended in a total of 81 Colegios (Vargas, 2002) and by 2004 there were 82 CTPs, which offered specialties in the areas of Commercial and Services, Agriculture and Livestock and Industry (Bolaños, 2004). The last

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increase occurred in 2014. By this time there were 133 daytime CTPs, 85 of these were offering evening programs and 2 nighttime (Alvarado y Mora, 2020).

The Minister of Education Leonardo Garnier, in the "Institutional Report 2006-2014: Subversive education: daring to build the country we want", regarding these schools, pointed out:

"The Colegios Técnico Profesionales are one of the best-kept secrets in Costa Rica: few people know what they are, what they are like, what education they provide, and what scale the technical-professional education of the MEP is. Many times, the idea prevails that nothing has changed with vocational education - as some people still refer to it - and that these schools continue to be an option for those who, because they do not want or can't aspire to a professional academic training, are left at least with "the little machete" that vocational education gives them. The reality is radically different: today, the Colegios Técnico Profesionales constitute one of the most interesting educational offers that Costa Rica offers, they combine academic training – which continues to allow graduates of these schools to successfully aspire to university education – with technical training focused on the most modern skills, in areas of high level of employability, and with increasing levels of quality and sophistication."[3] (p. 257)

For Camacho (2024a), what was expressed by the Ministry reveals a shift in the conceptualization of TVET since the country's historical efforts to create an innovative educational offer at the secondary level that will allow students to progress not only to higher education but also to the labor markets stand out.

Throughout the historical development of Costa Rican TVET, there have been multiple allusions made by Ministers of Education to the need for technical specialties that allow the Costa Rican population to have the necessary skills to enter the labor market (Camacho, 2024). However, the mechanisms defined to ensure that the skills are adjusted have not always been the most optimal.

For this reason, the Education-Employment Linkage Index (EELI) is extremely relevant in the Costa Rican context, since it allows measuring the degree of linkage between the educational system and the labor system, in the different phases of curricular development. Thus, its results allow for feedback processes and improvement of the structural coupling between both systems, generating better results for the young population, since better linkage is associated with easier entry to labor markets for youth (Bolli et al. 2021).

The research that provided the results presented in this text comes from the project Linking Education and Labour Markets: Under what conditions can Technical Vocational Education and Training (TVET) improve the income of youth? (LELAM-TVET4INCOME), implemented jointly by ETH-Zürich,

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University of Kathmandu in Nepal, University of Abomey-Calavi in Benin, University of Chile and University of Costa Rica between 2017 and 2024 (McDonald et al., 2024).

2. Theoretical Approach

The theoretical framework underpinning the Education-Employment Linkage Index (EELI) is detailed in Rageth and Renold (2020), a summary of which is presented below. The education-employment linkage is based on Luhmann's (1998) theory of social systems, which states that a system is understood as a set of elements that are interrelated among themselves, and it is these same relationships that give it the unity of a system. In addition, it is pointed out that it has a series of properties, and these are the sum of the elements that compose it. Each social system has assigned functions, which gives rise to the existence of multiple social systems within society.

In the case of Technical Vocational Education and Training (TVET), it is proposed that the educational system assumes the responsibility of offering educational programs that socialize and enable people to develop labor competencies that qualify them for employment. On the other hand, the employment system is understood as a subsystem of the economic system, which governs the economic development of a country in productive terms. Although Luhmann (1998) states that each system is structured autonomously, it can be related or linked to other systems, so in the case of TVET, concerning curriculum design and implementation, it can count on the contributions of other social systems, in this case the employment system.

The principal function of TVET programs is that they qualify people in a skill to enter a specific job; therefore, the educational system must consider the necessary competencies demanded by the employment system, which, in turn, needs the educational system to be able to produce economically and contribute to the economic development of the country. From Luhmann's (2007) perspective, when systems are linked, there is a structural coupling; in the case of TVET, according to Bolli et al. (2021), when there is a lack of coupling between the two systems, coordination and control problems are generated, resulting in a mismatch between the competencies developed by the education system in individuals and the qualifications needed by the employment system. Therefore, it is expected that when the linkage index is increased, there is a better coupling, which results in people entering the labor markets, thus reducing unemployment and increasing salaries.

Thus, education-employment linkage (EEL) is the observable quality between the actors of two systems, according to Bolli et al. (2021, p.7), EELI is “the degree to which actors from the education system share power with

actors from the employment system in all processes related to providing VET". Figure 2 shows the functioning and distribution of power in three different scenarios, one when power is held only by the education system and therefore qualifications do not correspond to the needs of the employment system, another when power is held by the employment system and it is necessary to adjust educational processes, the third when there is strong linkage between actors and the outcomes for graduates in terms of entry into labor markets is optimal. According to Caves et al. (2021, p.3), these three scenarios refer to "three ideal-type models for linkage in TVET programs":

> *"First, in high-linkage systems, power is generally shared. The other two models are low-linkage situations where one system has most or all of the power. When the education system has most of the power, employers have limited influence on curriculum content, program delivery, and curriculum updating. Programs like this are likely to be mismatched to labor market demand, expensive to operate, and outdated. In contrast, when the employment system has most of the power, educators have limited influence. Employer-dominated programs may lack general and transferable skills in the curriculum, may not include sufficient theoretical content along with the practical content, and may only be updated when one narrow job changes rather than to reflect changes on an occupational level."* (Caves et al., 2021, p. 3)

3. Data and Methods

The Education-Employment Linkage Index

As previously described, the Education-Employment Linkage Index (EELI; Bolli et al. 2018) is an instrument developed to measure the level and quality of interactions between actors from education and employment systems in TVET. TVET relies on close collaboration between these two systems in order to provide students with workplace training and industry-relevant experience during their studies – this "dual TVET" leads to the best outcomes for youth (Bolli et al., 2021).

The EELI is constructed based on data from a questionnaire that can be adapted to individual education programs. Experts from education and employment systems answer questions related to responsibilities and collaborations between the two systems for a given program. The questions are organized along the *Curriculum Value Chain*, a framework for understanding education programs based on their key functions (Rageth & Renold, 2020). Figure 1 illustrates the CVC, its phases and processes.

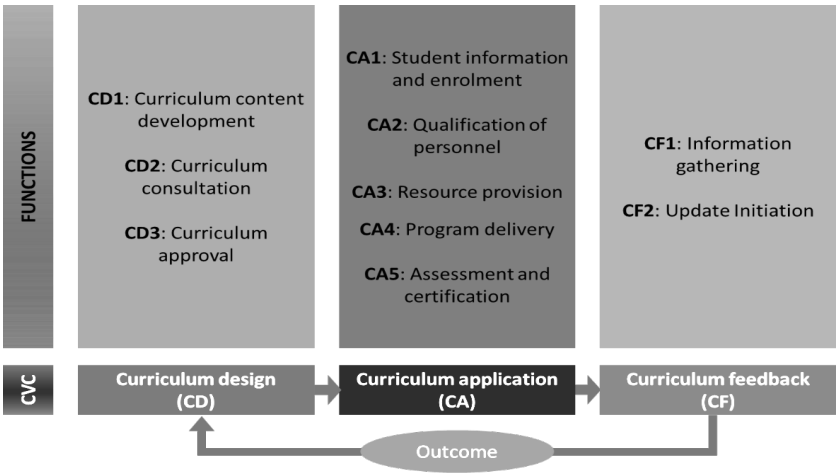

Figure 1. The Curriculum Value Chain, its phases and processes

Note. Own adaptation, based on Bolli et al. (2018)

For each of the processes on the CVC, respondents indicate to what extent activities are led by education or employment actors, or to what extent power is shared. These results are converted into a 1-7 scale, with 1 representing the lowest level of linkage and 7 the highest. Figure 2 displays three theoretical ideal-types of linkage. Ideal-type 1, or optimal linkage, indicates a scenario where actors from the employment and education systems share power relatively evenly, and the results on the EELI scale would be close to 7. Ideal-types 2 and 3, by contrast, show scenarios where education and employment actors respectively hold all power and results on the EELI scale would be close to 1. The former of these scenarios is relatively typical of government-driven TVET programs in Latin America, while the latter is often seen in informal traditional apprenticeship programs that are prevalent in sub-Saharan Africa (Caves et al. 2021).

Figure 2 also shows that while situations where power is completely held by a single actor group are obvious, at the other end of the scale the optimal level linkage is not clear. What is clear is that values at the higher end of the scale are more valuable for the education program than those that are lower.

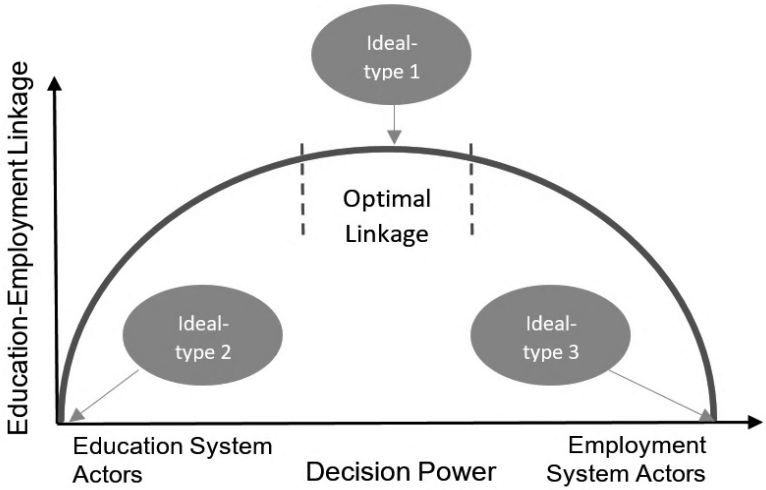

Figure 2. Possible distribution of linkage, with three ideal-types

Note. Bolli et al. (2018); Rageth and Renold (2020)

The individual process scores are combined to create an overall linkage score for each program. To account for the fact that different processes may be more or less important for the functioning of the program overall, or that linkage may be less important in some process than others a multi-step weighting system is used to obtain the overall scores. This weighting scheme uses a combination of respondents' own evaluation of the importance of each of the phases (curriculum design, application and feedback) for the program overall, and a regression analysis of the importance of each of the individual processes for the overall program score the respondents also provide in the questionnaire. This "semi-objective" score provides the most accurate and least-biased estimate of the true level of linkage in the program.[4]

Since its inception in 2018, the survey that is used to calculate the EELI has been implemented in many countries – including in Costa Rica in 2019 (Caves et al. 2021). Figure 3 shows the current distribution of EELI results in countries where a large sample size, and therefore a more reliable estimate of the score, are available. In general, European countries with strong dual

4 For a full explanation of the empirical methodology, see Bolli et al. (2018).

education systems score highly, countries in Asia and Africa cluster close to the average, while programs in the Americas show a low amount of linkage. Costa Rica's two scores are well below the average, but an improvement is seen between 2019 and 2022. These results are the subject of the empirical analysis of this article.

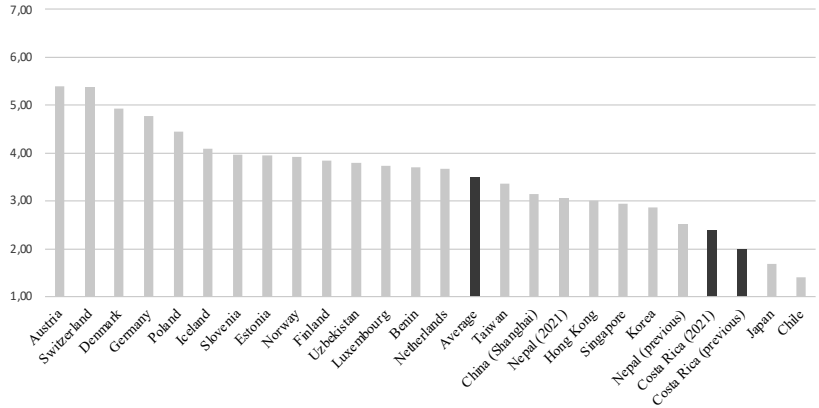

Figure 3. Distribution of EELI scores

Note. Caves et al. (2020), own data

Data and Context

This article focuses on education-employment linkage in the CTPs. To obtain the EELI score, stakeholders in the program were sent the EELI questionnaire in 2022. 118 people received the questionnaire, representing teachers and education department experts, business, unions, NGOs and academia. We received 67 responses, covering all stakeholder groups.

4. Results

Table 1 presents the overall EELI score, as well as the individual scores by phase and process. With an overall score of 2.24, Colegios Técnico Profesionales remain well below the EELI average. Design and application phases score at or slightly above the total score, while the feedback phase, at 1.73, is significantly lower. The program scores best on the learning place, training regulations in the workplace, cost sharing, and information gathering,

and worst on examination design, classroom education provision, the examination itself, and update timing.

Table 1 and Figure 4 illustrate that one of the challenges for the Colegios Técnico Profesionales is that their linkage scores are often quite high on processes and features that are only of low importance for the program and therefore carry only low weight for the overall scores. For instance, scores of over 5 out of a possible 7 are obtained for the information gathering process and its two features, but these account for a total of 1% of the EELI score. On the other hand, on examination design and update timing, which count for 16% and 23% of the score respectively, the score is below 2. This suggests the need for a change of focus on areas for linkage, which may go some way to quickly increasing the program's EELI score.

Table 1. EELI scores for Colegios Técnico Profesionales, overall, by CVC phase, process, and feature

	Weights			**Scores**	
	Phase	Process	Feature	CR (previous)	CR (2022)
Index Score	**100%**			**2,02**	**2,24**
Design	**42%**			**1,95**	**2,23**
Qualification Standards		16%		1,48	2,23
Standards: Involvement			*16%*	*1,66*	*2,30*
Standards: Decision Power			*0%*	*1,29*	*2,16*
Examination Design		12%		1,09	1,16
Examination: Involvement			*12%*	*1,11*	*1,19*
Examination: Decision Power			*0%*	*1,07*	*1,11*
Involvement Quality		14%		1,72	2,13
Career vs Occupation vs Job			*0%*	*1,00*	*1,00*
Firms vs Employer Associations			*4%*	*5,80*	*4,60*
Represented Firm Share			*0%*	*1,83*	*2,60*
Legal Def. of Involvement			*10%*	*1,86*	*2,39*
Application	**34%**			**2,39**	**2,59**
Learning Place		13%		3,02	2,72
Classroom vs Workplace Share			*13%*	*2,60*	*2,43*
Legal Def. of Share			*0%*	*3,77*	*3,51*

Workplace Training Regulation		9%		2,30	3,77
Work Contract			*2%*	*2,50*	*3,18*
Curriculum: Existence			*0%*	*2,82*	*4,63*
Curriculum: Implementation			*7%*	*4,00*	*4,75*
Workplace Trainer Requirements			*0%*	*1,28*	*3,03*
Cost Sharing		2%		2,28	2,47
Classroom Education Costs			*2%*	*1,20*	*1,42*
Workplace Training Costs			*0%*	*3,68*	*4,41*
Equipment Provision		0%		2,17	2,04
Equipment Provision & Quality			*0%*	*2,17*	*2,04*
Classroom Education Provision		3%		1,04	1,11
Classroom Education Provision			*3%*	*1,04*	*1,11*
Examination		8%		1,60	1,59
Practical Share of Examination			*0%*	*2,03*	*1,76*
Examination: Location & Supervision			*0%*	*1,82*	*3,08*
Examination: Employer Expert			*8%*	*1,35*	*1,62*
Updating	**24%**			**1,61**	**1,73**
Information Gathering		1%		4,91	5,10
Employer Surveys			*1%*	*5,34*	*5,09*
Labor Force Surveys			*1%*	*4,68*	*5,05*
Update Timing		23%		1,45	1,56
Update Involvement			*16%*	*1,43*	*1,56*
Legal Def. Update Involvement			*7%*	*1,44*	*1,54*

Note. Own depiction, based on method described in Bolli et al. (2018)

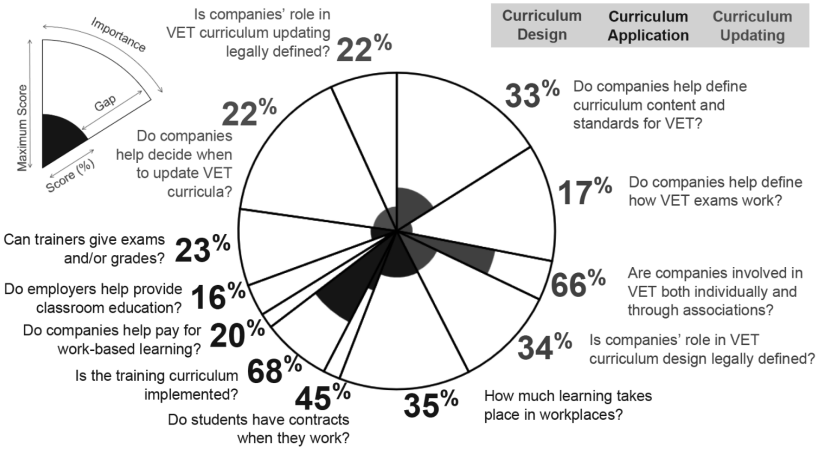

Figure 4: Illustration of Colegios Técnico Profesionales EELI components by weight

Note. Own depiction Results comparison 2019 and 2022

Colegios Técnico Profesionales were already the subject of an EELI measurement in 2019 (see Caves et al., 2021 for further detail). Although the sample of the two surveys is not identical, it is nevertheless useful to undertake a comparison of the scores to see if there has been an improvement.

On the overall score, a slight improvement from 2.02 to 2.24 can be observed. Figure 5 sets the process-level scores for the two years alongside each other, as we as providing the average and top scores of all countries collected as comparison points. This shows that the improvement is driven largely by a significant change in qualification standards and workplace regulation, while all other processes remain at a similar level between the two observation points. A small improvement in linkage in defining the examination form is balanced by a small drop in the score on the learning place. The impact of this, however, is uneven: since the learning place (school or the workplace) makes up such an important part of the index, this reduction will have a larger impact on the change of score.

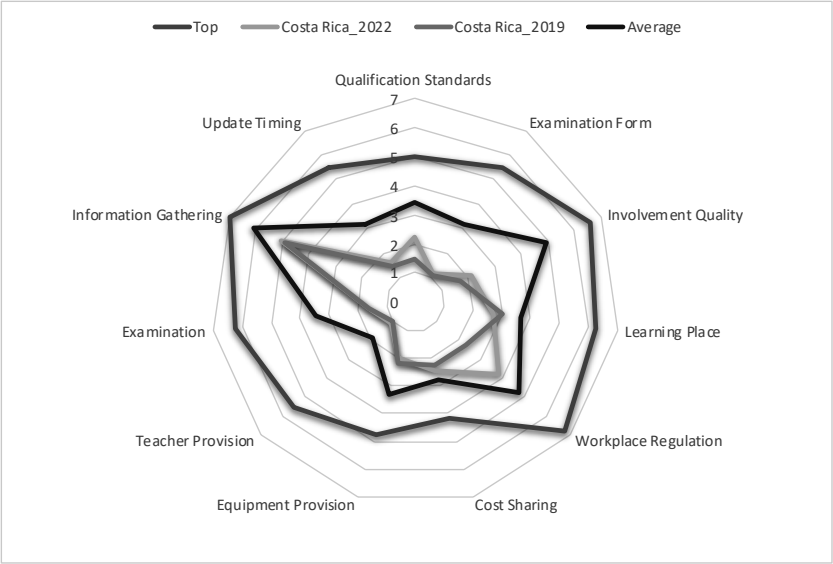

Figure 5: Comparison of Colegios Técnico Profesionales EELI scores (2019 and 2022), with international average and maximum

Note. Own elaboration

It is nevertheless positive to observe an upwards trend in the EELI scores for Colegios Técnicos Profesionales. This is especially the case because the full impact of school and workplace closures, remote schooling and work during the pandemic are not yet fully understood, but it seems that the Colegios Técnicos Profesionales withstood these challenges relatively well, at least in terms of maintaining, and even improving, links between education and employment actors in TVET.

This is especially positive, as the Colegios Técnico Profesionales are by default pursuing an "employer engagement strategy" – that is, moving from an entirely school-led system to one where employers are granted some ability to shape and lead the program. This has proven to be difficult in other contexts, including previously in Costa Rica, as employers are often wary of submitting to education department expectations, or do not see the economic value in additional participation in education programs (Caves et al. 2021, de Amesti et al. 2021; Rageth and Renold 2020). The Colegios Técnicos Profesionales have shown that employer engagement can produce results, albeit incrementally.

5. Conclusions

Strong linkage between education and employment actors is critical for successful TVET programs (Bolli et al. 2018), as vocational education, more than general education, relies on participation of employers to ensure job related skills and soft skills are relevant for the labor market. The Education-Employment Index (EELI) seeks to quantify the level of linkage in an education program, using an index based on a questionnaire that askes experts about education-employment collaboration along the Curriculum Value Chain.

In this article, we have focused on linkage in Costa Rica's Colegios Técnico Profesionales. The 2022 survey of experts gave an EELI score of 2.24, which is low by global standards. Colegios Técnico Profesionales score well on components of the index that are less important for linkage, such as information gathering, but poorly on more important components of the index such as definition of curriculum standards and the amount of training in the workplace. Nevertheless, the score represents a slight improvement over the score of 2.02 from 2019, suggesting that the employer-engagement strategy is bearing some fruit. The Colegios Técnico Profesionales should continue this strategy with particular focus on creating space for employers to be more involved in the development of standards and examinations and creating more opportunities for workplace-based training and evaluation in a program that is currently largely school-based.

We acknowledge some limitations of this research: The two surveys that form the basis of the analysis are snapshots in time, with small samples and not strictly the same responses. While a comparison is useful, it is not necessarily statistically rigorous. Moreover, a survey of other experts may produce different results, though qualitative follow-ups suggest that the characterization of the Colegios Técnico Profesionales as low linkage is broadly correct. We nevertheless consider this research to be a useful contribution to the improvement of the Costa Rican education system, and a basis upon which stakeholders may continue their efforts to improve linkages and ultimately, program quality.

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Empowering University Professors: Effective Professional Development Programs to Strengthen Qualifications in Technical and Vocational Education and Training

Keywords: Educational Qualifications, Higher Education, Professional Training

Abstract

This paper analyzes the professional development strategies at the Escuela de Secretariado Profesional (ESP), Universidad Nacional, Costa Rica, which aim to empower university professors by enhancing their competencies and qualifications in Technical and Vocational Education and Training (TVET). ESP has developed a targeted approach to faculty training focusing on critical areas such as curriculum design based on competencies, digital literacy, leadership, research, and social responsibility. These areas are essential for equipping professors with the skills to navigate the evolving educational and industry landscape, integrating technological advancements and innovative teaching methods to prepare students for an increasingly complex workforce. The strategies presented offer a comprehensive view of the critical growth and skills acquisition areas through interdisciplinary training. The faculty's participation in local and international professional development opportunities, particularly the latter, underscores the school's commitment to broadening pedagogical perspectives and introducing diverse methodologies. This international experience enriches faculty skills in curriculum design based on competencies, culturally responsive teaching, and digital integration, aligning ESP's educational practices with global standards and labor market demands. Findings suggest that ESP's commitment to structured, strategic faculty development supports a model of continuous learning and adaptability, positioning the academic unit as a leader in TVET. By fostering an educational culture rooted in lifelong learning and proactive

engagement, ESP empowers educators to meet current academic and labor market standards while preparing students for the challenges of a rapidly evolving world. The paper underscores the critical role of effective professional development in setting a benchmark for educational excellence and promoting social and economic progress through a well-prepared and responsive faculty.

1. Introduction

Higher education today operates within an increasingly complex and unpredictable landscape, shaped by rapid advancements in Information and Communication Technologies (ICT), Artificial Intelligence, machine learning, deep learning, the Internet of Things, robotics, quantum computing, and augmented and virtual reality. These developments present significant challenges to public universities, which must strategically equip students and professionals with the knowledge and skills necessary to meet evolving societal and labor market demands. In this dynamic context, university professors in Technical and Vocational Education and Training (TVET) play a pivotal role in bridging the gap between vocational training and workforce needs.

The United Nations Educational, Scientific and Cultural Organization (UNESCO, 1997) highlights the necessity of robust educational infrastructure and highly qualified faculty in achieving higher education excellence. Professional development, specifically in TVET, enhances these qualifications, enabling professors to respond effectively to the evolving demands of their specializations and contribute to educational transformation. Investing in professional development programs strengthens both pedagogical and methodological skills, ensuring that university educators can foster student-centered learning environments and uphold the quality of university teaching (Abarca, 2016). This is particularly relevant in the context of automation and digital transformation, which demand continuous knowledge updates from the academic community.

The Universidad Nacional de Costa Rica (UNA) embodies this commitment by requiring its faculty to engage in continuous professional development, emphasizing excellence, social commitment, and inclusivity. Training programs provided by UNA's Vice Rectorates of Academic Affairs, Research, and Extension focus on developing faculty competencies in pedagogy, research, and community engagement, aligning with the university's mission to promote human welfare and societal transformation (UNA, 2015). This approach fosters collaborative, dialogic learning environments where professors engage in peer learning and reflective practice,

enhancing their sense of self-efficacy and motivation (Smith & Wyness, 2024). UNA's model shifts the focus from traditional content delivery to an innovative approach where academic staff act as facilitators, guiding students through meaningful and relevant learning experiences.

Empowering professors through targeted professional development in TVET is essential not only for adapting teaching methods to industry needs but also for reinforcing the societal impact of their work (Hernández-Chaves & Ruiz-Chaves, 2024). Academic empowerment enables faculty members to assume leadership roles, engage in collaborative and interdisciplinary work, and contribute to the advancement of technical and vocational education (Day & Sammons, 2016). This commitment is evident in the Escuela de Secretariado Profesional, which has prioritized comprehensive faculty training to ensure that educators are equipped to meet evolving labor market demands. By fostering both technical expertise and pedagogical skills, the institution prepares students for roles across educational and administrative sectors, aligning with national and global workforce needs (UNESCO, 2021).

To address these challenges and uphold the commitment to excellence in TVET, this paper analyzes the professional development strategies implemented by the Escuela de Secretariado Profesional at Universidad Nacional. Specifically, it explores the faculty training initiatives designed to enhance competencies and qualifications in TVET. This analysis highlights a continuous training model initiated in 2011, comprising two key faculty development projects: Training in the Competency-Based Educational Model and Pedagogical Innovation in Virtual Environments.

The first project aims to develop teaching skills aligned with competency-based education, promoting self-assessment and quality assurance in academic offerings. The second project introduces a blended learning modality, facilitating technological integration in teaching and addressing accessibility and scheduling challenges. These initiatives collectively contribute to the empowerment of university professors, fostering innovative and interdisciplinary teaching practices that align with contemporary educational demands.

2. Technical and Vocational Education and Training (TVET) in Costa Rica

The educational structure of Costa Rica is characterized by a strong public education system that ensures access to quality learning opportunities at various levels. The country has consistently invested in education as a means of social and economic development, with policies that emphasize the importance of Technical and Vocational Education and Training (TVET) in

addressing labor market needs. TVET programs in Costa Rica are designed to equip students with specialized skills that enhance employability and economic productivity.

Costa Rica's educational system comprises preschool, primary, and secondary education, followed by higher education, which includes both academic and technical programs. Secondary education is divided into two cycles: general academic education and technical education. The technical education pathway prepares students for direct entry into the workforce or further specialized training at the tertiary level. This structure ensures a smooth transition between educational levels, allowing students to pursue professional careers aligned with industry demands.

Higher education institutions in Costa Rica, including public universities like the Universidad Nacional (UNA), play a crucial role in advancing TVET. UNA's Escuela de Secretariado Profesional is one of the leading institutions in this field, offering programs in Office Administration and Business Education. These programs are designed to align with the competency-based education model, ensuring that graduates possess both theoretical knowledge and practical skills relevant to their professions.

A key component of TVET in Costa Rica is its alignment with the National Qualifications Framework, which integrates industry input into curriculum development. This framework ensures that TVET programs are responsive to labor market needs, fostering a workforce that is adaptable, innovative, and capable of meeting evolving economic challenges. Additionally, institutions like UNA emphasize lifelong learning and continuous professional development, recognizing that faculty training is essential for maintaining the quality and relevance of TVET programs.

The evolution of TVET in Costa Rica has been driven by policies that promote education-industry partnerships, competency-based learning, and the use of technology in teaching and training. These policies aim to enhance workforce readiness while fostering social mobility and economic growth. The Escuela de Secretariado Profesional exemplifies this commitment by integrating experiential learning, interdisciplinary approaches, and professional development opportunities into its academic offerings.

Understanding the structure and significance of TVET in Costa Rica provides essential context for analyzing faculty professional development initiatives. As institutions like UNA continue to refine their training programs, they contribute to strengthening the national education system and ensuring that TVET remains a dynamic and effective pathway for professional and economic advancement.

3. Strategic Program for TVET Professional Development

UNESCO (1989) provides a foundational definition of TVET, describing it as an educational approach that integrates skills, knowledge, and attitudes essential for economic and social sectors. Subsequent international declarations have expanded on this concept, emphasizing targeted professional development for TVET educators.

The Convention on Technical and Vocational Education (1989) underscores teacher training through continuous professional growth, international collaboration, and adaptable lifelong learning structures. The Copenhagen Declaration (2002) further highlights the unique professional development needs of TVET educators, advocating targeted training initiatives. Subsequently, the Maastricht Communiqué (2004), the Osnabrück Declaration (2020), and the UNESCO recommendations emphasize bridging theory and practice, continuous skill enhancement, and adopting proactive lifelong learning approaches to technological advancements.

Several scholars underscore professional development as vital for enhancing educators' responsiveness to evolving educational standards and labor market expectations. Guskey (2002) and Darling-Hammond et al. (2017) suggest that effective professional development programs empower educators to navigate educational challenges and adopt innovative practices. Álvarez (2021) further emphasizes educators' roles as primary agents of improvement, requiring continuous knowledge renewal and responsiveness to societal demands.

In alignment with these theoretical principles, the ESP has developed targeted professional development programs. These initiatives focus specifically on enhancing professors' technical expertise, pedagogical skills, and interdisciplinary approaches, effectively addressing both institutional priorities and broader educational challenges.

ESP's strategic framework, known as Programs, Projects, and Activities (PPAA), organizes development initiatives into coherent units addressing institutional and market needs. Programs integrate subprograms, projects, and specific activities, systematically enhancing faculty competencies.

Through these structured initiatives, UNA's ESP actively fosters innovative, adaptable, and socially impactful education, aligning academic objectives with the evolving educational landscape and labor market requirements. Table 1 provides a detailed classification of these PPAA, highlighting their specific impacts on faculty qualifications and their contributions to TVET.

Table 1. Programs, Projects and Academic Activities classified by key categories of professional development

Category	Objective	Impact on TVET Professors (Competencies, Skills, and Abilities Developed)
Continuous Training and Professional Development	Equip professors with continuous professional learning to stay current with labor market standards and interdisciplinary collaboration.	Keeps professors up-to-date on emerging technologies and management practices, fostering adaptability and enhancing their interdisciplinary competencies to effectively model lifelong learning in technical and vocational education.
Dual Training and Theory-Practice Integration	Provide professors with real-world experience aligned with academic theory, bridging the gap between theory and labor market needs.	Enhances professors' industry-relevant skills and reinforces applied teaching methods, fostering adaptability and preparing students for seamless entry into the workforce through workplace adaptability and teamwork.
Pedagogical Innovation and Curriculum Management	Strengthen the ability of professors to design, evaluate, and manage curricula to meet labor market and ensure high quality.	Equips professors with tools for curriculum design, quality assurance, pedagogical leadership, and competency-based teaching, promoting high-quality learning aligned with market demands and fostering the development of outcome-oriented, relevant programs.
Social Responsibility and University Outreach	Promote training in social responsibility and sustainability, allowing professors to integrate these values into their teaching.	Enables professors to instill ethical responsibility and sustainable practices, enriching technical education's societal impact by developing skills in social responsibility, sustainability, and community engagement.
Internationalization and Academic Collaboration	Expose professors to global perspectives and cross-cultural competencies through international partnerships and collaborations.	Expands professors' global competencies and collaborative networks, equipping them to integrate global standards into their teaching and prepare students for the diverse, globalized workforce.

Note. Own elaboration, Information retrieved from PPAA reports, 2024

These PPAA aim to enhance the competencies of university professors within TVET through a robust training program. By focusing on critical areas such as continuous professional development, which keeps professors updated on emerging technologies and industry trends (Darling-Hammond *et al.*, 2017);

dual training, which combines practical experiences with academic theory to ensure students receive applied, relevant education (Campos & Sánchez, 2024); pedagogical innovation, which equips professors with curriculum management tools to design and deliver quality programs that meet high standards (Fullan & Langworthy, 2014; UNESCO, 2021); social responsibility, which encourages faculty to embed ethical and sustainable practices in their teaching (Hargreaves & Fullan, 2012); and internationalization, which prepares professors to introduce global perspectives essential for students entering a globalized workforce (Tran & Dempsey, 2016), the PPAA framework empowers faculty to align their skills with the dynamic demands of the labor market.

In fulfillment of its commitment, the ESP has invited a diverse group of renowned international interns to train its faculty in essential areas for professional development. These experts have shared their knowledge in various fields, enriching the academic unit's educational approach. Experts from Germany have trained professors in developing a competency-based curriculum and implementing the dual training model.

Professionals from Mexico have addressed multi, inter, and transdisciplinary approaches, in addition to social skills development and creating a competency-based curriculum. An expert from Argentina has strengthened digital competencies, while contributions from Puerto Rico have deepened knowledge in Commercial Education. Artificial intelligence has been explored with a specialist from Peru, and an expert from Spain has enhanced automation expertise.

These initiatives reflect ESP's commitment to providing updated and relevant training aligned with labor market needs and the demands of a globalized world. Additionally, they strengthen the development of intercultural competencies and further the academic unit's internationalization, ensuring that faculty and students are prepared to engage effectively in diverse and globalized professional environments (de Wit & Hunter, 2015).

In line with its commitment to advancing faculty development and strengthening international collaboration, the academic unit has awarded scholarships for faculty members to participate in various international congresses and events, where they gain valuable knowledge and skills and present their own research. Table 2 below outlines the key competencies and knowledge faculty members have gained through these experiences, showcasing the contributions of each event to their professional growth, academic expertise, and active participation in diverse fields.

*Table 2***.** International conferences and training programs attended by ESP faculty

Country	Event	Competencies and Skills
China	Seminar on Vocational Education for Teachers of Developing Countries	Developed skills in competency-based curriculum design, dual training methodologies, and vocational education management.
Israel	Innovation and Entrepreneurship	Strengthened competencies in innovation management, entrepreneurial thinking, startup development, and creative problem-solving in educational contexts.
Switzerland	Linking Education and Labour Markets: TVET Conference	Gained insights into labor market alignment, competency-based education models, and skills-gap analysis to better prepare students for employment.
United Kingdom	International Congress on Interdisciplinary Sciences	Fostered interdisciplinary collaboration, systems thinking, problem-solving techniques, and approaches for integrating multiple disciplines.
Spain	VIII International Congress on Human Sciences	Strengthened critical analysis skills, ethical reasoning, qualitative research techniques, and human-centered approaches in education.
Portugal	VIII International Congress on Education and Learning	Acquired knowledge in educational research methodologies, curriculum innovation, student-centered learning models, and educational policy analysis.
France	VIII International Congress on Social Sciences	Developed proficiency in social research methods, community engagement, participatory research, and applied sociology in education.
Greece	XXV International Congress on Learning	Gained expertise in digital learning frameworks, online content creation, instructional technology integration, and strategies for student motivation.
Ireland	XXVI International Congress on Learning	Enhanced lifelong learning approaches, skills in integrating learning technologies, and understanding of adult learning theories and frameworks.
United States	XXIV International Congress on Learning	Acquired high-level skills in learning analytics, strategic assessment methods, and data-driven decision-making to enhance educational impact.
United States	Active Methodologies	Mastered active learning methodologies, collaborative teaching techniques, and practical application strategies to increase student engagement.
United States	Intercultural Education	Developed expertise in intercultural communication, inclusive curriculum design, and cultural sensitivity in educational settings.
Mexico	Interdisciplinary Research	Gained interdisciplinary research skills, project-based learning techniques, and methods for integrating diverse perspectives in academic inquiry.
Brazil	International Secretariat Congress	Enhanced administrative acumen, professional ethics, event organization, and cross-functional collaboration skills.

Colombia	XVIII Virtual Educa Meeting	Developed virtual education strategies, digital competency frameworks, and expertise in online instructional design and engagement.
Cuba	XIII Latin American Congress on Extension	Built competencies in community-based education, outreach programming, and partnership building for educational and social impact.

Note. Information adapted from reports by the Scholarship Board of UNA (Universidad Nacional), 2024

This international training, as reflected in Table 2, represents a strategic investment in the professional development of professors, the enrichment of students' learning experiences, and the advancement of TVET at the academic level. Each international event and seminar, spanning countries and diverse topics, provides unique competencies that align with global market demands and exemplary educational practices. This commitment to continuous improvement ensures that ESP faculty members have a solid understanding of academic theory and are equipped with practical, globally relevant skills to impart to their students (Inamorato dos Santos et al., 2019)

These initiatives are essential to fostering a responsive, relevant, and outstanding educational environment. They enable ESP to cultivate a faculty capable of delivering high-quality education, empower students with skills necessary for the modern workforce, and enhance the TVET framework to meet the needs of both local and global markets. This approach supports lifelong learning and positions ESP as an academic unit that values continuous growth and adaptability in a changing world.

Finally, it is essential to highlight that professors at the ESP have cultivated an intrinsic motivation for professional growth across various fields, supported by the training initiatives offered by the three vice-rectorates. This commitment reflects a profound dedication to continuously enhancing their competencies, adapting to evolving educational standards, and contributing meaningfully to the development of students and the broader TVET landscape. Table 3 below provides an overview of the key areas in which faculty members have pursued professional development through these vice-rectorate programs, showcasing the skills and competencies acquired that support their dedication to excellence in teaching and responsiveness to labor market demands.

Table 3. Key Areas of Faculty Professional Development

Area of Professional Development	**Skills and Competencies Acquired**
Curriculum and Program Development	Design and evaluation of competency-based curricula, program planning aligned with industry standards, continuous improvement in educational programs.
Teaching and Learning Innovation	Implementation of active and inclusive teaching methods, pedagogical innovation, strategies for student engagement, and classroom management techniques.
Technology in Education	Digital literacy, integration of e-learning tools, use of educational software, understanding data security, and ethical use of technology in education.
Quality Assurance and Standards	Knowledge of quality certification processes, program accreditation, outcomes assessment, and quality management systems within academia.
Student Support and Development	Skills in academic advising, mentoring, addressing diverse learning needs, providing mental health support, and fostering student well-being.
Educational Leadership and Management	Leadership in academic environments, policy development, strategic planning, and faculty development for effective institutional governance.
Inclusive Education and Diversity	Competencies in inclusive teaching practices, cultural sensitivity, universal design for learning (UDL), and supporting students with disabilities.
Community Engagement and Social Responsibility	Development of social responsibility programs, community needs assessment, creation of sustainable development initiatives, and partnerships with local organizations.
Public Policy and Social Impact	Skills in public policy analysis, promotion of education for sustainable development goals (SDGs), and advocacy for human rights and equity in education.
Leadership and Communication Skills	Development of leadership skills for community engagement, effective public communication, media relations, and building partnerships with stakeholders.
International Collaboration and Exchange	Cross-cultural communication, global citizenship education, management of international programs, and fostering international partnerships.
Capacity Building and Skills Development	Training in entrepreneurship, vocational skills development, financial literacy, and economic empowerment for students and community members.
Environmental and Health Education	Knowledge of environmental sustainability, health promotion, climate change advocacy, and public health education practices.
Research Skills and Methodologies	Mastery of research design and methods, data collection, statistical analysis, ethics in research, and bibliometric analysis for academic projects.
Intellectual Production and Dissemination	Academic writing, grant writing, knowledge of intellectual property, and dissemination through open-access publishing and repositories.

Innovation and Technology Transfer	Skills in applied research, patent filing, commercialization, entrepreneurship, and managing innovation in academic settings.
Interdisciplinary and Collaborative Research	Project management in interdisciplinary research, building research networks, and collaboration with public and private sectors.
Sustainable Development Research	Conducting research on sustainable development goals (SDGs), social impact assessment, conservation studies, and community-based research.
Advanced Data and Digital Tools in Research	Proficiency in big data analysis, data visualization, and research software for academic purposes.
Ethics and Integrity in Research	Competence in research ethics, human subjects' protection, responsible data management, and methods for ensuring objectivity and integrity in research.

Note. Own *elaboration, information retrieved from course records and professors' certification documents, 2024*

The training offered by the three vice-rectorates plays a crucial role in equipping ESP professors with a comprehensive range of competencies. Each vice rectorate provides targeted programs that address essential areas. Professors with skills in curriculum development, digital literacy, research, and leadership are better prepared to deliver exemplary education that equips students for success in their careers. Strengthening their expertise in these fields enables professors to design curricula that align with current labor market standards, ensuring students acquire practical and relevant knowledge that closes the gap between academia and professional practice.

Moreover, empowering professors in leadership and social responsibility expands their influence beyond technical instruction, enabling them to foster a culture of ethical engagement and positive community impact within the institution. Competencies in quality assurance further reinforce the institution's credibility, as professors trained in maintaining high standards build trust with employers and stakeholders, enhancing the institution's reputation. This commitment to quality assurance goes beyond simply meeting standards; it is about exceeding them and setting a new standard for excellence. Such empowerment transforms educators into proactive agents of change, dedicated to continually improving the educational experience.

4. Implications and Future Perspectives

The analysis conducted highlights that ongoing professional development at the Escuela de Secretariado Profesional (ESP) at Universidad Nacional is strategically positioned to support Technical and Vocational Education and Training (TVET) faculty in effectively addressing rapid technological advancements. Given the increasingly digitalized and automated educational environment, the continuous enhancement of professors' knowledge in areas such as artificial intelligence, digital learning platforms, and innovative teaching methods is essential. TVET educators must consistently update their knowledge and teaching approaches to maintain relevance (UNESCO, 2019; OECD, 2020).

To remain relevant and effective educators, TVET professors must cultivate digital literacy, adaptability, pedagogical flexibility, and resilience. Consequently, future professional development programs should prioritize interdisciplinary training, integrating technical competencies with critical thinking, ethical responsibility, and communication skills. This integrated approach is critical for developing graduates capable of contributing meaningfully to society and the labor market (UNESCO, 2021).

Furthermore, ESP should actively pursue international collaboration to enhance faculty exposure to global best practices, innovative teaching methodologies, and curricular development (OECD, 2020; UNA, 2021). Such partnerships can significantly enrich professional development initiatives, fostering continuous innovation and quality enhancement within TVET education.

Additionally, the institution's emphasis on leadership, ethical awareness, and social responsibility should be explicitly expanded within professional training programs. Educators' roles must go beyond administrative and technical tasks, including active community engagement and a robust commitment to institutional social impact (UNA, 2021). Quality assurance processes, therefore, should focus on continuous improvement and responsiveness to societal and labor market needs rather than mere compliance with established standards (UNESCO, 2021).

Finally, defining a clear, research-based educator profile is essential for aligning faculty development strategies with the dynamic educational landscape. Identifying specific competencies such as digital integration, inclusivity, autonomy in pedagogical methods, and active involvement in educational reform is critical. Further research exploring the direct impact of professional development on student outcomes will inform these strategic decisions, ensuring continuous alignment with evolving labor market demands (UNESCO, 2021).

In conclusion, by adopting a proactive and reflective approach to professional development, ESP can effectively empower educators as agents of educational innovation, positioning the institution as a leader in TVET. It can also contribute significantly to social and economic advancement, both locally and globally.

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Gloriela Rodríguez Venegas

Workload of Vocational Teachers in Organization, Lesson Preparation and Monitoring – A Case Study at CTP Don Bosco, Costa Rica

Keywords: Teacher Labor Organization, Teaching Workload, Technical Education

Abstract

This article examines the organization and workload of vocational school teachers in relation to the preparation and monitoring of classes, focusing its analysis on a case study in the Colegio Técnico Profesional (CTP) Don Bosco, Costa Rica. The study seeks to understand how workload and organization affect lesson preparation and how teachers cope with these demands under the 40 lessons per week limit stipulated in their contract. To explore these issues, 13 semi-structured interviews were conducted with teachers and principals, with a qualitative content analysis based on the method of Mayring (2006).

The results reveal that teachers face a considerable workload due to the lack of sufficient time to plan during working hours, which forces them to bring work home, affecting their free time and generating stress. Despite this, the teachers maintain a high commitment to their work, which, together with the efforts of the institution, helps them to cope with difficulties. The study suggests that in order to improve working conditions, it is essential to implement adjustments in the organization of time and offer structural support.

Moreover, this research enriches the literature by detailing the specific challenges and suggesting solutions for the technical education sector in Costa Rica. The findings highlight the importance of optimizing working time management models and promoting teacher well-being, which could contribute to improving educational quality. Finally, it is concluded that it is necessary to implement structural changes to achieve sustainable improvements in working conditions and teacher satisfaction, key aspects for the quality of teaching.

1. Introduction

In Costa Rica, teachers in vocational schools are hired on the basis of a certain number of teaching hours (maximum 40) per week, which means that there is no contractual time for didactic planning and monitoring of lessons. In addition, a study published in Costa Rica in 2014 shows that fourth-cycle teachers suffer an overload of around 15 hours per week (Cordero et al., 2014, p. 8). Similarly, the OECD report "Education at a Glance" shows that Costa Rican teachers work at least six hours a day more than the OECD average (OECD, 2022, p. 328). This workload can lead to overload if the necessary resources are not available. "Stress can have consequences on social behavior and on less exhaustive preparation of classes by the teacher, with possible effects on student motivation and performance" (Maslach et al., 1996, cited in Cramer et al., 2018, p. 12).

However, CTP Don Bosco is nationally recognized for its academic achievements. Therefore, it is important to empirically investigate teachers' professional coping strategies and the effects of workload on lesson planning and monitoring.

The objective of this study was to know how vocational teachers with 40 lessons per week plan and follow up on these classes, and to propose a work model that takes into account all the tasks of the teacher.

In addition, it was possible to understand the challenges faced by the teachers and administrative staff of the CTP Don Bosco when it comes to optimizing the organization of the work of vocational teachers in terms of workload.

In this context, the following research questions were asked:

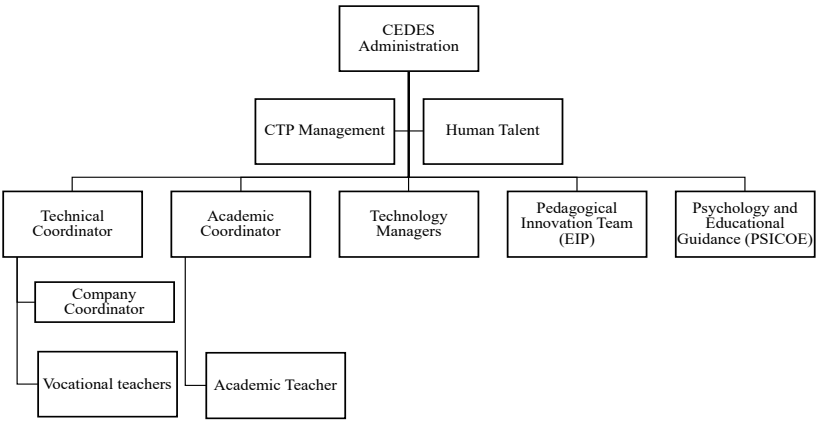
- How do the teachers of the Don Bosco Vocational School manage to plan and follow up on their classes under the contractual condition of 40 lessons?
- How do the teachers of the Don Bosco Vocational School perceive the workload in relation to the preparation and follow-up of the classes?

2. Theoretical Framework

2.1 CEDES Don Bosco

To understand the context of the research, it is necessary to describe what CEDES Don Bosco is. CEDES Don Bosco is a private and technical-academic educational center of Catholic orientation in Costa Rica, which operates under the guidelines of the Ministry of Public Education (MEP) but with philosophical and administrative autonomy (CEDES Don Bosco, 2012b). Located in Alajuelita, San José, it is governed by the preventive system of San Juan Bosco, focused on reason, religion, and love. It offers various educational opportunities, highlighting the CTP Don Bosco, where six technical disciplines are taught to more than 650 students, with around 30 vocational teachers in the specialties of electromechanics, architectural modeling, software development, cybersecurity, graphic design and precision mechanics. Although it is a private institution, CEDES Don Bosco receives subsidies from the State, and most of its teachers are hired by the MEP, having to comply with the curricular requirements of the ministry without limiting its educational offer. Its financing is complemented by contributions from parents, donors and the National Office of Planning and Development of the Salesians of Costa Rica (CEDES Don Bosco, 2012a). In addition, students obtain the title of Intermediate Technician and the Bachelor's Degree in Diversified Education, essential to enter university.

Figure 1. CTP Don Bosco Organizational Chart



Note. Own elaboration

The organizational structure of CEDES Don Bosco, which is relevant to the CTP Don Bosco, is shown in the *Figure 1.* CTP Don Bosco Organizational Chart*1*. Since CEDES Don Bosco is a very large and complex educational institution, this organizational chart only shows the positions related to the structure corresponding to the TCP Don Bosco. This in order to provide an overview.

CEDES Don Bosco's hours are from 6:50 a.m. to 4:30 p.m., beginning with a morning meeting called "Good Morning," where a prayer is performed and announcements are shared. Students are divided into two main blocks: the first receives technical instruction on Monday, Tuesday, and Wednesday mornings, while the second focuses on academic subjects. In the middle of the week, the blocks swap their schedules.

Technical classes include four 60-minute lessons in the morning and four in the afternoon, with a 20-minute break in the morning and afternoon, and a 50-minute lunch break. The breaks for students and administrative employees are differentiated, with different services available for each group.

CEDES Don Bosco organizes various Salesian pedagogical activities during the year, such as:

- Good morning: daily meeting in the morning.
- Annual pastoral retreats for reflection and recreation.
- Pastoral moments every 15 days for integral accompaniment.
- Patriotic holidays with student participation in civic activities.
- Salesian accompaniment with recreational activities during breaks.
- Expotec: annual art, science and technology fair in October, where students present their projects.

These activities reflect the Salesian identity and extend learning beyond the classroom (CEDES Don Bosco, 2012a).

2.2 Background

The phenomenon of teacher overload and its effects has been studied on several occasions in Costa Rica and around the world. The MEP study in Costa Rica on workload and salaries concludes that teachers' salaries are proportional to their functions, schedule, academic degrees, and professional group. However, it points out that the activities of the teachers far exceed the contractual time (Chavarría & Gaete, 2013, p. 16).

The study of Cordero et al. (2014) recommends that the working day of secondary school teachers should take into account the effective planning time, not limited to 40 hours per week. In the case of a full timetable of 40 lessons, it is proposed to extend the time allocated to planning to meet the actual needs

of secondary school teachers. The study of Badilla et al. (2019, p. 68) concludes that it is difficult for teachers in Costa Rica to get enough rest due to pending issues outside of school hours, especially on weekends. They point out that this burnout and stress can have a negative impact on the quality of lesson planning and that the expectations of teachers and students are not met. Research by Retana-Alvarado et al. (2022, p. 178) reveals that teachers in Costa Rica face difficulties in emotional management in stressful situations, presenting physical and psychological symptoms such as worry, tension, fear, sadness, and excessive crying due to the high workload. Despite recognizing these symptoms, their emotional coping is inadequate, attributing their symptoms to physical discomfort and lack of time for personal activities. In addition, the recommendations of the ILO and UNESCO are clear:

> *"In setting the hours of work of teachers, all factors that determine the total workload of teaching staff should be taken into account, such as: [...]; b. The convenience of having the necessary time for the planning and preparation of lessons, as well as for the correction of the students' work. [...] "* (ILO/UNESCO Recommendation concerning the Status of Teachers (1966) and UNESCO Recommendation concerning the Status of Higher-Education Teaching Personnel (1997) , 2019, p. 40–41).

Mußmann et al. (2016) found a high workload in vocational schools in Germany, especially due to administrative tasks and lesson preparation. This research is relevant for Costa Rica because despite the fact that in Germany there is a work model in which only about 60% of the time within working hours is dedicated to teaching lessons, there is an overload of work.

Despite several studies on the workload of teachers in Costa Rica, the present study is relevant because it focuses specifically on technical teachers and uses the CTP Don Bosco as a case study. More than ten years have passed since the first study of teacher workload in Costa Rica and employment conditions based on the lessons taught are still the norm. Therefore, it is necessary to understand how teachers manage the preparation and follow-up of their classes despite this situation.

2.3 Comprehensive Stress Framework Model

The teaching profession is characterized by a high level of psychological stress, which has already been investigated numerous times. Cramer et al. (2018) used existing theories and models to develop a comprehensive framework model that explains stress and tension in the teaching profession. This model allows for a systematic discussion by clearly distinguishing between different burdens, resources and their consequences, as well as

personal and work aspects. Some concepts are clarified below according to Cramer et. al. (2018):

The *psychological load* refers to the external influence that affects the individual at the mental level, distinguishing between personal and workloads. Personal burdens come from individual factors such as disposition, biographical events, and health conditions, while labor burdens originate from the objective characteristics of work and professional activity. In this study, only the workloads of teachers are focused on, considering all work-related activities, whether inside or outside the working day and the institution.

Personal *and work resources* are crucial for load management, as they determine how teachers perceive and process the stress of work. *Internal resources* include cognitive and motivational skills, while *external resources* rely on job support, such as peer support and recognition from superiors. Although a lack of resources does not always lead directly to tension, it does affect how demands are handled and acts as an intermediary between the load and the perceived tension.

Perceived *tension or burden* occurs when resources are insufficient to meet work demands, affecting both the well-being of the teacher and the quality of their teaching. Factors such as ineffective classroom management can intensify this burden by not relieving the stress of classroom disruptions. In this context, both the preparation and the follow-up of the lessons, as they are not integrated into the working hours, are seen as sources of workload.

2.4 Demands of the Teaching Profession

Teaching work requires a variety of skills, and it is unlikely that a teacher will be able to achieve maximum performance in all areas due to the breadth and complexity of the tasks. Baumert and Kunter (2006, cited in Artelt & Kunter, 2019). They identify four key aspects that make up teachers' professional competencies: professional knowledge, professional convictions, motivational orientations, and self-regulatory skills. Each of these aspects contributes to the integral performance of the teacher in the classroom and in his or her interaction with the educational environment.

Professional *knowledge* is fundamental and encompasses both subject-specific knowledge and the pedagogical and psychological knowledge necessary to facilitate learning. This knowledge includes both mastery of curricular content and understanding of teaching and learning principles, which allows teachers to make informed decisions and adapt to different situations, such as meetings with parents. In addition, types of knowledge such as conceptual, procedural, and situational are essential for their capacity for professional action.

Professional *convictions* reflect the perceptions and values that the teacher has about school and teaching, and although they are subjective, they influence their approach to work. As for motivational *orientations*, it is based on goal orientation, self-efficacy, and intrinsic motivation; these motivations determine the teacher's commitment to the development of their skills and their reaction to challenges. Finally, *self-regulatory skills* allow the teacher to manage their personal resources effectively, combining commitment with professional resilience, which is crucial to maintain sustained performance and adapt to difficult situations or failure.

2.5 Criteria for Evaluating Working Time in Schools

Dorsemagen et al. (2013) propose 14 key criteria for assessing working time management in schools, integrating aspects of labor and organizational psychology, as well as policy and trade union requirements from Germany. These criteria include, firstly, the quality of pedagogical work, which encompasses the achievement of objectives and a favorable learning environment, and new teaching approaches, which require flexible schedules to adapt to project-oriented methods. In addition, transparency towards society is valued, to increase the recognition of teaching work, and school reliability, with the aim of minimizing the loss of classes. Other criteria include the importance of a good social climate, which is fundamental for teacher well-being; equity in the distribution of workload, avoiding inequalities that could lead to burnout; and internal transparency on teacher performance to build trust. Likewise, the need for limits on working hours and the separation between work and private life are highlighted, avoiding overload and the perception of constant availability.

Finally, the administrative burden is mentioned, which must be proportional and documented, and the interaction between these criteria, since they can complement or counter, which should be considered when planning working time to improve educational quality and the teaching work environment.

2.6 Alternative Forms of Organization of Working time in Schools

Dorsemagen et al. (2013) describe five alternative models for organizing working time in schools:

The *compulsory hours model* establishes a number of classes per week according to the labor standards for public employees in Germany, varying according to the region and the type of education. It includes adjustments such as reduced hours for certain ages and flexibility options such as schedule and gap year adjustments. The *differentiation by subject* adjusts the workload considering that the preparation varies according to the subject, adapting the teaching obligations to each case. The *cooperation time* model assigns teachers weekly presence hours at the school for group activities, usually between two and four hours. In the *time-of-presence model*, teachers spend additional time at school for meetings, administrative management, and coordination. Finally, the *annual working day* model distributes the total annual time into tasks such as teaching, preparation and continuous training, with indicative percentages (for example, 45% teaching, 40% preparation, 5% training).

3. Methodology

The research adopted a qualitative and applied approach, with the aim of solving practical problems through empirical data collection and analysis. The subjects of the study were teachers from the CTP Don Bosco, and the results are aimed at developing a work model that addresses the teaching work overload, highlighting the importance of collaboration with the management and technical coordination to organize resources and schedules.

For data collection, semi-structured and individual interviews were conducted from February 19 to March 29, 2024. In total, 13 people were interviewed, of which seven were teachers of different technical specialties and six were directors inside and outside the CTP Don Bosco. The objective was to include in the sample those cases that are particularly significant to answer the research questions. Of the 13 interviews conducted, 4 were conducted online through "Google Meet" and 9 face to face. At the beginning of each interview, the purpose was discussed in general terms, a confidentiality agreement was signed, and all respondents were asked for permission to record the conversation for further analysis. The duration of one-on-one conversations varies between 40 and 80 minutes. All interviews were transcribed and anonymized.

The content analysis followed Mayring's (2006) method, applying deductive and inductive approaches to define and adjust a category system in the MAXQDA software. For this research project, a qualitative approach was chosen, which allows the previously posed research questions to be addressed. The qualitative research approach focuses intensively on a small number of cases, examining open-ended research questions in great detail using unstructured or semi-structured data collection methods. The goal is to

describe the subject matter and generate theory, with qualitative, non-numerical data being analyzed interpretatively. This approach is characterized by a loosely structured process that enables unexpected findings and centers on an in-depth analysis of a few cases in their natural context. Flexibility regarding the research subject and theory development are central to this approach (Döring & Bortz, 2016, p. 184). Although the research lacked a reliability test between coders, consistency in coding was ensured, reflecting the importance attached to certain topics by participants.

4. Results

Table 1 shows a summary of the categories that resulted from the research, the type of category, and the frequency with which the interviewees referred to each category.

Table 1. Categories, subcategories and frequencies

Category	Category System	Frequency per teacher	Frequency per manager	Total frequency
1 Work Activities	**Deductive**	**56**	**11**	**67**
2 Working hours	**Deductive**	**39**	**3**	**42**
3 Resources	**Deductive**	**119**	**32**	**151**
3.1 Personal resources	Deductive	91	23	114
3.2 Labor resources	Deductive	28	9	37
4 Perceived stress	**Deductive**	**53**	**1**	**54**
5 Suggestions for improvement	**Inductive**	**65**	**109**	**174**
5.1 Support for teachers	Inductive	30	23	53
5.2 Planning	Inductive	4	24	28
5.3 Management staff	Inductive	22	47	69
5.4 Recruitment of staff	Inductive	9	15	24
6 Challenges	**Inductive**	**4**	**74**	**78**
6.1 At the CEDES level	Inductive	2	4	6
6.2 At the plevel	Inductive	1	49	50
6.3 Resistance to change	Inductive	0	7	7
6.4 Normalization of teacher overload	Inductive	1	14	15

Note. Own elaboration

Work Activities

The interviewees agree that the main task of teachers is to teach classes and guide students in their learning process, which requires not only presence in the classroom, but also ensuring that students understand and apply the content. This task is accompanied by extensive planning and annual preparation, where they must organize the topics, considering the school calendar and how to present the contents in an interesting way. In addition, teachers should develop support materials, such as practical exercises and teaching resources, and ensure that equipment and tools are in good condition for learning.

Other responsibilities include customizing instruction to fit individual student needs, which demands extra time and ongoing attention. The implementation of tools such as "Google Classroom" facilitates communication and evaluation, although it requires time to manage tasks and evaluations. In addition, the administrative and coordination burden has increased due to the distribution of roles among teachers, which includes participation in school events, the student admission process, and the organization of special projects and activities, such as STEAM[1] initiatives and Expotec[2].

Teachers also face tasks such as correcting papers, communicating with parents and students, and handling disciplinary situations. Often, they must cover for absent colleagues, which increases their burden and creates challenges due to the lack of continuity in other teachers' plans. In addition, they participate in school events and ceremonies, which, although part of their institutional commitment, increases the workload. Finally, teachers must manage disciplinary processes and support students emotionally, which implies interrupting their classes and dedicating extra time to these administrative and support responsibilities.

Working Time

All the teachers interviewed officially work 40 hours a week, distributed in 8 hours a day from Monday to Friday, complying with the MEP contract, which establishes 40 lessons per week. However, they must dedicate additional time outside of working hours to attend to some work activities, which they usually carry out in the evenings or on weekends.

During class hours, teachers often multitask simultaneously, such as attending to students and answering emails or correcting papers, taking advantage of times when students work independently. This, however, poses

1 STEAM stands for Science, Technology, Engineering, Art, and Mathematics.
2 Scientific fair that takes place annually at CEDES Don Bosco.

the risk of discipline problems in the classroom. Teachers must constantly balance these different responsibilities in order to fulfill their obligations.

Some teachers use the time before the start of the school year, during exam periods and in November, after Expotec, to plan and prepare their lessons, as during these periods students do not have classes. This allows them to better organize themselves for the activities of the academic year.

Resources

Teachers mention various *personal resources* such as self-regulation, motivation, and flexibility, which allows them to adapt to daily challenges. They see obstacles as learning opportunities, looking for ways to integrate additional tasks into their lessons to make learning engaging and meaningful. They also value the recognition of their students, and they feel fulfilled when they see the professional success of their former students. In terms of *digital skills*, the pandemic accelerated the use of tools such as Google Classroom, which facilitates the organization and management of tasks. Teachers highlight the importance of organizational skills to optimize their time in class, especially when adapting their planning and available resources to the needs of students.

All the teachers interviewed have more than 9 years of experience and are also alumni of the institution. They showed a strong conviction for the Salesian philosophy of education, where education is carried out under the pillars of Don Bosco's preventive system: love, reason and religion. On the other hand, although they have university studies in education, they refer to the quality of teacher training in Costa Rica as insufficient and deficient.

Regarding *labor resources*, they highlight the support in training and the quality of the technical equipment provided by the institution, although they point out areas for improvement such as connectivity and quantity of equipment in the workshops. In addition, the exchange of experiences with colleagues is a valuable resource to improve their practices, although there is no formal time stipulated for this purpose. Teachers also implement creative and planning ahead strategies to optimize materials and resources throughout the year. The directors refer to the importance of the Pedagogical Innovation Team, however, some teachers perceive that the joint work has not been optimal to enhance its benefits.

Perceived Stress

Teachers express that they experience tension due to the lack of time to perform work tasks during working hours, which generates frustration at not being able to execute all the planned activities and high emotional load,

especially for those with family responsibilities. They also refer to a difference in workload between technical and academic teachers; academics have more flexibility for planning during the day, while technicians do not have that time or receive additional compensation from the Ministry of Education.

In addition, tensions are evident within the institution due to the lack of recognition and inequality in the distribution of tasks, which creates an environment of dissatisfaction and demotivation. Some teachers perceive the return to traditional planning structures as a step backwards and are frustrated by the lack of clarity and support from senior staff. Finally, teachers face challenges in planning due to constant interruptions due to institutional activities and weeks of additional exams, which reduce effective teaching time. These activities, although they contribute to the integral development of students, make it difficult to comply with the curriculum and force teachers to constantly adjust their lesson plans.

In addition to the overload associated with preparing and following classes, some teachers suffer from overheated and noisy classrooms, which makes working conditions very difficult and causes additional stress.

Suggestions for Improvement

As part of the results, the interviewees expressed several proposals to improve the working conditions of teachers in the technical area. Four key areas stand out: teacher support, curriculum adaptation, leadership of management and recruitment of staff.

To improve support for teachers, it is suggested to assign specific times within the working day for planning and teaching activities that are carried out outside the classroom, even considering asynchronous work for students at certain times, which would allow teachers to dedicate time to preparation. Other ideas include reducing class time so that teachers have time for such tasks at the end of the day. It also proposes the creation of standardized materials, such as guides and digital tools, and promoting collaboration between teachers through joint planning meetings.

As for the curricula, a flexible and dynamic approach is proposed, focused on interdisciplinary projects and practical experiences, such as technical visits and work practices, which better prepare students for the world of work. It is also suggested that the plans be reviewed regularly to ensure their relevance.

Regarding leadership of the management staff, emphasis is placed on promoting equitable distribution of tasks and that the directors come from a technical context for a deeper understanding of the needs of the area. Interviewees express that institutional support and adjustment of working hours are crucial to give teachers space for planning, teamwork, and training within their regular working hours.

Teachers report a lack of formal monitoring and evaluation of their activities, without receiving periodic feedback on their teaching plans or methods. Some want more support and feedback to improve their practices, although they value the freedom they are allowed to organize their work. Currently, teacher evaluation is mainly based on informal feedback from students and parents, highlighting the need for regular observations and comments from management staff. Positive feedback, small gestures of thanks or encouragement, and active listening by managers are perceived as very satisfying.

Finally, in terms of staff recruitment, it is proposed to hire substitute teachers for absences of more than two weeks and to include assistant teachers for large classes, to recognize off-the-clock working time with adequate compensation, and to adopt a hiring model based on hours of work rather than lessons taught, which could improve working conditions and teachers' sense of belonging.

Challenges

In the interviews, challenges were identified in four areas: challenges in the Don Bosco school, national challenges, resistance to change, and the normalization of teacher overload.

Among the challenges faced by the *CTP Don Bosco* are: 1. The consideration in obtaining time for work activities outside of lessons for both academic and technical teachers. 2. The administrative requirements of the Ministry of Education, as many teachers are hired by the MEP and a change in the number of lessons affects several directorates of the ministry, whose system is difficult to change. 3. Analyze the necessary adjustments in the schedules, for example, the arrival and departure times of students. 4. The coverage of technical and academic curricula, as the National Qualifications Framework establishes a specific number of hours for each field of learning.

According to some managers, challenges *at the national level* lie in adapting the policy framework to the specific needs of regions, the need for a clear governance structure for technical education, significant difficulties in recruiting and training teachers in specialized technical subjects, which are exacerbated by insufficient political support, for example, cuts in the education budget.

As for the *resistance to change*, there are situations both at the national level and at the level of the CTP Don Bosco. For example, difficulties in the implementation of the Civil Service Law, which requires continuous training of teachers. However, according to one executive, the COVID-19 pandemic has shown that the education system and its actors can adapt quickly in new and urgent situations. On the other hand, a director opposes suspending classes

to carry out other teaching activities, arguing that teachers are paid to teach and that parents pay for their children to receive lessons.

The paradigm shift regarding the *normalization of teacher overload* is a challenge facing Costa Rican society. The statements of the interviewees reflect that extra dedication outside working hours is considered part of the commitment and vocation of teaching. It is also expressed that financial and legal constraints contribute to this situation, expecting teachers to complete additional tasks without compensation.

5. Discussion

The study of work activities, working hours and resources clearly shows how teachers at CTP Don Bosco face the challenges of the 40 hours of teaching stipulated in the contract, which leads to the answer to the first research question. It is important to first understand which activities cause teachers' workload, and then analyze when they perform these activities and what resources are available to them to do so.

The fact that the teachers surveyed are hired for 40 lessons per week and need to spend additional time preparing and monitoring these lessons and performing different teaching activities is considered workload because, according to Cramer et al. (2018), workload is an objective characteristic of work that can cause stress.

Another characteristic of the workload of vocational teachers at the CTP Don Bosco is the "Multitasking" that they are used to doing during working hours. At the same time that they are with the young people in the classroom, the teachers review homework, read emails, attend to parents, solve disciplinary problems, plan activities for the next lessons, carry out tasks for institutional events, for the admission of new students to the specialty, budgets for the specialty, among others. Multitasking can affect teachers' attention by reducing their efficiency, and affect the quality of immediate pedagogical interaction by affecting students' learning experience. Students should receive timely feedback, scaffolding, and attention, which are key elements in pedagogical practice.

However, a series of resources have been identified for teachers, both work and personal. According to the Integrative Stress Framework Model by Cramer et al. (2018), these resources directly influence the subjective assessment of this burden, so they act as mediators between workload and stress.

When analyzing the resources available to the teachers, it can be said that a particularly important and differentiating factor for the teachers of the CTP Don Bosco is the fact that they are Salesian past pupils, most of them with more than 9 years of work experience in the institution, which justifies the

strong commitment with which they work for the well-being of young people. The sense of belonging to the institution is manifested by the fact that they call themselves Salesians, following the example of the founder of the Congregation, Don Bosco, who dedicated his life to professional formation and the "salvation of souls" of young people, especially the most disadvantaged. This factor is undoubtedly a professional conviction, since, according to Baumert and Kunter (2006), this term encompasses attitudes and values related to school and teaching.

Another outstanding personal resource in the results is that teachers have high self-regulation skills that allow them to adapt to challenges. For example, those teachers who expressed taking advantage of the time they are at school without students, to carry out tasks beyond teaching the lessons, including planning and monitoring them. These times are concentrated in three moments: a week before starting lessons, during exams, and after Expotec.

According to the Comprehensive Stress Framework Model, the interaction between this workload and the resources available to teachers indicates that they are able to cope with the workload of 40 teaching hours, even though stress is also present, as shown in Figure 2, where the positive signs mean “Increase” and negative signs mean “Decrease”, in other words, the high workload can decrease the personal resources available to the teacher and at the same time increase perceived stress, while the resources available to teachers decrease perceived stress.

To answer the second research question, the category "Perceived stress" was examined. The question asks: How do the teachers of Don Bosco perceive the workload in terms of preparation and follow-up of the classes? Teachers perceive significant stress due to lack of time. The consequences of perceived stress manifest themselves both personally and professionally, as stated by Cramer et. al (2018). On a personal level, the frustration and personal sacrifice suffered by teachers stand out, as a result of the lack of time and workload, as well as the feeling of not being recognized by the Ministry of Education. These demands contradict the Fundamental Law of Education in article 3 paragraphs a and h. These paragraphs establish that Costa Rican schools must promote health and cultivate learning in accordance with the Universal Declaration of Human Rights (Fundamental Law of Education, 1957). The right to work, to just and favourable conditions of work, as well as the right to rest, recreation and an adequate limitation of working hours are some of the human rights (articles 23 and 24 of the Universal Declaration of Human Rights , United Nations, 1984) that could be threatened in this case.

Among the consequences of perceived stress at the professional level, tensions in the institution due to different workloads and lack of recognition, ambiguity about lesson planning that generates dissatisfaction, and reduced teaching time stand out, which can create additional pressure and stress for teachers.

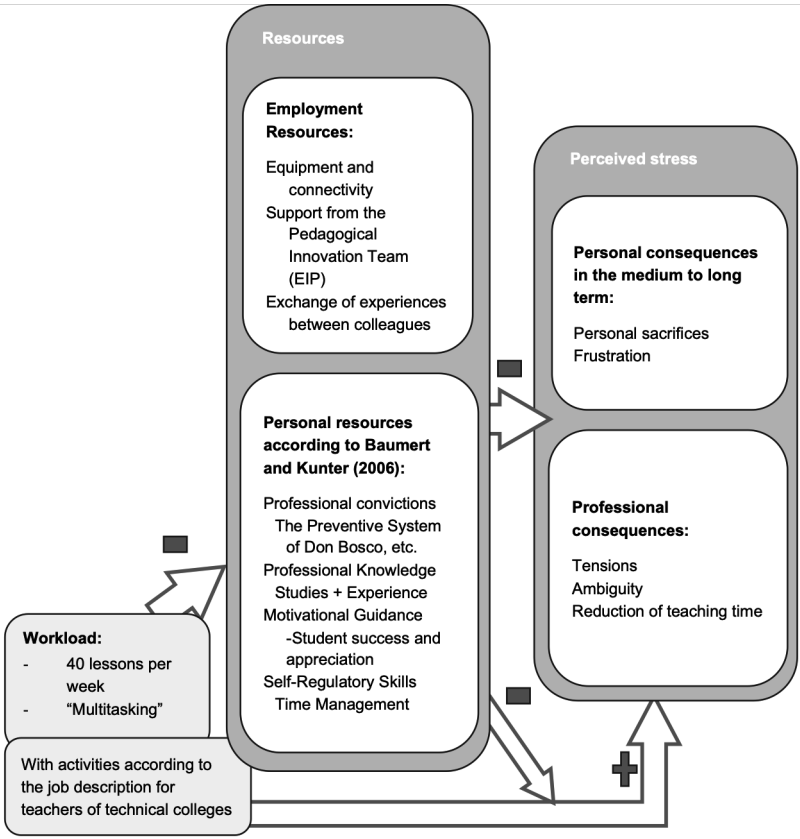


Figure 2. Comprehensive Framework Model of stress applied to vocational teachers of the CTP Don Bosco.

Note. Own elaboration based on the Comprehensive Framework Model of stress by Cramer et. al., 2018

To propose improvements in the institution, the categories of "Suggestions for improvement" and "Challenges" were analyzed, in addition to the criteria for evaluating working time in schools according to Dorsemagen et al. (2013). Among the main recommendations of teachers and directors are:

- Integrate time for planning and other pedagogical tasks into working hours: It is proposed to use fixed schedules during the week for these activities and digital support materials, which

would favor the separation between work and personal life and strengthen teamwork (Dorsemagen et al., 2013).

- Flexibility in curricula: Encourage cross-curricular projects and periodic planning reviews, as well as educational excursions, to promote practical and interdisciplinary learning.
- Fair distribution of tasks and constant evaluation by managers: Fairness in working time and transparency are key to avoiding burnout and strengthening the sense of belonging, as well as trust and cooperation (Dorsemagen et al., 2013).
- Greater administrative support in planning and training: Teachers should be valued both professionally and personally to improve the social climate in the institution, reducing the risk of burnout and increasing job satisfaction (Dorsemagen et al., 2013; Rudow, 1994).
- Hiring long-term substitute teachers: This would reduce the burden on teachers in the event of unforeseen events and improve class continuity (Riecke-Baulecke and Müller, 1999).
- Increase teaching and equipment maintenance support staff: This would ensure the necessary technical support and allow teachers to focus more on teaching.
- Better remuneration and hiring by working hours: This would increase the transparency and social recognition of the teaching effort, an *essential factor for self-esteem and self-confidence (Dorsemagen et al., 2013).*

6. Conclusions

Balance between workload and personal resources: The teachers of the CTP Don Bosco face a significant workload due to the 40 hours of additional lessons and pedagogical activities. Although these tasks can generate stress, the personal resources and those provided by the institution help teachers to manage these demands.

Impact of stress on well-being: The lack of time and recognition by the Ministry of Education causes frustration and personal sacrifice in teachers, which contradicts the Fundamental Law of Education and Human Rights, underscoring the need to improve their working conditions.

Need for an institutional support system: The tensions within the institution due to the lack of recognition and clarity in planning show the importance of a support system that distributes the workload equitably and provides recognition and clarity, thus improving the teaching work environment.

The research highlights the importance of implementing structural changes to improve working conditions, equitably distribute the workload and provide the necessary resources for effective class planning.

Limitations

A limitation of the transferability of the study results from the focus on a single school in Costa Rica. This limited geographical and institutional diversity could limit the generalizability of results to other countries or types of schools.

An intercoding reliability test could not be carried out because the research was conducted by a single person. Therefore, this deficiency may have compromised the reliability of the results. It was not possible to conduct a research audit, as research is an individual master's thesis. This means limitations in terms of objectivity.

Future Research

Future research could expand data sources and study different institutions and educational levels to improve the transferability and generalizability of results. In addition, they could focus on implementing and evaluating the effectiveness of improvement measures in various schools, as well as including students' perceptions of lesson planning and quality.

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Assessment for Learning in Technical Education. Reflections in the Costa Rican Context

Keywords: Technical Education, Assessment for Learning, Educational Paradigms, Assessment of Technical Learning

Abstract

This article examines the concept of assessment for learning and its implementation in the Costa Rican education system, particularly in technical education, by reflecting on the educational paradigms and current conditions of this educational modality. The main objective is to identify the distinctive characteristics of Costa Rican assessment and, based on these, to define the structural components to formulate a robust proposal for the assessment of technical learning.

The study adopts documentary analysis as a methodological strategy, a tool that, according to Martínez-Corona, Palacios-Almón and Oliva-Garza (2023), allows information to be collected, interpreted and critically reformulated in order to construct academic proposals that favor pedagogical reflection in the field of technical education. Data collection was carried out by consulting virtual databases provided by the Universidad Técnica Nacional (UTN), prioritizing analytical categories related to the paradigms of technical education and the structuring elements of the assessment of technical knowledge.

The results of the analysis allow for the identification of key components for the design of technical learning assessment strategies. Furthermore, it highlights the importance of establishing a coherent articulation between learning activities and assessment processes to ensure the integrity and relevance of the educational process.

1. Introduction

According to Alvarado-Calderón and Mora-Hernández (2020), Costa Rican technical education originated in 1958 with the Fundamental Education Law No. 2298. It is defined as a comprehensive educational alternative, with equal opportunities, with equal and non-discriminatory access, with a wide variety of disciplines, and is aimed at people who need to enter the labor market. The authors add that it is a training tool that allows people to quickly enter the labor market, with the aim of generating social mobility by promoting personal, social, economic and technological development.

Despite its important contributions to the country, Technical and Vocational Education and Training (TVET) in Costa Rica, particularly with regard to its implementation in various educational contexts, requires further research. According to Rommel, Angles and Frommberger (2024), theoretical and methodological approaches to TVET have not kept pace with the socio-political and economic transformations in the country and the region.

In the Ninth State of Education (2023), there is evidence of a slowdown in the expansion of the coverage of vocational technical schools in the country, despite the high demand for technical personnel in the labor market.

These conditions highlight the need for critical reflection to adapt educational paradigms to the contemporary challenges of technical and vocational education in Costa Rica. In this way, if the country does not have the possibility to increase the number of educational opportunities, it can focus on improving its current technical education offer.

The definition and characterization of education are fundamental pillars in any educational planning or implementation process, as well as for its improvement, whether from a methodological or evaluative perspective. Gutiérrez-Huamaní and Ayala-Esquivel (2021) emphasize that the components of the educational act are intrinsically interconnected, proposing the concept of the Teaching-Learning-Evaluation Process (PEAE). This approach, conceived as unique, transdisciplinary, simultaneous, continuous, and permanent, integrates the individual and his or her context from a complex and systemic educational perspective. In this framework, technical education assumes a holistic dimension, where training and assessment processes must respond to the social, cultural and labor realities of the environment.

Furthermore, Camacho-Calvo (2020) highlights that the lack of conceptual clarity among teachers, particularly with regard to key notions such as competences, hinders their application in the classroom. This lack of theoretical precision limits educators' ability to assign meaning to competences and, consequently, prevents their effective implementation in the processes of

learning mediation[1] and assessment within this model. This gap underlines the need to strengthen teacher training in technical education by fostering a comprehensive and contextually relevant understanding of the concepts underpinning this educational approach.

The development of technical education highlights the contributions of the Competency-Based Model and Action Learning (AL). Regarding the former, Camacho-Calvo (2020) points out that Technical and Vocational Education in Costa Rica is based on the Competency-Based Approach, which is performance-oriented to meet the demands of the labor market. However, the author emphasizes the need to incorporate an integrative vision of knowledge, which allows for the development of both professional and social competences, thus fostering comprehensive personal growth. In relation to the latter, Salazar (2017) defines active learning as a didactic principle for technical training with roots in the German tradition. This approach differs from traditional active learning, which tends to be more theoretical, by focusing on concrete work actions and the development of competences directly linked to practical application and professional performance.

In this context, fundamental questions arise that guide the research, in particular: What essential elements should be considered when designing a proposal for learning assessments in technical education in Costa Rica?

To address this question, a comprehensive literature review was conducted, including academic and scientific publications with qualitative analyses of education in Costa Rica, with a special focus on technical education. In addition, theoretical contributions related to the assessment of learning were analyzed from different educational paradigms and comprehensive national and international evaluative proposals. As stated by Barrientos (2018), an appropriate review of documentary sources will allow for a solid argumentative construction.

The search was conducted on platforms such as SCIELO, REDALYC, KÍMUK, DIALNET, ESBCO and SCOPUS. The selection categories included conceptual reflection on education, evaluation, paradigms, and current trends in evaluation. Only articles with a publication date of no older than 5 years were considered, although some exceptions were made for older articles due to their relevance to the topic. In addition, studies from the Costa Rican or Latin American context were selected. Based on these findings, the structural components necessary for the design of evaluation proposals in this modality were defined.

The results made it possible to identify the key characteristics of the assessment of technical learning and to propose a conceptual structure for

1 Pedagogical mediation is a learning proposal that seeks to create bridges or connections that promote interaction between the universe of knowledge and the learning potential of the student. As a teacher you have the important task of promoting meaningful learning experiences for learners.

assessments in this field in Costa Rica. Further research of this type is recommended to guide the development and improvement of the implementation of technical education assessment in Costa Rica, ensuring its alignment with contemporary social and labor demands.

2. Theoretical and Empirical Presentation

2.1 Assessment of learning in technical education in Costa Rica

2.1.1 Evaluation as a Natural Process

According to the Royal Spanish Academy, the word evaluate has its origin in the French *évaluer* and is associated with actions such as defining, calculating or estimating the value attributed to something, as well as the possibility of awarding a qualification or examining people's knowledge, skills or attitudes.

The action of evaluating can be applied to all scenarios of life, i.e. to nature itself, as seen in the deer that must evaluate whether it is safe to approach a pond to drink water or whether it represents a danger due to the presence of predators such as crocodiles, according to the aspects it observes in its context. Just as a bird assesses the color, aroma and consistency of a fruit, as these will indicate whether it is edible or whether it contains elements that can cause death. In this case, it can be considered that they will use their instincts, knowledge of their species and even previous experiences, their own or those of nearby animals.

Humans have also used evaluation to survive, as the learning inherited and passed down from their ancestors, as well as that generated from their own experience, has provided them with prior knowledge to develop indicators that allow them to observe, collect information, evaluate it and make decisions. Whether in prehistoric times or in the present era, evaluation is a natural process that human beings carry out, often unconsciously, but which determines our actions and, therefore, their consequences.

2.1.2 Assessment and Educational Paradigms

Just as human beings have implemented assessment strategies for their daily lives, they have also included it in learning processes. In the educational context, evaluation can be understood from different points of view and

historical moments. From a more traditional perspective, it can be associated with practices related to the measurement of mechanical, decontextualized and uncritical actions, such as the textual memorization of content dictated by the teacher.

In a more current proposal, according to the results obtained by Flórez Nisperuza, Páez García, Fernández and Salgado (2019) when researching with teachers and students, assessment can be defined as a subjective and evaluative activity that allows identifying strengths and weaknesses in the learning construction process, both in the performance of students and teachers and in the level of achievement of learning outcomes. This should invite all actors involved to a process of critical and creative reflection that integrates the different scenarios of everyday and working life.

The concepts used to describe objects and phenomena in the world are in constant transformation, for as realities change, so do the paradigms that attempt to explain them. Thus, as the concept of education has evolved, so have the educational paradigms and, consequently, the way in which assessment is understood and applied. As González (2023) explains, paradigms are overcome when one appears that improves or transforms the way in which they respond to the educational conditions or needs of each historical moment.

The author clarifies that, in the social sciences, paradigms have a network behavior; that is, the arrival of one does not make the previous one disappear completely, but rather they continue to exist in certain scenarios; that is, they coexist with each other, taking advantage of the valuable aspects that they still have to contribute to the new paradigms that are being constructed. The following are some aspects of interest in this process of change, according to the main associated paradigms.

2.1.2.1 Behaviorist Paradigm

According to González (2023), the behaviorist paradigm is associated with teaching from an empiricist view of knowledge, with a methodology based on association and conditioning. Therefore, it is evident that assessment from this paradigm focuses on the student demonstrating the theoretical acquisition of knowledge based on a specific result, according to the teacher's intention.

In the proposal by Berlanga Ramírez and Juárez-Hernández (2020), this paradigm supports the traditional assessment associated with the exact sciences, which focuses on the observable, measurable and quantifiable quality of objects, which meant that assessment was limited to actions such as observation and measurement, turning the experience into something mechanical, standardized, and massive, and the ultimate aim of learning was to pass the assessment activities.

Among the characteristics that can be attributed to these evaluations is that they are based on the behavior that can be observed, since the strategy is measurement and quantification, so as to allow objectivity, as well as reinforcement or punishment according to the results, that is, whether or not the student was able to reproduce what was expected by the teacher. In this scenario, the traditional exam or written test that focuses on memorization and repetition of content, in a scenario similar to a laboratory for the control of external variables, in which an input is offered and each student must react to it according to the expectations of the teacher in charge who constructed it, turns out to be the best instrument for evaluation.

2.1.2.2 Cognitive Paradigm

From the proposal of González (2023), the cognitive paradigm focuses on the mental representations of people, it is developed through the experiences of the student who maintains active participation in managing information, with reflection and the development of attitudes promoted by the teacher.

As the name suggests, there is an interest in the development of students' cognitive skills through the application of didactic strategies that facilitate knowledge, thinking and application, whereby a different relationship is established between teacher and student, in which each person's prior knowledge and particular ability are validated. A differentiating aspect is that, just as what is learned is important (i.e. the content), so is the reason why it is learned (the why), which allows for a more critical and reflective view of the learning process.

In view of this, assessment also undergoes transformations since in this scenario it is interested in showing not only that the person knows, but also in finding out how they process information, how they organize it and how they put it into practice in different circumstances, assessing not only the final product or result but also the process, recognizing the influence of the context, offering feedback for improvement purposes and using different evaluative activities.

An example of this type of evaluation would be the elaboration of an analytical report, by stages, which allows visualizing the general diagram of the ideas, the associated referential research, the analysis of the proposals of the expert authors, the reflection from personal practice and the elaboration of the academic constructions or conclusions.

2.1.2.3 Constructivist Paradigm

Gonzalez's (2023) study of the constructivist paradigm indicates that it retains essential aspects of the previous one, such as the evaluation of prior learning,

the active participation of students and the recognition of the creation of personal mental structures. However, it presents important contributions, such as the granting of power and protagonism to students, since it is they who construct their learning and, therefore, they are responsible for it. Moreover, this learning must be deepened, i.e. it must be put into practice.

In this context, the teacher guides the process of development and consolidation of student autonomy. According to the contributions of Berlanga-Ramírez and Juárez-Hernández (2020), assessment from the constructivist paradigm considers the students' constructions and results, promotes decision-making, negotiation and generates a change of roles, as both students and teachers become researchers to improve their understanding of what they have learnt. To achieve this objective, assessment must be characterised by being continuous, timely and participatory, which is achieved by including processes of self-assessment and co-assessment in the participants, as well as allowing the development of meta-assessment activities for continuous review.

In this sense, it is possible to recognize that assessment has also changed, not only in its concept, but also in the way it is carried out, since assessment activities from this paradigm must be oriented towards respecting and promoting the autonomy of the student in their learning construction process. Therefore, it is important to offer the ideal conditions to stimulate learning through meaningful, authentic and realistic experiences and contexts that allow experimentation and reflection, as well as the implementation of their knowledge, skills and attitudes. Feedback is maintained throughout the learning process and different tasks and assessment tools are applied, which facilitates self- and peer-assessment in both personal and group actions. There is room for creativity, flexibility and autonomy, among others.

An example of evaluation from this paradigm is project-based evaluation, as it involves a series of stages or deliverables that require the performance of various actions to achieve the objective. In addition, it requires interaction with peers, with expert staff, as well as academic and work-related enquiry or research, etc. This type of complex activity involves putting into practice a range of knowledge, skills and attitudes to complete it successfully.

As mentioned above, paradigms in the social sciences and therefore in education can coexist, as can ways of understanding and applying assessment to learning processes. The reflection that can be made on paradigms and their application in educational work is a key aspect to identify how they are influencing the way in which the construction of learning is promoted and how they are being evaluated, as well as whether it is necessary to move towards new ways of understanding education.

Thus, the most important thing is to be clear about the intention of the assessment, as this is what determines its application. If the intention or interest lies in determining who passes or fails the course, a behavioural final

assessment may be an appropriate option; but if the interest is to guide the process of learning construction, both for the teacher and the students, constructivist assessment may offer more resources and inputs.

2.1.3 Educational paradigms and Costa Rican education

Education in Costa Rica has also been influenced by different educational paradigms, which have undergone transformation processes in the interest of addressing the realities and needs of the country. According to Rivera-Alfaro, Porras-Solís, Solórzano-Alfaro, Chinchilla-Coto and Jiménez-Corrales (2023), in the 1980s, Costa Rican education was influenced by technical-instrumental tendencies, focused on the quantitative, on the sanctioning of behaviors considered to be far from the norm, and on control, which was reflected in the learning assessment regulations, specifically in the 2009 regulations of the Ministry of Public Education.

They also mention that the curricular model based on learning objectives was criticized for maintaining traditional educational approaches that promoted gaps between public and public schools. The objectives had a positivist approach, aiming to reduce subjectivity when assigning grades to students, which was reflected in the standardized exams of sixth grade of primary and fifth year of secondary school.

Rivera-Alfaro, et al (2023) add to their reflection that in previous government administrations, important changes have been proposed in pedagogy, in fields such as philosophy, curriculum and methodology. An example of this is the curriculum policy of the Ministerio de Educación Pública (2015) called *Educating for a new citizenship*, which involved changes in subject programs, as well as in curricular and methodological approaches to integrate theory into everyday life, from paradigms such as sustainability, the ecosystemic approach and planetary boundaries, among others. Despite this, the authors mention that in the State of Education Reports of Costa Rica, the application of these changes in the work of schools and colleges is not perceived, expressing a difference between the prescribed curriculum and the real one.

Thus, although there have been changes in educational paradigms, these transformations are not reflected in the classroom. This situation motivates us to investigate more about the educational practices of the teaching population in Costa Rica, specifically in technical education, in order to identify opportunities for improvement.

In this scenario, the Ministry of Public Education (Ministerio de Educación Pública, 2024) defines education as seeking the full development of each student's personality, as well as promoting respect for human rights and freedoms, understanding, tolerance and friendship in the midst of human

diversity. Furthermore, it focuses on the development of skills, abilities and competencies for the formation of free, autonomous, critical and self-critical persons, for their integral personal development, for the good of society as a whole. This is evidence of the position of the education authorities aimed at providing comprehensive education.

Likewise, in the Educational Policy of the Ministry of Public Education (Ministerio de Educación Pública, 2017) entitled *The person: centre of the educational process and transforming subject of society*, in its philosophical and conceptual framework it defines Social Constructivism as one of its essential paradigms, which seeks the maximum and multifaceted development of capacities and interests of the student, in their social and cultural context, integrating the person in their previous experiences and mental structures, within the sharing generated in the learning communities (Ministerio de Educación Pública, 2017).

Despite these conceptual approaches or ideals of education, as well as the transition through various paradigms such as positivism, social constructivism, and others oriented towards a more comprehensive education, as stated by Vargas-Venegas (2022), education faces serious challenges. One of them is to value the process and not only the results, as well as the assessment and reflection on its coverage, equity, relevance and quality, as well as whether it is promoting the development of meaningful learning that motivates and inspires, that is contextualized and relevant, as well as emancipatory.

2.1.4 Costa Rican Technical Education and Evaluation

According to Alvarado-Calderón and Mora-Hernández (2020), Technical Vocational Education in Costa Rica is defined by the Ministry of Public Education as a subsystem of the formal education system, considered as a comprehensive training alternative for women and men interested in entering the labor market. It seeks the integration of skills and knowledge, in a particular area, related to the labor field. The process integrates the academic and the specialized in the specific technical branch.

In the Ninth State of Education of the State of the Nation Program (Programa Estado de la Nación, 2023) it is mentioned that Technical Education and Vocational Training (TVET) becomes an alternative for early entry into the labor market or to continue their university studies. In this sense, the Ministry of Public Education aimed to strengthen technical education through programs aligned to the National Qualifications Framework for Technical and Vocational Education and Training of Costa Rica (MNC-EFTP-CR) and its percentage weight in enrolment.

Unfortunately, this has not been possible due to the period of stagnation in the country, which is evidenced by the fact that despite the creation of 117

services related to this subject between 2011 and 2017, including the creation of technical colleges, the transformation of academics to technicians and the creation of evening sections, from 2014 to date only two technical colleges have been created in the country, for a total of 135 daytime technical colleges and only two evening colleges. In 2018, the offer was expanded with the implementation of 16 Professional Institutes of Community Education (IPEC) and Integrated Adult Education Centers (CINDEA), but as the authors state, this does not reduce the geographical gaps in educational opportunities.

This State of Education report adds that in 2019, Law 9728 on Dual Technical Education and Training came into force, the purpose of which is to promote competences, knowledge, skills and abilities, as well as attitudes, for incorporation and adaptation to the constantly changing labor scenario (Programa Estado de la Nación, 2023). Despite this, no significant progress has been reported in dual education processes. Likewise, it is detected that the results of the evaluations are not applied to implement improvements in the teaching and learning processes. In this context, the Report proposes within its triad of priorities the substantive improvement of student learning and assessment.

From the Ministry of Public Education (Ministerio de Educación Pública, 2024), learning assessment is considered as a process that allows both the collection and analysis of diagnostic, formative and summative information, through a comprehensive, continuous, dynamic, reflective and transformative approach (p. 3), so as to guide decision-making in favour of continuous improvement in the construction of learning and educational practice. They also add that it should not only seek a qualification (number), but should seek to accompany the student body, feedback, improvement of teaching, self-evaluation and co-evaluation in order to encourage reflection on performance and achievements. This is the ideal proposal described in the Ministry's documentation, which begs the question: how can it become a reality in technical education?

3. Proposal of Structuring Components to Guide the Evaluation Strategy in Technical Education

The analysis of the concept of education and its technical modality, as well as its particularities in the Costa Rican context, together with the reflection on natural evaluation and learning, the different educational paradigms and their influence on its characterization, have allowed us to consider that technical education is an important opportunity for the progress of the country, through the integral development of its citizens, as it allows people to build the theoretical and practical knowledge necessary to develop adequately in society

and the labor space in a faster way. This has an impact on a personal, family and social level as it allows them to generate their own income, but at the same time, it contributes to the productive sector and the development of the country.

In addition to this, technical education demands more effective learning construction processes, as they are developed in less time than academic education and their work immersion is more direct, they must have the opportunity to put their knowledge into practice and face different situations, in order to create, implement and assess solutions to different problems, so that the development of competences and learning in action are an ideal route. They must also be intrinsically linked to effective evaluative strategies that enable learners to assess their performance, recognize their strengths and limitations, receive and provide feedback on their work, in order to engage in institutional or self-managed learning processes to reach their full potential.

Based on these ideas about technical education and by situating ourselves in the social constructivist paradigm of learning in Costa Rica, the following definition of technical learning assessment is proposed, which consists of an integral process of generating information about the level of achievement of the student in the construction, internalization and application of knowledge (know-how), skills (know how to do), competences (know how to do effectively) and attitudes (know how to be and to be) related to optimal performance in a technical or professional field, considering the particularities of the work context and the associated social interactions, with the purpose of providing feedback to the student and teacher, so that they can be oriented towards continuous improvement.

Based on this definition, five structuring components are proposed that will serve as a reflection and orientation for the design and implementation of the assessment of technical learning in Costa Rica. These elements are listed below and a description of each is presented in order to facilitate their understanding.

3.1 Coherence between learning experiences and assessment

The processes of learning construction should not be considered as different elements from those of assessment, since it has been shown that both processes complement each other in the different sciences that contribute to the development of education. Therefore, a first element to be considered when designing an assessment proposal is the coherence between the learning experiences developed in the classroom and the assessment activities, since it is this condition that allows students to deepen their knowledge and put it into practice successfully.

It is essential to remember that comprehensive technical training is not limited to the development of strictly occupational competences, but

contributes to the development of the biopsychosocial and spiritual person, as a member of a family, of a work team, as a citizen of a country and as an active agent of humanity in this common home. Therefore, avoiding the separation of both processes as independent and unrelated activities allows for the development of strategies that value their theoretical knowledge, skills in the application of that knowledge, as well as attitudes, which involve skills associated with the management of emotions, communication skills, teamwork, among many others related to interaction with other people and their contexts.

In this sense, the teacher must be clear that when receiving a group of students in the course he/she is in charge of, he/she encounters people - who will be at the center of the learning process - with a great diversity of conditions that can facilitate or hinder learning at different moments of the school year. Therefore, each experience must be accepted as a new challenge. Of course, you can apply the knowledge acquired in your experience with previous groups, but it is essential that you carefully analyze the particularities and situations that may arise in this new educational experience.

It is a daily challenge, but the invitation is that when planning class sessions and assessment tasks, be clear that you must have a flexible approach to respond appropriately to emerging issues that may arise and, ultimately, seek similarity between the learning and assessment processes. It is not appropriate to develop master classes aimed at presenting concepts and their characteristics, and then develop assessment activities focused on the resolution of exercises or cases. This would cause a methodological disadvantage that could prevent the student from demonstrating the learning he/she possesses.

According to Díaz-Barriga (2019), although it is not possible to define a list of unique or ideal learning experiences to guarantee the success of teaching and assessment processes in the competency-based approach, it is important to consider that, as a guiding principle, students should be encouraged to face situations that recreate authentic reality, with problems and cases associated with the professional sphere. Therefore, when designing experiences that promote the construction of learning, as well as evaluative experiences, this fundamental principle must be respected.

In this line of reflection, the author comments that there is evidence that any educational process oriented towards practical training, experiences and that promotes enquiry, favors learning oriented towards competences and action. He even adds examples such as project-based learning, problem-based learning, case methods and community service, among others, as these active methodologies favor the development of competences, as they place the person at the center of the learning process, promote the development of their skills and their implementation, articulating learning and evaluation.

Naturally, as already mentioned, there is a link between learning and assessment, since human beings must evaluate something as interesting or important in order for learning to take place, and the knowledge acquired is subjected to evaluation processes to determine when and where to put it into practice. Therefore, in the process of lesson and assessment planning, an adequate articulation and coherence must be maintained between their modalities, approaches, and achievements to be attained. Furthermore, it should always be oriented towards action or the implementation of knowledge, the reflection that allows for understanding why this educational and assessment activity is used, as well as the comprehensiveness that allows for the development of competences that promote adequate human coexistence.

3.2 Assessment for Learning

Assessment in education must be reoriented towards assessment for learning. The term 'assessment' implies intention and direction, placing learning at the center of the process. This perspective transforms the role and application of assessment, influencing every stage of the teaching and assessment strategy. From the planning of activities and the design of materials to the shaping of classroom experiences and teacher guidance, all elements must be aligned to support and build meaningful learning experiences.

This approach challenges the traditional separation between learning and assessment, often characterized by isolated sessions devoted exclusively to assessment. These practices often reduce assessment to a summative function, focused strictly on determining pass/fail results. In contrast, assessment for learning incorporates the advantages of formative assessment, which identifies strengths and areas for improvement throughout the learning process. In addition, it builds on diagnostic assessment to understand a learner's basic knowledge and skills, laying the foundation for further learning.

As Sánchez and Martínez (2020) explain, assessment for learning is a processual activity that can occur at any stage of the learning process. It involves collecting information on student progress and using this data to guide decision-making and ensure the achievement of learning outcomes. This type of assessment encourages the collaborative construction of knowledge through horizontal dialogue between teachers and students, with an emphasis on reflection, feedback and mutual participation. It encourages self-regulation, as it is inherently participatory, reflective and motivating. By recognizing individual and group strengths and opportunities for growth, assessment for learning aligns with the overall goals of education: fostering critical and creative thinking, personal development and problem solving.

For competency-based learning or action learning - proposed in this article as optimal approaches for technical education - Díaz-Barriga (2019) stresses the importance of not only acquiring knowledge, but also applying and evaluating it in realistic and contextually relevant scenarios. This ensures that students can tackle complex real-world tasks effectively, bridging the gap between theoretical understanding and practical application. Assessment for learning therefore integrates seamlessly with technical education, encouraging action, reflection, and holistic development.

3.3 Authentic Assessment

Authentic assessment, as the name implies, focuses on a genuine and realistic process of assessing learning. It requires students to demonstrate their knowledge and skills in scenarios that resemble real professional or social contexts. In the context of competence-based education and action learning, this form of assessment goes beyond theoretical knowledge, requiring students to analyze and respond to the complexities of real circumstances. By applying their knowledge to solve real-world problems, students develop the ability to address a variety of social and professional challenges.

Authenticity in assessment arises from creating experiences that immerse students in real or highly realistic conditions. This enables them to perform as professionals in training, maximising their potential within their disciplines. By facing scenarios similar to those in the work environment, students gain valuable pre-professional experience, allowing them to reflect on the technical and emotional consequences of their decisions. As argued by Maluenda Albornoz, Varas Contreras and Chacano Osses (2021), authentic assessment goes beyond measuring achievement; it provides accurate and contextualized feedback that helps students integrate prior and new knowledge to develop problem-solving strategies. This approach supports the acquisition and refinement of technical and generic competencies, while fostering continuous improvement.

According to Vallejo and Molina (2004), cited by Camacho-Navarro and Salinas-García (2022), authentic assessment offers a meaningful alternative to traditional methods, which are often based on static instruments focused on declarative knowledge. Instead, authentic assessment privileges autonomous performance through active methodologies linked to real-life experiences and competences. It involves participatory tasks, moving away from traditional written tests towards scenarios where students demonstrate their skills through actions. This approach requires appropriate equipment, resources and environments that allow for a holistic assessment of performance.

A contextualized assessment consciously integrates the specific environment in which learning takes place, connecting it to the students' future professional landscape. By involving a variety of contextual factors - social, economic, political and institutional - this approach requires more complex analytical processes. It broadens the scope of assessment to include technical, social and environmental competences, fostering a holistic understanding of learning outcomes.

Situated assessment, closely related to contextualized assessment, emphasizes the interaction between learners and their environment. As López, Álzate, Echeverri and Domínguez (2021) explain, situated learning recognizes that education occurs in a specific time and place, shaped by interactions with resources, peers and the community. Thus, situated assessment integrates students' lived experiences, encouraging reflection on their emotions, thoughts and perceptions as they apply their knowledge and skills. This approach aligns with the integrative perspective of technical education, addressing the interaction between action, reflection and dialogue in social and professional contexts.

3.4 Active Assessment

Reflecting on the concept of active learning and active learning methodologies, as well as following the arguments presented on the coherence between learning activities and assessment, it is necessary to integrate the characteristic of the active in the assessment proposal, i.e. that the proposed assessment tasks or activities lead the student to apply or put into practice the acquired knowledge.

According to Bonwell and Eison (1990), cited in Espejo Leupín (2016), active learning allows students to engage in action and reflect on what is being done. In this way, active assessment would focus on proposing tasks, activities and experiences in which students are interested, engaged and actively participate in the application of knowledge, skills and attitudes.

Therefore, assessment activities should clearly show the desired level of quality in the processes or products performed, as the commitment to quality that they practice or demonstrate in the educational processes could reflect their performance in the workplace.

If technical education is worked from the competency-based approach, it is appropriate to develop learning experiences based on active methodologies, which, according to Silva Quiroz and Maturana Castillo (2017), are techniques, methods and strategies that the teacher designs and implements so that the teaching process promotes student participation in the construction of learning. Instead of focusing on content, it is centered on activities, which revolutionises

the roles of the actors in the educational act. This proposal should be reflected in changes in the definition of subjects, as well as in the planned learning and assessment activities, towards a more constructivist approach.

Based on these ideas, assessment should also be carried out through activities that promote student participation that place them at the center of the learning process, and that the teacher is a mediator and advisor in the assessment processes. Furthermore, it requires the design of assessment tasks that involve complex processes, that go beyond the repetition or summary of a text, but require self-development, critical and creative analysis, and the execution of higher skills and abilities; in short, that students put their knowledge into practice.

Furthermore, such assessment activities should contain clear instructions, a definition of the steps to be followed at each stage of the task, quality criteria, specific requirements and, especially, assessment tools that guide the learner on his or her level of achievement (what is expected of him or her) in this activity. These instruments, such as the checklist, the grading scale or the rubric, whether specific or global, will also be key tools for the revision and grading process of the assignment by the teaching staff.

With an adequate definition of the evaluation instruments and the evaluation activity, any learning experience, from this active approach, can become an evaluation task. Moreover, it facilitates the implementation of participatory evaluation, as it guides the processes of self-evaluation, co-evaluation and heteroevaluation.

3.5 Self-Assessment of Performance

The last point to consider is that, in a proposal to assess learning, it could be considered to offer evaluative experiences that not only allow to demonstrate the knowledge acquired, but also integrate aspects that allow a process of self-assessment based on their performance in carrying out the task.

Generally, students focus on the completion of the task; there may even be situations where learning takes a back seat and the main objective of their performance is to meet the minimum pass mark. Therefore, providing the opportunity to analyze and reflect on how they performed the activity could generate important feedback, not only for their professional development, but also for their personal development.

In this line of thought, according to Dolores Ruiz, Salazar Gómez, Valdivia Rivera, Hernández Cárdenas and Huerta Mora (2023), job performance is associated with the way in which people work, describing what is expected of efficiency and effectiveness in achieving objectives and goals, in form and time. Furthermore, the authors citing Hancco, Carpio and Laura (2021)

mention that it is related to the worker's performance or action towards the proposed result, which is why it is characterized by being dynamic, measurable and observable. Therefore, the competences of the graduate profile of the degree course or training experience in order to establish the achievements expected and required by the contracting companies or institutions could serve as a basis for the development of performance indicators or items, which will be integrated into an assessment instrument intended for this purpose.

In this sense, although students are not yet in a real work environment, if the work is carried out by competences and with the aim of developing their potential to the maximum, it would be interesting to include in the learning assessment activities some aspects associated with work performance assessments. Among the contributions that this practice can generate, we can consider the familiarization with performance evaluations in the work environment, as well as the development of metacognitive processes that allow students to identify their strengths and areas for improvement in order to plan and carry out self-regulation processes, which will help to guide their decisions and actions towards the continuous improvement of their training experience, as well as an input for the improvement of their professional practice.

4. Conclusions

The review of articles addressing the conceptualization and implementation of assessment for the construction of technical learning showed that more research and writing is needed. Furthermore, the analysis reveals that this topic is broad and complex, which generates new questions and concerns that invite further exploration. Therefore, it is essential to promote research that involves all key actors in the educational process: teachers, students, curriculum specialists, education authorities and actors from the productive sector, among others. This is in order to know what they are doing and the results that are being generated, so that these efforts allow for the continuous updating, innovation and improvement of technical knowledge assessment processes, thus strengthening the comprehensive training of future professionals.

Technical education in Costa Rica should be understood as an action-oriented training process, where the competences developed integrate knowledge, skills and attitudes, with a reflective and transversal approach. Beyond specific technical expertise, this type of education seeks to prepare people to apply their knowledge in complex and dynamic contexts, adopting a critical, creative, and adaptive perspective. This approach not only addresses the emerging demands of the work and social environment, but also promotes the holistic development of learners, forming citizens equipped with technical, social, and ethical competencies. Thus, technical education transcends mere

occupational training by incorporating values such as quality, maximization of human potential, and a continuous dialogue with present and future socio-occupational contexts.

There is a need for reflection and research on the closeness that exists between the documentary proposal for technical education offered by the Ministry of Public Education in Costa Rica and what is actually being developed in the classroom. A key aspect that stands out here is the necessary coherence between learning and assessment. Assessment should not be seen as a separate component of the learning process, but as a natural extension of it. To ensure this coherence, it is essential that the technical and transversal competences promoted in the classroom are reflected in the assessment activities, keeping the learner at the center of the educational design. This perspective requires the adoption of the constructivist paradigm, not only in curriculum design, but also in daily lesson planning and development. Active methodologies are vital not only to develop competences, but also to assess them in a meaningful and contextualized way.

Any assessment approach in technical education must incorporate essential elements to ensure its effectiveness. These include coherence between learning experiences and evaluative activities, a focus on assessment for learning and its characterization as authentic, contextualized, situated and active. The inclusion of self-assessment strategies is also crucial, encouraging reflection, autonomy and the holistic development of learners. These elements contribute not only to enriching the educational experience, but also to promoting more meaningful and relevant learning outcomes.

Finally, it is important to consider that assessment in technical education must transcend its traditional role, integrating itself dynamically and coherently with learning processes. This is the only way to address contemporary social and labor demands, ensuring that technical education not only prepares people for the labor force but also contributes to their holistic development and their ability to positively impact society.

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Active and Meaningful Learning in Technical and Vocational Education and Training in Costa Rica from a Constructivist Approach

Keywords: Constructivism, Technical Education, Pedagogical Mediation, Active Methodologies

Abstract

This article analyzes the potential of integrating pedagogical mediation with a constructivist approach in active and meaningful teaching-learning processes within Technical and Vocational Education and Training (TVET) in Costa Rica. The primary method of data collection follows the classical approach, using documentary analysis as the main technique. The study is based on a descriptive bibliographic review, which includes the consultation of digital documents, e-books, and articles from the main authors of the work, as well as other scholars who address their theories and offer relevant reflections for the purpose of this research.

The article argues in favor of the constructivist approach based on theoretical foundations and suggests how it can effectively integrate social and personal relevance criteria into TVET learning in Costa Rica. This not only enables a more contextualized and meaningful education but also facilitates individuals' efficient and effective integration into work environments by developing competencies relevant to the labor market and the specific needs of their surroundings.

Additionally, it suggests that the articulation between theory and practice, fostered through active pedagogical strategies, enables students to develop critical, reflective, and collaborative skills. Among its main conclusions, the article highlights that pedagogical mediation with a constructivist approach in Costa Rican TVET enhances the effective integration of theoretical and practical knowledge in relation to students' sociocultural contexts.

Furthermore, if Costa Rica adopts a constructivist approach in TVET, it promotes meaningful and innovative learning geared toward solving complex problems, strengthening the competencies needed to face both professional and

social challenges. This pedagogical contribution has the potential to positively impact socioeconomic development and collective well-being by preparing professionals capable of adapting to the demands of dynamic technical and professional environments.

1. Introduction

Constructivism is a learning theory that posits knowledge is not passively received but actively constructed by the learner through experience, social interaction, and reflection. This approach is grounded in the premise that individuals interpret and make sense of the world based on their prior knowledge, skills, and lived experiences, thereby generating a unique and personal understanding of their environment. (Tünnermann Bernheim, 2011)

On the other hand, Technical and Vocational Education and Training (TVET) aims to equip students with the knowledge, practical skills, and essential attitudes required for efficient and competitive performance in specific occupational fields. Its primary goal is to align education with labor market demands, promoting employability, sustainable economic growth, and lifelong learning (United Nations Educational, Scientific and Cultural Organization, UNESCO, 2024).

Given this context, the following question arises: How can TVET Costa Rican institutions design and implement pedagogical strategies that balance the development of technical competencies required by the labor market with critical and reflective thinking from a constructivist perspective?

This question can be approached from multiple perspectives. For instance, it can be argued that while TVET tends to focus on competencies and skills of instrumental value to the workplace—often translated into specific curricular structures—constructivist approaches provide opportunities for reflection, discussion, and participatory integration within those structures. Such strategies enrich the learning process, fostering a more engaged and meaningful educational experience that bridges technical skills with critical thinking.

In a constructivist framework, teachers act as facilitators, encouraging their students to develop autonomy and critical thinking, but in the context of TVET, they must comply with institutional guidelines and standardizations that often constrain pedagogical freedom, focusing on specific technical objectives. This can reduce opportunities for students to engage in meaningful and socially relevant learning processes, limiting their ability to apply skills in innovative and critical ways. (Tünnermann Bernheim, 2011)

Under this logic, the implementation of a constructivist pedagogy in TVET Costa Rican would therefore require a broader approach that goes beyond the

acquisition of technical skills to a comprehensive education that also considers the social and personal development of students. This broadened view challenges traditional education and proposes active methodologies, such as project-based learning and problem solving, in which each student, guided by their personal interests and in interaction with their peers, can apply technical, critical and situated knowledge.

Along these lines, Costa Rica has made progress in incorporating these approaches in the TVET system, specifically in the National Learning Institute (INA) with a renewed educational model and curricular proposals based on a competency-based approach, and the Ministry of Public Education (MEP), which promotes an educational model based on competencies, entrepreneurship and other areas associated with employability.

In this context, this article describes the links between constructivist pedagogical mediation and the teaching and learning processes in TVET. To develop the proposal, the theories of Jean Piaget's cognitivism and Lev Vigotsky's social constructivism are integrated in order to extract points that could be related to active and meaningful learning in TVET Costa Rican teaching, as well as the possible adoptions of constructivist and interactionist premises (Rodríguez Arocho, 1999).

2. Development

2.1 Theoretical Approach: Piaget and Vygotsky Perspectives on Constructivism

The constructivist approach, encompassing cognitive processes on an individual level and social dimensions of learning, has been theoretically grounded by Jean Piaget (1896–1980) and Lev Vygotsky (1896–1934). These scholars laid the foundations for understanding cognitive and social functions of knowledge, offering valuable insights into teaching and learning processes that are directly applicable to Technical and Vocational Education and Training (TVET). Their theories, while distinct, converge in providing strategies that foster both technical skills and broader, adaptive capabilities, essential for students' success in a dynamic labor market.

Jean Piaget focused on the mental processes through which individuals acquire, organize, and process knowledge. Piaget described learning as a dynamic interaction between the individual and the environment, highlighting the processes of assimilation (integrating new information into existing schemas) and accommodation (modifying schemas to incorporate new

experiences). For Piaget, cognitive development progresses through active exploration, influenced by contextual factors and pre-existing logical structures (Piaget, 1972). This progression reflects the construction of increasingly complex instruments of thought, demonstrating that learning builds cumulatively upon prior knowledge.

Piaget's theory also recognized the role of language as a social tool that not only conveys shared societal concepts but also integrates individual thought into collective systems of ideas (Piaget, 1991). However, he argued that while social transmission is vital, it alone cannot drive cognitive development, as active individual assimilation remains essential for meaningful learning (Piaget, 1972).

In the context of TVET, Piaget's emphasis on active learning finds practical application in environments where students engage in hands-on activities. Practical methodologies such as Design Thinking exemplify Piagetian principles, enabling learners to develop logical reasoning, critical thinking, and problem-solving skills. Design Thinking encourages students to define problems, ideate solutions using strategies like brainstorming, SCAMPER, and mind mapping, and test iterative prototypes. This approach not only builds technical skills but also fosters teamwork, creativity, and adaptive reasoning—key competencies for the modern workplace. Piaget's active pedagogy supports TVET learners in dynamically constructing knowledge, ensuring they develop technical expertise alongside the ability to navigate real-world complexities.

In contrast, Lev Vygotsky placed greater emphasis on the social and cultural mediation of learning, positing that cognitive development is inherently influenced by social interaction and contextual factors. Vygotsky's concept of the Zone of Proximal Development (ZPD)—the distance between a learner's independent abilities and their potential achievements with guidance—provides a key framework for scaffolding learning processes (Vygotsky, 2009). This scaffolding, facilitated by teachers or more capable peers, allows learners to internalize skills and progressively achieve autonomy.

Vygotsky argued that higher mental functions, such as memory, reasoning, and problem-solving, emerge from social interaction and are shaped by cultural tools, including language and technologies (Wertsch, 1988; Ramírez Garrido & Mata Benítez, 1988). Cognitive development is, therefore, not linear but dynamic, resulting from the interaction between natural (biological) and sociocultural forces (Vygotsky, 1995).

In TVET, Vygotskian principles align with collaborative and contextualized learning environments. Methodologies such as the flipped classroom embody this perspective by shifting theoretical learning outside the classroom—through videos, readings, and digital resources—allowing class time to focus on collaborative, problem-based activities. In these settings, students engage in practical problem-solving, peer discussions, and group

projects, fostering both technical competencies and transversal skills such as teamwork and communication.

Furthermore, Vygotsky's emphasis on social interaction is evident in group projects and industrial simulations, where learners collaborate to design systems, solve real-world problems, and experiment with technical tools in simulated environments. These experiences expose students to multiple cognitive levels and perspectives, particularly in diverse learning spaces where individuals of different cultural and age backgrounds contribute to the construction of shared knowledge. Such environments mirror Vygotsky's assertion that learning is culturally situated and socially mediated (Wertsch, 1988; Nieva Chaves & Martínez Chacón, 2019).

When integrated into TVET, the complementarity of Piaget's and Vygotsky's theories becomes evident. Piaget's focus on individual cognitive processes and Vygotsky's emphasis on social interaction converge in learning strategies that develop both technical skills and critical-reflective abilities. Students actively engage with tools and technologies while also benefiting from structured guidance, collaborative learning, and contextualized experiences. These approaches create holistic learning environments that prepare learners not only for the demands of a dynamic labor market but also for meaningful participation in society.

The contributions of Jean Piaget and Lev Vygotsky provide a comprehensive theoretical framework for improving teaching and learning processes in TVET. While Piaget stresses active cognitive construction through interaction with the environment, Vygotsky emphasizes the socio-cultural mediation of knowledge. Together, their perspectives support dynamic pedagogical strategies that balance the development of technical competencies with the promotion of reflective thinking and collaborative skills. By incorporating methodologies such as Design Thinking, flipped classroom and industrial simulations, TVET can provide learners with a solid foundation to meet real-world challenges, adapt to evolving labor market demands and contribute to socio-economic development.

2.2 Active and Meaningful Learning

Some authors have taken the fundamental ideas of Piaget and Vygotsky and adapted them to the educational context, highlighting the implications of individual cognitive processes as well as the socio-cultural context for learning. Their contributions to TVET are related to pedagogical approaches that consider it essential to design experiences that allow students to discover principles and apply skills in practical situations, to foster independence and adaptability in technical learning, to build knowledge gradually, to connect

new knowledge with previous concepts and to explore in exercises the application of theory in practice.

Jerome Bruner (1915-2016) is one of the developers of this active and meaningful constructivist pedagogy. Inspired by Piaget, he was one of the founders of cognitive psychology, especially when he affirmed that the mind is not limited to receiving information, but can interpret it, giving it a particular meaning. At the same time, based on Vigotsky's constructivism, he argued that human life not only has species-specific biological adaptations, but is also culturally adapted, since people depend on assigned concepts and meanings. In this context, Bruner (1990) mentions that it was difficult to fully recognize the contribution of culture to human adaptation and functioning (because, according to the author, reality is constructed from the knowledge generated by cultural traditions, since learning and thinking are always situated in cultural contexts) (Bruner, 1997). From this perspective, the key role of education lies in providing the necessary tools to create meanings and adapt to the environment, and even to change it.

Bruner (1960) was particularly interested in the heuristic condition of learning, considering that the learner can learn by discovery. Based on Vygotsky's concept of the zone of proximal development, he proposed the metaphor of 'scaffolding'. This refers to the temporary support provided by the teacher to the students so that they can advance in the construction of learning. Once the 'scaffolding' has served its purpose, it is removed so that the learner can continue autonomously and develop the potential of his or her abilities. Teachers can provide detailed instructions at the beginning of learning and then reduce support. For example, in teaching how to operate complex machinery, a technical teacher may begin by demonstrating each step and then the learner performs it independently.

For his part, David Ausubel (1918-2008) developed the theory of meaningful learning based on some Piagetian principles, especially the importance of relating new information to pre-existing information, for which he asked himself the question: what should be understood by meaningful? The idea that knowledge was raised for centuries according to the positivist paradigm as objective, universal and stable, justified that learning was memoristic and arbitrary, therefore, rational without emotions or corporeality, but Ausubel (1978) generated critical contributions by highlighting meaningful learning, which is active by nature and requires the student to assimilate and accommodate the new information in their cognitive structures. This new learning paradigm evokes that when new concepts are related in a way that makes sense to pre-existing cognitive structures, better assimilation and integration of new knowledge occurs, thus ensuring continuity and deepening.

It is therefore an organization of knowledge with a logical, sequential, non-arbitrary sense, which favors the effectiveness of learning, since it is learned from a network of concepts that gradually adds new concepts to expand this

network (Ferreira et al., 2019). This means that new content is better assimilated as it is connected to familiar ideas, following a logical structure that goes from the most basic to the most complex. The premise is that knowledge is transmitted in a way that is potentially meaningful to the learner as well as clear, stable and precise structures that serve as an anchor for the new information (Rodríguez Palmero, 2011). For this reason, TVET teachers are key in the connection between the training process and the demands of the labor market. By training competent professionals, they drive economic growth and social transformation with equity and sustainability. To this end, in Costa Rica, it is promoted that TVET teachers will play a crucial role in the restructuring of the world of work, and the demand for teachers trained in these specific areas. Their contribution in training highly skilled and competent professionals not only benefits individuals, but also drives economic growth and the progress of society as a whole. (Fernández Arauz, 2023, p. 22).

From the perspective of Ausubel and Bruner, the role of the teacher in TVET is to provide clear, complete and sufficient information, identify the levels of progress of each individual, provide activities that arouse curiosity and interest, provide feedback with formative, authentic and participatory assessments, as well as organize the space and materials, and guide each student towards the achievement of their learning (Miranda-Núñez, 2022). This requires careful follow-up to ensure that new concepts are related to didactic experiences and specific skills not only socially but in response to the real work context.

2.3 Technical Vocational Education and Training (TVET)

According to UNESCO (2024), TVET is a fundamental pillar for promoting equity, productivity and sustainability. It also contributes to improving conditions for equal access to education, employment, entrepreneurship, and decent work. This type of training is essential to achieve both individual and societal transformation, as it seeks to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity (Láscarez Smith 2023).

Likewise, Alvarado and Mora (2020) argue that technical education is a tool to train people quickly in order to insert them into the labor market as soon as possible. In this way, its purpose is to achieve the integration of knowledge and skills in a specific technical area, approaching the world of work. All of the above allows people not only to acquire skills, but also to obtain economic resources to improve their social status and obtain a better quality of life.

In this sense, Durán-Pérez and Gutiérrez-Barreto (2021) state that education based on results, competences and skills is necessary for the student population to be able to face the new challenges of the world of work. It is

intended that each student in the educational field develops the necessary competences and learning outcomes expected in a qualification standard for employability. As stated by Cejas et al. (2019), such training is a teaching and learning process that is oriented to people in order to acquire skills, knowledge and attitudes for a suitable performance.

2.4 TVET in Costa Rica

In the case of Costa Rica, according to Camacho (2024), Costa Rican TVET has been understood in multiple ways throughout its historical development, going through various stages—from its initial linkage to the economic system, primarily the labor market, to an emphasis on its comprehensive nature. This evolution has allowed individuals to face the transformations and challenges of modern societies from an inclusive and responsible perspective, enabling them to develop in multiple aspects of life.

The current trend aims to provide knowledge and tools for quick integration into the labor market, foster critical thinking, encourage teamwork, and enhance problem-solving skills. Additionally, it promotes productivity and facilitates actions that support the development of sustainable, digitalized, and entrepreneurial societies (MEP, 2023).

Moreover, Costa Rica has undertaken efforts to integrate its TVET systems. Since 2016, the country has taken on the challenge of implementing Qualification Standards within the National Qualifications Framework for Technical and Vocational Education and Training in Costa Rica (MNC-EFTP-CR). The objective is to integrate education systems while improving the transparency, accessibility, progression, and quality of qualifications to achieve competency recognition, certification across different educational levels, and the provision of relevant, comprehensive, and high-quality training that ensures employability and lifelong learning (Esquivel Porras & Mora Arce, 2024). This framework outlines what an individual must know and be able to do to be considered competent as a result of quality learning (MTSS, 2021).

With the implementation of this Framework, the TVET subsystem is structured with the primary goal of meeting the demands of productive sectors, providing relevant, comprehensive, and high-quality training that enhances employability and contributes to the country's development (Esquivel Porras & Mora Arce, 2024). It serves as an instrument that organizes technical careers into five levels through qualification standards, which are official documents applicable nationwide (MTSS, 2021).

Furthermore, Costa Rica promotes business participation in TVET. For this reason, the Legislative Assembly approved Law No. 9728 on Dual Technical

Education and Training, which defines this educational model as one that allows students to train in two learning environments: a Technical and Vocational Education and Training (TVET) institution and a training company, utilizing its material and human resources to implement this legally regulated modality (Law No. 9728, 2019).

This law establishes that dual technical education and training is a voluntary, comprehensive, practical, formative, continuous, permanent, open, and inclusive educational strategy. It enables individuals to acquire the necessary competencies for integration into the evolving labor market while ensuring quality learning that provides students with a well-rounded education.

It is important to mention that in Costa Rica, institutions that train students in TVET are not only focused on preparing them for the labor market but also on providing a comprehensive education.

At the Costa Rica Institute of Technology, its Academic Model (2020) establishes epistemic principles that drive the transformation of the educational process by promoting meaningful, humanistic, competent, pedagogical, and autonomous learning. This model embraces lifelong education and fosters strategic pedagogical responses to make education a lifelong endeavor, equipping students with the intellectual tools necessary to adapt to the constant transformations of society, the evolving demands of the labor market, and the obsolescence of knowledge.

The aforementioned proposal demonstrates the implementation of meaningful learning, allowing individuals to apply their knowledge in various contexts. Additionally, it theoretically introduces two epistemological approaches: constructivism and the systemic-complex perspective, as they are best suited to the knowledge era (Academic Model, 2020).

On the other hand, the case of the National Technical University (UTN) emphasizes a comprehensive education for students, aiming to foster holistic development—intellectual, emotional, social, physical, creative, intuitive, aesthetic, and spiritual. The goal is to guide education for life and develop professional profiles that respond to the needs of the productive sector and the continuous advancement of technology as drivers of social development (UTN, Educational Model, 2018).

These institutional examples highlight the efforts made to integrate skills and knowledge into TVET education in Costa Rica that go beyond labor market insertion, also promoting personal, cultural, and social growth. It is important to emphasize that the National Policy on Technical and Vocational Education and Training 2023-2033 (MEP, 2023) proposes a framework for coordination and addressing the demand for human talent in productive sectors. Given that the economy has become digitalized, Industry 4.0 is impacting various sectors, and technologies are transforming commercial exchange. As a result, "a competency-based pedagogical mediation is required,

rather than one focused on specific content with a memorization and repetitive approach" (MEP, 2023).

In this sense, the DETCE (2021) states that the MEP has incorporated the competence-based approach from a training perspective, with a direct link to the comprehensive development of individuals. Hence, the new TVET curricula include, in addition to the essential knowledge, the development of specific, generic competences for human development.

> *"The competences for human development refer to the ability to maintain an optimal social relationship (...). They are linked to the ability to achieve an overall vision and involve the understanding, knowledge and sensitivity of people (...) They are acquired during the development of the pedagogical mediation process, in the performance of the disciplinary field and throughout life."* (DETCE, 2021, p. 5).

From the Costa Rican case, the question arises whether the implementation of constructivist approaches in TVET pedagogical mediation promotes reflective thinking? At the institutional level, the MEP has worked on the educational model so that the student not only acquires technical competences, but is able to relate to others and has the capacity for self-learning, self-control, negotiation skills, ethical commitment, as well as assertive communication, ethical commitment, assertive communication, oral and written communication, creativity and innovation, discernment and responsibility, judgement and decision-making, leadership, customer service orientation, critical thinking, proactivity, solution focused approach, and teamwork (DETCE, 2021).

Now, how can constructivist theory be specifically applied to the teaching-learning processes of TVET? In order to achieve this, it is necessary for the curricular offer to include the competences required in the labor market and its environment and, in turn, for these to be mediated by learning outcomes, i.e., what each student is expected to know, understand and be able to demonstrate (Ibarra & Rodríguez, 2010). In this way, constructivist pedagogical mediation would allow the appropriate technique and the development of critical, reflective and divergent thinking from the application of multiple resources, methodologies and procedures (Vélez et al., 2024).

The active methodology of gamification is an example of constructivist application to TVET, because it makes a different use to the traditional classroom, applying the logic of games, such as levels, challenges, rewards, in non-playful contexts, becoming a dynamic, entertaining and motivating space. This creates interactive environments, of theoretical applicability and immediate feedback, typical of social constructivism, which highlights the importance of collaborative learning. In other words, a new orientation towards the teaching of competence learning through constructivism would allow for the incorporation of an integrative approach to knowledge and experience.

Cabreras and González (2006, cited by Hincapié & Araujo, 2022), mention in this respect that competences are the concatenation of pragmatic production knowledge, and knowledge that articulates knowing how to be, knowing how to live together, knowing how to know, and knowing how to do. This approach is developed by Guillén (2008 and Jacques (1996), when they specify that 'education contains a treasure', when they state that learning to know goes beyond the simple transmission of knowledge and involves understanding the world around us and feeling the pleasure of knowing and discovering. Learning to do implies a procedural knowledge that is associated with the conceptual and enables the individual to cope with a large number of situations and to work in a team

Learning to be revalues the personality of the individual, his or her autonomy, capacities and responsibility and opens up the possibilities of an education that values the various potentialities of the learner: reasoning, physical capacity, aesthetic sense, communicative competence. Learning to live together develops understanding of others and enables human beings to live in a community respecting the values of pluralism, solidarity, collaboration, acceptance, and peace.

In accordance with the above, by articulating the different forms of knowledge, the students acquire an integral education through competences of being, knowing, doing and living together. This vision goes beyond the insertion in the labor market and incorporates problem solving, collaborative and integral work, through active and meaningful learning from a constructivist logic. In this way, learning would be understood as an integral, self-planned, self-organized, goal-oriented, practical, and authentic action (Hansen, 2010). This allows the student population to become competent actors, capable of making decisions with social responsibility in the integral macroeconomic context.

3. Discussion

From the theoretical bases exposed from the constructivist approach and its possible relationship with TVET, highlighting its role in the integral formation of students. Now, we will explore how the learning theories of Piaget, Vygotski, Bruner and Ausubel, effectively shape pedagogical practice in Costa Rica, through active and meaningful learning. In addition, we show how interdisciplinary STEAM methodologies promote the development of technical, social and communicative competences.

As mentioned above, TVET, from a constructivist approach, transcends mere job training by integrating human, social, and cultural dimensions into its pedagogical and didactic practices. It becomes not only a driver of innovation,

productivity, and change but also a catalyst for the socio-economic well-being of individuals and communities. This constructivist foundation supports the creation of meaningful and participatory learning environments, where knowledge is built through real-world experiences, critical reflection, and social mediation (Antiche et al., 2021).

The pedagogical focus of TVET, therefore, shifts from passive knowledge transmission to active knowledge construction, fostering learners' ability to problem-solve, adapt, and innovate within their technical and professional contexts. Pedagogical strategies, such as project-based learning, collaborative tasks, and reflective practice, enable students to connect theoretical knowledge with practical applications, ensuring learning that is not only relevant to the demands of the labor market but also responsive to broader socio-economic realities. This balance is critical for developing technical professionals who understand their emancipatory role in improving social and economic conditions through systemic ways of being, thinking, and acting (Hansen, 2010).

From a didactic perspective, the constructivist approach in TVET requires instructional methodologies that integrate real-world scenarios, contextualized tasks, and social interactions as key components of learning. For example, the use of simulations, apprenticeships, and workplace-oriented projects allows students to internalize technical skills while fostering transversal competencies such as critical thinking, teamwork, and ethical decision-making. The social mediation that occurs within these learning contexts further ensures that students not only acquire trade-specific expertise but also develop an awareness of their role as active participants in collective well-being and socio-economic development.

By combining constructivist pedagogy and didactics, TVET emerges as a transformative educational framework that prepares individuals to meet the complexities of the modern labor market while simultaneously contributing to the social and economic advancement of their communities. This dual focus ensures that TVET learners are not only competent professionals but also agents of change, capable of engaging with and improving their realities in an innovative and sustainable manner.

Constructivism is a broad concept and has been formulated, interpreted and applied in a variety of ways. Thus, Piaget’s psychogenetic constructivism and Vygotsky’s sociocultural constructivism has inspired and informed learning theories such as those of Bruner and Ausubel, whose contributions are particularly important for technical disciplines. According to Arias Gallegos and Oblitas Huerta (2014), while Bruner’s theory of learning by discovery is based on action, where the teacher acts as a guide who orients students with as little intervention as possible, Ausubel’s theory of meaningful learning by reception emphasizes perception. In the latter case, the teacher plays a leading role in organizing knowledge in a structured way, starting from the student’s

prior knowledge and adjusting to the subordinate categories of each subject. (p.458).

The successful applicability of Bruner's discovery of learning within TVET requires specific cognitive prerequisites, such as self-regulation, motivation, critical thinking skills, and a well-defined life project. Furthermore, learners must possess effective study techniques and learning strategies that educators are responsible for providing in advance. Without these learner-centered conditions, active discovery-based learning would lack the effectiveness needed for meaningful outcomes.

In contrast, Ausubel's meaningful learning shifts the focus away from individual learner motivation and centers on the learning process itself. Learning is viewed as a constant tension between existing knowledge and progress towards new knowledge, a process conceptually aligned with Vygotsky's Zone of Proximal Development (ZPD). Although learners play an active role in this process, it is the responsibility of educators to plan, guide, and dynamically redirect the progression of learning. This requires versatility and adaptability in the frequent application of diagnostic assessment to incorporate strategies that develop critical analysis, enhance skill acquisition, strengthen research tools, and foster the practical application of knowledge for problem-solving and the integration of experiences and learning (Matienzo, 2020).

Given the nature of TVET, which focuses on the development of competencies aligned with qualification standards, constructivism provides a robust pedagogical foundation for guiding teaching and learning processes towards both active and meaningful learning. This approach enables the application of methods and strategies tailored to the teaching of technical disciplines (González & Suárez, 2024). Active methodologies thus play a central role in the development of competencies, encompassing the knowledge, skills, and attitudes essential for employment, entrepreneurship, and personal and social growth. In this way, TVET programs are well-positioned to meet the evolving demands of a globalized and constantly changing labor market (Hernández & Ruíz, 2024).

However, how can the design of TVET programs effectively integrate cognitive and emotional aspects to foster critical reflection, creativity, and collaboration among learners, particularly in response to the challenges posed by a highly technologized world? In this regard, González (2009) asserts that, for Vygotsky, it is essential to integrate cognition and affect into new units of psychic life. This incorporation of emotional experiences contributes significantly to the effectiveness of the educational process. If learners can apply the training received in the classroom in an active manner, rather than passively memorizing content, then the educational process can truly be considered successful (Matienzo, 2020).

Every TVET teacher is a curriculum designer who unites technical skills with critical thinking to form not only competent workers, but reflective citizens capable of transforming the world with their talents and values. Therefore, the success of the educational process in TVET lies not only in technical knowledge, but in the personal, cultural and social development of its teachers. Social interactions and context are intrinsic components of the learning process, which encourages each student to be a subject in the construction of their knowledge based on their personal, social and emotional experiences, as, for example, is promoted in the educational models of the MEP and the UTN in Costa Rica; linking competences in their study programs not only based on qualification standards and the needs of the labor market, but on the comprehensive development of students for their socio-cultural life.

Likewise, González (2009) considers that the school scenario should be redesigned as a social space for exchanges, reflection, and debate, which favors the participation of the student population based on the diversity of their current forms of psychological organization. Complementarily, Morduchowicz (2023) points out that, in a technified world, data are not enough, but rather it is necessary to understand them through confrontation with reality and their relationship with other information. This requires increasingly complex skills to generate knowledge autonomously and in teams, to awaken astonishment and an open, flexible, innovative mentality, open to change:

> *"The school should teach how to formulate higher-level questions... that demand from students' capacities for reflection, curiosity, research, analysis, inference, anticipation, argumentation, communication, collaboration, evaluation, imagination, creativity and participation. Questions that require analysis of a diversity of arguments and perspectives (...) Questions that demand teamwork, collaboration and communication."* (Morduchowicz, 2023, p. 42)

Indeed, it is necessary to know how to formulate questions that exercise deep and critical thinking, moving away from other people's opinions, from simple and descriptive questions. Well-posed questions foster complex skills such as reflection, analysis, integration of diverse perspectives, and collaborative work.

A clear example of the aforementioned principles can be observed in various teaching initiatives and learning experiences implemented in TVET institutions in Costa Rica. One such case is presented by Soto (2022) in the Revista Arjé of the Universidad Técnica Nacional (UTN), where a project-based strategy was applied during the final examination of the Artes Finales course in the Graphic Design programs in the second semester of 2022. Soto's experience demonstrates that the use of this didactic and evaluative strategy enabled a comprehensive assessment of the learning outcomes achieved by

students. By engaging in this methodology, students were able to apply creativity and innovation, showcasing their technical skills and artistic competencies in a manner that actively integrated theory and practice.

In the same Revista Arjé, a pedagogical mediation strategy for teaching chemistry was published, utilizing constructivism for the design of activities such as discovery-based pedagogy, problem-based learning, and error-based pedagogy. The analysis indicates that this approach promotes active student participation, interprets errors as opportunities for improvement, fosters the habit of self-evaluating work for continuous improvement, encourages analytical thinking, and shifts the paradigm away from rote memorization (Bárcenas Parra, 2023).

The constructivist teaching method has also been applied in studies of applied technology subjects. A particular case is in the field of tourism at the Universidad Estatal a Distancia de Costa Rica (UNED). The focus was on the use of digital applications and the gamification methodology, including the rally technique, to develop innovative teaching strategies that enhance student engagement and active learning during on-site field trips. The discussion of the findings suggests that this methodology fostered the development of transversal skills such as teamwork, problem-solving, and effective communication (Hooper & Osorno, 2025).

Additionally, studies have been conducted on the active knowledge construction methodology in mathematics education through the flipped classroom strategy, which is student-centered. The results of these experiences reveal a strong connection between prior knowledge and new learning, enhancing self-directed, meaningful learning. This, in turn, leads to a deeper and longer-lasting understanding, as well as an increase in attendance at in-person classes (Díaz-Porras, 2025).

The above results highlight why Costa Rica should adopt a constructivist approach in TVET, as its benefits students by enabling knowledge construction through reflection and action. By engaging in this methodology, students were able to apply creativity and innovation, showcasing their technical skills and artistic competencies while actively integrating theory and practice.

The constructivist approach significantly enhances this process, as it fosters active, experiential, and meaningful learning. Another concrete example lies in the application of interdisciplinary methodologies such as STEAM highlighted by Montés et al. (2024). These methodologies embody constructivist principles within the context of TVET by integrating curricular content, tools and equipment, and real-life experiences. The interdisciplinary and collaborative nature of STEAM provides a platform for project-based learning that bridges theoretical concepts with practical problem-solving, fostering teamwork, innovation, and creativity among learners.

In addition to the above, it has been found that there is a higher rate of course failure among students who "pursue a STEM career (72%) compared to

a non-STEM career (49%)" (Fernández Arauz, 2023). The main causes are associated with the role of the teacher, including their pedagogical style, as well as other didactic aspects such as course design, teaching methodology (over 50%), unclear explanations of topics, and evaluations that differ from what was taught in class (over 40%) (Fernández Arauz, 2023). These are relevant data regarding the contributions of applying constructivism with its active methodologies to student retention in their careers.

In contrast to a traditional functionalist approach, which prioritizes the mechanistic transmission of skills, the application of these strategies aligns with Hansen's (2010) vision of constructivist pedagogy. Hansen argues that effective TVET must focus on an action-oriented pedagogy, wherein learners actively construct their knowledge by engaging with real-world tasks and developing the necessary competencies for personal and professional growth. For workers to meet the demands of high-quality production, it is essential to incorporate social and communicative competencies—such as dialogue, teamwork, and collaborative problem-solving—into the core learning objectives (Hansen, 2010, p.40).

By incorporating these pedagogical strategies, TVET learners in Costa Rica are not merely taught to "know" and "do" but also to "be" and "coexist". As Jacques (1996) highlights, the integration of constructivist pedagogical mediation in TVET represents a transformative shift in vocational education. This shift responds directly to the evolving needs of productive systems by fostering the integration of knowledge, skills, and attitudes essential for both the labor market and broader socio-cultural development.

In conclusion, the successful application of constructivist strategies, such as project-based learning and interdisciplinary STEAM approaches, transforms TVET en Costa Rican into a space for holistic formation. It empowers students not only to develop technical expertise but also to cultivate reflective, collaborative, and adaptive abilities, preparing them to face the challenges of an increasingly globalized and dynamic workforce.

4. Conclusions

Based on the above, we consider that it is crucial to create the necessary conditions to develop a laboratory of contextual competencies. This laboratory would consist of a pedagogical environment that simulates dynamic work ecosystems, where students face complex and multifaceted scenarios inspired by real problems. Integrating the constructivist approach and work skills, this laboratory allows us to design experiences that combine problem solving, collaborative work and decision making in changing conditions. Activities vary from simulated emergencies to projects with continuous feedback from

external actors. Through this approach, the student not only applies technical knowledge, but also develops transversal skills, such as communication, adaptability and leadership, comprehensively preparing for challenging work contexts.

The integration of labor competency frameworks with the principles of constructivism in TVET de Costa Rica necessitates the adoption of an action-oriented pedagogy. This approach not only supports the development of technical skills and transversal competencies essential for professional performance but also fosters active, meaningful, and socially contextualized learning. By combining the pragmatic goals of technical training with the reflective and collaborative tenets of constructivism, TVET Costa Rican becomes a comprehensive educational space aligned with the contemporary demands of both the labor market and society.

In this context, active methodologies—such as project-based learning (PBL), problem-based learning, design thinking, the flipped classroom, and cooperative learning—place students at the center of the educational process, enabling them to act as protagonists of their own learning (Arteaga-Marín et al., 2024). These strategies align with constructivist principles by connecting technical knowledge to real and simulated situations. For instance, project-based learning enables students to work collaboratively to identify, design, and solve authentic technical problems, fostering the integration of theoretical knowledge with practical application. This process enhances planning, effective communication, and decision-making in environments that emulate professional realities. Consequently, learning becomes a critical, autonomous, and reflective experience, consolidating knowledge through the interplay of theory and practice in real-world contexts.

Furthermore, the implementation of constructivism in developing labor competencies within TVET Costa Rican requires the adoption of authentic assessments that reflect the needs of contextualized learning. Through challenging tasks such as projects, simulations, and practical experiences, these assessments enable students to demonstrate mastery of their technical skills in real-world situations. This reinforces the constructivist premise that meaningful learning is achieved when theory is applied practically and reflectively.

Constructivist pedagogical strategies in TVET Costa Rica not only facilitate the development of technical and transversal skills but also promote an experiential, authentic, and innovative learning process. This convergence between technical education and constructivism strengthens an educational model capable of addressing modern challenges, preparing professionals who are not only well-equipped to integrate into the labor market but are also critical, reflective, and innovative agents capable of leading processes of active and meaningful social transformation.

It is important to mention that, in order to achieve the aforementioned goals, it is necessary to prepare the teachers who train students in the various TVET institutions in Costa Rica so they can effectively implement the constructivist methodology. Therefore, the implementation of various workshops and teaching materials to train them is essential. Only in this way will it be possible to achieve active and meaningful education for the students.

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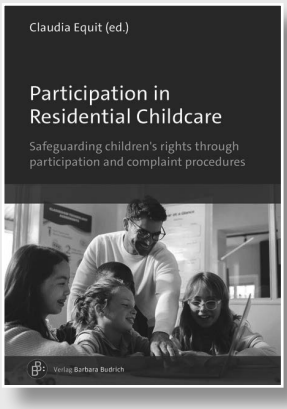

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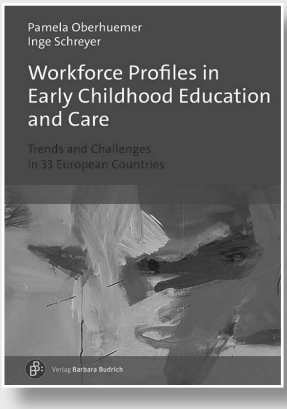

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