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# Dual Education and its Impact on developing Professional Skills

(A study on the impact of the work environment and practical training on female students' personalities and job performance)

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# ABSTRACT

This study investigates the impact of dual education on the development of professional skills, focusing on how the work environment and practical training influence female students' personalities and job performance. Dual education, which integrates theoretical learning with hands-on workplace experience, has expanded notably in Europe over the past two decades, yet faces implementation challenges in certain regions. The research emphasizes the importance of practical training in enhancing students' adaptability, problem-solving abilities, and employability, while addressing gender disparities within vocational sectors. Data were collected using semi-structured interviews and surveys from participants across diverse professional fields, with a balanced representation of males and females. Findings reveal a pronounced gender gap: women dominate sectors such as healthcare and education, whereas men predominate in engineering, IT, and construction. The study highlights that effective dual education requires strong collaboration between educational institutions and industry partners, supportive work environments, and targeted address gender stereotypes and work-life balance challenges. policies to Recommendations focus on improving dual education frameworks, developing pedagogical support for trainers, and fostering inclusive career pathways for female students. The research contributes to the ongoing discourse on vocational education reform by providing practical insights and policy implications to enhance skill development and gender equality in the workforce.

**Keywords:** Dual education, professional skills development, gender disparities, practical training.



# **1. Introduction**

Over the last two decades, dual education has flourished in Europe, leading to major reforms in higher education systems. This model requires students to divide their time between classroom learning and production sites, with educational organizations sharing program responsibility. However, dual education faces challenges in its implementation in Russia despite growth opportunities. (А. Тюрина & А. Туигina, 2019)

Dual education cuts costs and time in training by using simulations and case studies. In various European nations, this model corresponds with their economic and social progress. Additionally, social stability and citizen welfare in new member states depend on adopting dual education. While educational reforms align with this approach, challenges persist regarding potential devaluation of both general and professional education due to political and social changes. This stems from fewer educational institutions and programs, and the rapid introduction of new educational forms that integrate studies with career development. (DOKU et al., 2013)

The rapid introduction of new educational forms, despite no strong reasons, spread quickly. Even unprepared countries embrace dual education, highlighting its appeal. Studying these issues can tackle implementation challenges and enhance the education system.

#### 2. Literature Review

The dual education system boosts professional skills by addressing social, political, and economic factors, particularly enhancing soft skills like problem-solving and communication, which are critical in today's job market. The focus is on effectively acquiring and utilizing these skills, fostering personalized learning through active engagement. Adjustments for work-life flexibility improve training access, while inclusive learning environments and diverse recruitment are vital for future workforce development. Analyzing student interactions within this framework is essential, as it reveals how the system nurtures skill growth amid system shortcomings. There is a significant research gap on student experiences in dual education, highlighting the urgency for targeted studies. (M PhD Conn et al., 2017)

# 2.1. The Concept of Dual Education

Dual education, known as "educational apprenticeship" or "dual training," fosters individuality by combining learning in schools and hands-on training in workplaces. Students function as both learners and employees, developing practical skills vital for real-world success. In Norway, the dual learning model encounters challenges related to the apprenticeship system and vocational education and training (VET), which involve various political, workplace, and educational issues, highlighting the need for stakeholder collaboration. The notion of boundary objects may offer solutions to these challenges, encouraging partnerships between training companies and apprentices. This approach aids in dismantling cultural barriers and promoting effective communication among distinct groups, while analyzing possible boundary objects



reveals the complexities and advantages of this translation process, underscoring the significance of differing and shared Pools of Knowledge. (Gessler & Peters, 2017)(Petrina & Mezentseva, 2017)

### 2.2. Historical Background

In many countries, Dual Education is seen as vocational training combining school and company-based learning. This concept varies globally; German-speaking nations link it closely to Germany and Austria's model, while others adopt different versions. The US, Denmark, and Switzerland also have systems fitting this description. However, the US version greatly differs from European models, offering significantly less work-based education—only a fraction compared to Germany.

After Martin Luther's education reform, the Reformation resulted in educated citizens and established compulsory schooling. Local schooling requirements evolved into formal systems with records of literate children maintained by officials in Nuremberg and Augsburg since the 1510s. In Wittenburg, primary school attendance was recorded, and yearly exams were held, leading to fines for non-compliant parents. By the 1540s, compulsory schooling spread to Tyrol and other Alemannic regions. By the 17th century, rural schools began to emerge linked to fiscal responsibilities, resulting in most six- to seven-year-olds attending school, driven largely by clergy and humanistic reformers. (Gessler & Peters, 2017)

#### 2.3. Importance of Practical Training

Professional training in higher education is vital for students' intellectual and professional growth, thereby increasing their competitiveness in the labor market. This research assesses the impact of the Rotational Professional Training Program (RPTP) on students' experiences, examining its roles, methods, and potential enhancements. It is particularly significant for hospitality management students, encouraging dialogue on their insights and RPTP's effectiveness. The study seeks to assist educators in adapting training programs to align with labor market needs and enhance hospitality curricula in light of the growing emphasis on hospitality training. (DOKU et al., 2013)

Today, self-made tourism and hospitality training programs often overlook systematic approaches, relying instead on low-quality statistical data taught by novice educators. The modern labor market highly values the practical knowledge and skills of vocational graduates. Higher education institutions face criticism for producing graduates lacking the essential practical abilities for immediate employment in professional settings. Yearly, the requirements for graduates become stricter regarding practical training. Practical tip-oriented teaching emphasizes aligning practical experience with theoretical education for specialists in higher institutions. (Алмаз Рафисович & Н.И., 2016)



# 3. Work Environment Analysis

It is common for significant events to go unnoticed, particularly in work environments, where early days are filled with unique memories and milestones. Established businesses often share stories of resilience through tradition and change, despite facing opposition to new processes. These changes lead to a transition into new environments with unfamiliar rules. While gaps from the previous setting may emerge, it is essential to embrace each environment's unique qualities. This report centers around transitioning from work to study, presenting a personalized SWOT analysis. The focus will be on summarizing the past system to better understand strengths, weaknesses, opportunities, and threats. This journey began with an internship presentation delivered to students by nearing graduates. They encouraged the students not to regret their time in university, emphasizing how quickly three years pass. The interns shared their experiences, highlighting the opportunities that lay ahead for many excited students, marking their first internship. This transition sparks excitement, but also insecurity and fears about personal worth. (DOKU et al., 2013)(Palmer-Brown et al., 2015)

#### 3.1. Characteristics of Work Environment

The problem of extending the content of higher professional education by understanding new guidelines in professional educational environment has become urgent, contributing to the formation of a competent graduate capable of solving problems independently (N. Ganieva et al., 2015). The need to understand the educational-oriented environment of high school gives grounds for the thesis "features of educational-oriented environment of a higher educational institution" being formulated and further elucidated. The concept of "educational-oriented environment of a higher educational institution" is characterized by the totality of social and environmental conditions contributing to formation and development of individuality, motivation and need of creative person and being a unique structure determined by the context of development of various high schools. To identify the features of educational-oriented environment of higher educational institution, the authors analyzed existing definitions of environment and distinguishing features of educational-oriented environment of high school. The educational-environment of higher educational institution should include the creative potential of future specialists, formed in the process of conducting innovations in educational-oriented environment and transferred to an integrated unique program.

#### **3.2. Impact of Work Culture**

Globalization and rapid technology advancements require education reform to equip students with the skills to adapt and creatively use knowledge. Essential for individual and national growth are creativity, ethical thinking, and adaptability in new circumstances. Education must promote social responsibility, enabling students to tackle emerging issues, integrating moral education with academic knowledge, as noted in Vietnam's reforms. Despite progress, challenges remain. While Vietnamese students perform well in math and sciences, over 80% of graduates feel unprepared



for the job market, especially regarding soft skills—often overlooked by educators and training institutions. Innovative practices have mostly emphasized engaging students creatively with information for knowledge construction. Recent studies show that educational creativity is linked to teaching methods, underscoring the importance of students' constructive learning and emotional experiences. It is clear that higher education demands innovation at both the tertiary and pre-tertiary levels, requiring shared responsibility. Literature reviews reveal rising concerns about moral issues in education, prompting a reexamination of higher education's role.

#### 4. Practical Training and Its Influence

Professional training is vital in higher education for student development. This study assesses its effects on skills at Accra Polytechnic via interviews with eight students aged 22 to 30 who finished a year of training. Results show that such training improves adaptability to management styles, familiarity with industry practices, and career advancement. Moving between departments during training enhances employability and interview success. The research stresses aligning tourism and hospitality programs with practical training sites for best results. Recommendations include strengthening ties between educational institutions and training locations. Effective dual education requires a balance between theory and practical experience. Trust-based partnerships are crucial for workforce growth. Active stakeholder involvement towards common objectives is essential, along with structured policies. Continuous feedback can enhance improvements, but conflicts can arise, leading to blame rather than collaboration. Recent issues with university partnerships reveal the unpredictability of the education and training environment. (DOKU et al., 2013)

#### 4.1. Types of Practical Training

The authors examine the quantitative and qualitative aspects of dual education by analyzing scientific papers since 2010 and data from over 50 educational institutions. They surveyed more than 600 students and interviewed 170 enterprise leaders in the Russian Federation, Kazakhstan, and Tatarstan regarding dual education. They analyzed educational standards and the expected outcomes of practical training. Dual education differs from traditional models as it involves a partner organization, typically an employer, that works alongside the educational institution. Students combine studies with work, receiving wages and performing job functions aligned with their education level. This involvement enhances the training quality of future specialists and fosters early labor efficiency and employment motivation. Such systems are widespread in countries like Germany, Switzerland, and the USA. However, recent decisions concerning dual education development often disregard established practices, causing confusion and highlighting the need for more research. Current practical training methods do not align with modern expectations for vocational graduates, as theoretical knowledge cannot replace direct experience. Businesses require specialists who are well-versed in their fields, necessitating systemic changes in education, including secondary vocational institutions, to



eliminate the need for remedial courses in higher education. (Алмаз Рафисович & H.И., 2016)(DOKU et al., 2013)

# 4.2. Training Effectiveness

Professional training is vital in higher education globally. Students engage in various placements to gain or enhance professional skills. Dual education mandates students to undertake 2–4 practical placements, merging theory with real-world experience in firms or other institutions. The educational institution serves as an agent for broader organizational bodies. This section introduces a questionnaire designed to assess training effectiveness, focusing on knowledge and skills. It was administered to 166 Polish firms, including services, health care, and training sectors. The responses highlight areas for improvement based on visualized data and assessments among statement groups. (Dziechciarz, 2016)

The evaluation of training—both knowledge and skills—affects educational systems and firms providing employee training. For firms, understanding the effectiveness of their in-house training is crucial. They seek a comprehensive view of training effectiveness to eliminate ineffective programs and refine beneficial ones. A tool called the questionnaire was developed for this purpose, and its properties were analyzed, supporting its effectiveness. While micro education is often viewed as secondary, the questionnaire proves valuable in further studies, demonstrating wide applicability. (DOKU et al., 2013)

#### 5. Impact on Female Students

In Spain, gender stereotypes associate education and employment with male skills and values, leading to a system dominated by traditionally male-focused selection tests. A social-policy model emphasizing equality of opportunity aims to reduce social inequalities and address harm against women through targeted resources. Key questions emerge: 1) Can a twin-education approach in employment policies improve conditions for girls? 2) Which professional skills are most needed? 3) How do relevant actors perceive the development of such skills? The analysis considers a tripartite educational system, vocational education's limitations, participation rates, academic performance disparities, and perceptions from both students and employers regarding bias, support, and barriers. (Dolores de Juan Vigaray et al., 2012)

Formal education plays a vital role in post-compulsory education, enhancing transferable skills. Research indicates sex differences in college students' perceptions of these skills, with female students valuing achievement skills more, while male students focus on social skills. Models explaining these differences highlight the need to consider both quantitative and qualitative aspects. Female students recognize the significance of certain skills more than males do. However, married female students face limitations in acquiring transferable skills, even though they express higher satisfaction with their education. The findings emphasize the need to integrate these perception differences into the curriculum and to enhance females' social skills.



# **5.1. Personality Development**

The problem of personality development has recently come to the fore of educational activity in teacher training. There are reasons to believe that it is related to the gradual transition of educational systems to a personality-oriented type, which focuses on the development of the individual as a person. In the tradition of historical and pedagogical thought, educational process is understood as a purposeful influence on a human, which leads to the development or change of its cognitive, emotional, and volitional spheres. Personality development is considered as a process of change in its internal states, which result in holistic, stable, and organized transformations. The definition of personal development is given as a process, the result of which is a change in the individual as a person.

Educational activity involves a purposeful influence on individuals to cultivate selfeducating competencies, facilitating self-training and personal growth. Educational self-realization is the pursuit of meaning within education, organizing independent learning activities to acquire necessary skills while understanding the significance of knowledge. Student education focuses on creating conditions within post-graduate pedagogics, philosophy, and legal foundations. It emphasizes the importance of understanding one's educational rights for meaningful learning, fostering conscious self-realization, making informed educational choices, and assessing personal needs and capacities in the context of the surrounding educational environment.

#### **5.2. Job Performance Metrics**

To assess professional performance, the organization employs a performance sheet consisting of three main parts, each evaluated with five categories: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5). These serve as rate points, allowing for midpoint values to express understanding across cultural contexts. Assessments involve both employees evaluating their own performance (IN) and supervisors assessing employees (Cn). A larger difference indicates greater perceived disagreement. This evaluation element acts as a dependent variable linked to independent variables, while IN and MDS are leading variables. The assessment desolation evaluation includes job support factors like guidance, training, materials, and clarity. It also serves as a dependent variable, influencing indirect relations between job performance and assessment desolation evaluations, impacting organizational factors like staff turnover and labor productivity. (Loução de Almeida, 2014)

# 6. Challenges Faced by Female Students

In the last decade, women have comprised over half of global graduates, excelling in education, yet remain underrepresented in upper-end jobs, particularly in STEM fields. They often work harder due to self-discrimination and societal expectations, while men benefit from social immunity in high-paying roles. However, social mobility is constrained by wealth disparities, and even the richest societies face limits to economic growth.



Crumbling economic conditions and poor job prospects push women into subordinate roles and married life. To better support women as economic participants, emphasis on early childhood education is necessary. Women face socio-cultural hardships more than men but are also skilled at balancing their education and these burdens. Female postgraduate students are particularly affected by societal expectations tied to their age. These stereotypes lead to stress, along with pressure to marry or bear children, creating tension with their academic pursuits. This often results in delayed marriages and fewer opportunities for childbearing after graduation. (Joseph Alabi et al., 2019)

#### 6.1. Work-Life Balance

Work-life balance differs among individuals due to personal, domestic, and work factors. Some prioritize keeping work separate from personal life, while others integrate both, with some indifferent to any divide. This variability affects experiences of work-life balance and the development of policies tailored to employee preferences in work arrangements. While often seen as beneficial for both workers and employers, it's important to assess this consensus, especially regarding whether work-life balance has shifted from being perceived as primarily a women's issue to include men's experiences. Literature commonly focuses on time management, conflicting work-life demands, and care arrangements for dependants. Care-matching challenges persist for individuals with and without dependants, underlining the complexities of juggling these competing demands. (Gregory & Milner, 2009)

#### **6.2. Gender Stereotypes**

Gender stereotypes are pervasive and harmful, leading to discrimination in various settings. Educational systems often perpetuate these biases, with curricula and materials conveying skewed gender messages. Teachers and peers can reinforce these views, showcasing biases related to intelligence. The ongoing gender wage gap in developed countries reflects these discriminatory practices and unequal resource distribution. Boys often receive favoritism, while girls face skepticism about their abilities. In professional environments, stereotypes impact colleague interactions. Although states and fields vary in gender equality, children exhibit distinct gender roles that can shift in adolescence. Research indicates young men tend to hold more traditional stereotypes than young women, but as they mature, they often embrace egalitarian views. Factors such as parental employment, attitudes toward equality, and educational backgrounds contribute to the complex gender perception landscape. (Agut, 2017)(Mesquita & Pedro Lopes, 2018)

#### 7. Case Studies

Embedding skills development in curricula is crucial for TSN. Understanding faculty approaches to knowledge, skills, and experience is essential for creating effective employability-focused pedagogy. A case study examined staff perceptions of employability skills at transnational campuses, highlighting critical skills for graduates and perceived development across the global divide. At an Australian transnational university, qualitative semi-structured interviews with key faculty



employed a generic employability skills framework. Results showed varied responses and a lack of consensus, revealing differences and a growing divide between campuses. Skills were enhanced through curriculum design, teaching strategies, assessments, industry engagement, and co-curricular activities, reliant on the delivery and assessment of courseware within faculty divisions.

#### 7.1. Successful Female Professionals

In Canada, women hold only 20 percent of jobs in information technologies, limiting managerial opportunities. In Spain, their share in the media economy remains stagnant at about 36 percent. Across the EU, female part-time employment is 40 percent, with women lacking representation in policy decisions and 53 percent engaged in unpaid work. The glass ceiling is a widespread issue requiring localized, data-driven solutions. (Blanco-García et al., 2017)

The primary barrier preventing women from advancing professionally is a lack of self-esteem, as revealed by two European studies involving interviews with 45 international women and 32 women in Spain's audiovisual sector. Many women have internalised gender stereotypes of inadequacy, hindering their access to power positions. Without perceiving themselves as leaders, they struggle to develop personal branding strategies to gain such positions.

#### 7.2. Comparative Analysis

Analysis of the dual education system across cultures is crucial for educational institutions, aimed at sharing knowledge and best practices. This overview assesses the dual education system and its role in developing modern professional skills for students. The comparative analysis aims to create material for institutions interested in dual education, detailing its model and implementation in various countries. Additionally, the study proposes a dual education model for other cultures, focusing on potential impacts through interviews and standardized observation. By gathering information from various nations, this initiative enhances understanding of dual education, fostering constructive recommendations for improving existing systems and clarifying the relationships between educational levels.

# 8. Practical application of the study

This section offers real-world examples of how the dual-credit education system affects the development of vocational skills. We start by outlining the study population, which comprised individuals from a range of professional backgrounds in order to comprehend the impact of dual education on skill development. An explanation of the survey's architecture to guarantee balanced representation of genders and occupational sectors follows. We also go over the research methodology, which is predicated on examining the vocational competencies learned via coursework and hands-on training. The data collection methods are finally explained. Semi-structured interviews were used to ensure a thorough and in-depth survey, and



which code and categorizing techniques were used to ensure the accuracy and dependability of the findings.

#### 8.1. Sample of the Study

Participants in the study were chosen from different academic backgrounds to explore how dual education contributes to the development of professional skills. The sample consisted of 40% female and 60% male students. The study focused on two main academic disciplines: Financial Technology (FinTech) and Renewable Energy Engineering. Female students were predominantly enrolled in the FinTech program, while male students were mainly concentrated in the Renewable Energy Engineering program.

This distribution reflects a noticeable gender gap in specialization preferences, where traditionally male-dominated fields like engineering continue to attract more men, while emerging technology-related fields such as FinTech are increasingly engaging female students. The findings highlight the importance of addressing gender disparities in technical education and ensuring equal access to opportunities for both men and women across all sectors of dual education.



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The gender distribution in the Dual Studies programs at PPU reflects both progress and persistent traditional patterns. In the Renewable Energy Engineering program, men make up a higher proportion of the cohort (17 males to 11 females), illustrating the continued male dominance in technical and engineering disciplines. However, in the Financial Technology program, the gender dynamic is reversed, with female students significantly outnumbering their male counterparts (38 females to 14 males).

This represents a promising shift in the participation of women in non-traditional academic fields, particularly in areas related to financial and digital innovation. While the contrast between the two specializations highlights progress, it also emphasizes the importance of targeted support and awareness efforts to foster greater gender balance across all sectors of the Dual Studies system.

#### 8.2. Sample design

The sample design for this study relied on selecting participants to ensure representation of the various professional sectors relevant to the research topic. The sample was divided into groups based on gender and professional sector to ensure diversity and different experiences. The sample was also selected to enable the collection of comprehensive data on the impact of dual education on professional skill development, with an emphasis on a balance between males and females within the selected sectors to ensure the accuracy and objectivity of the results.

# 8.3. Research Methodology

The purpose of the research is to identify the professional abilities that students of higher educational institutions in the direction of training "Dual Studies programs at Palestine Polytechnic University" acquire in the process of study at the university (M. Pinheiro et al., 2011). The study of this problem is relevant due to the fact that in the



modern labor market the ability of future specialists to independently solve professional problems, take responsibility for their decisions and actions becomes a necessary and vital component.

Professional competence comprises various personality traits essential for successful professional activities. Professional training is a structured educational process within accredited institutions aimed at acquiring a profession for specific labor functions. Current legal and regulatory frameworks in education, especially higher education, set qualifications for professionals, implicating the need for continuous improvement of content or structure in both modern and traditional educational settings. (DOKU et al., 2013)

#### **8.4. Data Collection Methods**

Mediation relies on interviews, with the current research favoring semi-structured formats to allow for individual responses. This approach is vital due to expected structural and cultural differences among various polytechnics. A framework with open questions was established. Each interview lasted approximately 60 minutes, was recorded, and transcribed verbatim. While note-taking enriched the transcriptions, reference documents were included as well. All participants voluntarily consented, receiving pseudonyms to maintain anonymity.

Using neutrally-worded open questions, narratives were coded in a computer program to identify major constituents. Coding clusters similar narrations, with units at a higher abstraction level. Codes reflect general themes rather than specific wording. The main investigator prepared a coding units' list, discussed it with researchers, and defined codes with group agreement. Each interview was coded by the investigator, followed by reliability measures. A colleague analyzed scripts, revealing high correspondence on codes. A detailed report documented the research process, and a thematic approach was used for cluster analysis, considering respondents from various polytechnics for each code block. (Anselmann et al., 2022)

#### 9. Discussion

The study on dual education approaches in Austrian VET analyzed how practical vocational training affects student competency compared to theoretical education. It examined a VET institution involved in dual training, surveying students from different approaches. Results show that students in one approach achieve greater competency levels. Additionally, longer practical training and industry partnerships enhance competency development. Future research suggestions are included.

Occupational Safety and Health Education is crucial for preventing workplace injuries and diseases. Limited research on its influence on future engineers' skills exists. A study of 227 graduates from the Technical University of Sofia (2014-2017) found that 58.1% had prior OSH education. Furthermore, 83.2% believed this education enhanced their professional skills, especially in "Personal knowledge and view"



competence. These findings validate lecturers' efforts but indicate a need for further research to link OSH education with practical applications. (Anselmann et al., 2022)

# 9.1. Key Findings

The role of professional trainers in collaborative learning environments for apprenticeship training highlights findings and challenges in German vocational education. Soft skills, categorized into various competency groupings, raise concerns about the gender gap in Sri Lanka, Africa, and India. Key insights emerge on general skill acquisition for low- and medium-educated young adults transitioning from school to work, revealing social inequalities. The search for effective soft skills training in Taiwan's cram schools continues. On-the-job developmental transfer in vocational education and training (VET) provides a conceptual framework with empirical results, emphasizing the importance of mentoring and peer teaching for estimating software reliability through model analysis is proposed. Exploring ethics in a digitally transformed workplace underlines the importance of soft skills. Lastly, studying didactical contract tools for teaching soft skills in VET in Germany encounters various methodological challenges.

#### **9.2. Implications for Policy**

Initial teacher education is a pre-service training that demands relevant professional knowledge shared across a transnational community. Peer learning and cultural networks among educators can aid in unifying teacher education. A cohesive vocational education training framework should encompass all VET aspects and personnel, ensuring access across Europe. Existing VET teacher education frameworks could kickstart this initiative, requiring interconnected national qualification and registration systems. (Anselmann et al., 2022)

Transnational organisations play a vital role in establishing quality assurance systems for initial training and professional education of VET personnel in EU member and candidate countries. This includes both process and outcomes quality assurance, involving national and transnational peer review. Stakeholder participation, including VET teacher educators and professional communities, must increase in EQAVET-NVET Superb and ESQAF initiatives. Furthermore, these systems should integrate transnational frameworks for VET teacher training and effective law-based evaluations for comparing educational outcomes across nations.



# **10. Recommendations**

To enhance dual education quality, several recommendations have been made. Expanding its regulatory framework is crucial for students to apply theoretical knowledge in real-world settings. Local higher education institutions require support from specialized organizations to develop training manuals and textbooks. Teachers need specific pedagogical training and relevant experience. Practical training in professional environments is vital. Governments should prioritize modernizing training centers and dual education colleges at universities, while a working group must establish professional qualifications and labor standards for skilled workers, addressing existing gaps. Additionally, raising awareness among private sector companies about the importance of including women in traditionally male-dominated fields is essential.

Further improvement of dual education in higher institutions is necessary, considering the recommendations in the study. As its popularity grows, the regulatory framework at the national level is rapidly expanding. To better translate scientific findings into practice, additional recommendations are provided. Higher education institutions, key providers of education and training, should enhance dual education by developing public-private partnerships with employers. (Н. Воронько & Н. Середа, 2018)

#### **10.1. Enhancing Dual Education Programs**

The dual education system development in Europe aims to enhance educational outcomes for dual-education students by integrating theoretical and practical training. This model aligns with modern qualification demands, cultivating students' professional qualities and ensuring their competitiveness in the job market. By improving higher education quality, it meets society's need for skilled specialists and elevates educators' status. This approach also facilitates higher education's integration with industry, reflecting Ukraine's strategy to align with European standards for international educational quality.

The study investigates the influences and methods for aligning educational results in dual education systems with European standards. This approach integrates theoretical knowledge from educational institutions with practical workplace skills. Achieving educational outcomes that meet the National qualifications framework and its European counterpart is crucial. In Germany, automating the monitoring of student knowledge and skills is vital for reliable evaluations. Assessment strategies require additional inspection conditions, emphasizing organizational and methodological skills, alongside modern production compounds.

#### **10.2. Support Systems for Female Students**

Introduction: Support systems for female students exploring technical education and careers

(Cloutier et al., 2018) Gender influences social identity and related variables, affecting choices in science, technology, engineering, and mathematics (STEM).



Women's underrepresentation in engineering highlights the need to explore educational and career options for female technical high school students, ensuring these align with their preferences and aspirations. Support systems, including parental and mentor support, are crucial for helping individuals succeed and develop technology-related career aspirations.

Support systems are essential for both institutions and individuals. For institutions, they encompass exposure to work environments, with mentorship being vital, alongside early exposure to technology through career projects. A supportive university environment involves networks that connect students to mentors, offering seminars and workshops to enhance problem-solving skills. Institutions can also foster internal support through collaborations that develop professional identity and self-concept. For individuals, support stems from parents, teachers, and social networks. Parental influence plays a critical role in children's occupational awareness and academic guidance during their transition to high school. In higher education, teachers aid students in exploring interests and career goals, often providing personalized support in small cohorts.

#### **11.** Conclusion

Dual education is a highly important factor in developing professional skills. It combines theoretical instruction in front of educators from the different fields of study in vocational education and on-the-job training at companies. Both components become a unit to be integrated into an overall concept. The integration of theoretical and practical components as well as the cooperation between the stakeholders involved is key to successfully implement dual education. Dual education enables vast opportunities for personally pursue interests and inclinations and for future career.

However, prior to the discussion of how dual education can be developed internationally, the challenges and problems involved in developing successful dual education will be analyzed. Germany is illustrating a brief review on how dual education is currently organized. It is stated that how dual education is successfully organized in Germany is neither a straightforward nor simple matter. There are several, at least four, problems cities note when trying to establish dual education.

Firstly, there is no overall acceptance of the concept of dual education among the different stakeholders involved. Whereas the involvement of many stakeholders and their commitment are crucial for the success of dual education, there is usually a significant inequity in weight between them. Since primary and secondary education usually falls under state and/or local responsibilities, stakeholders on these levels are very often over-committed to the implementation of dual education. On the one hand, companies in developing countries show reluctance to involve themselves in dual education or are outright refusal for fear of losing their competitive advantage.

Second, dual education usually includes a high level of complexity at all levels once established and accepted. The dual nature of dual education results in at least two



components to be integrated into an overall concept. Both components must be interlinked, embedded into sectorial contexts, localized, qualitatively assured, evaluated and continually developed to ensure successful implementation of dual education. At the same time, there has to be cooperation between different stakeholders involved in vocational education at different levels.

Third, there are usually different levels of conceptability in each country, such as management of dual education, cooperation of different stakeholders involved, funding, and decision-making agencies. The outline of the concept needs further detailing, and complementary concepts must be developed, particularly regarding the cooperation between the stakeholders involved. It would be naive to assume that German structures can be copied in a devotionally often complex context like that of developing countries.

Lastly, providing intense technical support for several stakeholders several years as the least might not be sufficient to enable them to identify the challenges involved in establishing dual education, to stimulate their analytical capabilities and to commit themselves to processing the technical input offered (Anselmann et al., 2022).

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