1.1. CONCEPTUAL FOUNDATIONS OF VOCATIONAL EDUCATION QUALITY: THE EVOLUTION OF APPROACHES WITHIN THE CONTEXT OF HUMAN CAPITAL TRANSFORMATION

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This chapter investigates the conceptual foundations of vocational education quality amidst contemporary challenges. It analyses the genesis of the "education quality" category, evolving from academic canons to a dynamic model that satisfies stakeholder needs through conditions, processes, and outcomes. The transformation of educational orientations is examined through the lens of human capital theory evolution, where cognitive flexibility and lifelong learning capacities remain priorities. The study identifies a mutual determination between investments and quality standards as a guarantor of the economic efficiency of professional training. The analysis demonstrates that the consolidation of the competence paradigm facilitates a transition toward assessing actual learning outcomes. Finally, the research outlines strategic development vectors for a holistic educational ecosystem – namely digitalisation, inclusivity, and foresight – underpinned by next-generation occupational standards and independent professional qualification assessment tools.

Keywords: *human capital, inclusivity, competence paradigm, occupational standards, digitalisation, vocational education quality*

The establishment of the conceptual foundations for vocational education quality is inextricably linked to the long-term evolution of scientific perspectives on the role of humans in economic processes, originating from the works of the classical school of political economy. In the 18th and 19th centuries, William Petty, Adam Smith, David Ricardo, and John Stuart Mill established the methodological foundation for understanding that a worker's skills and abilities significantly drive national wealth growth (Duga, 2025). Specifically, Adam Smith equated the acquired abilities of society members with fixed capital, noting that expenditures on education and vocational training constitute real investments subsequently recovered through higher labour productivity and corresponding earnings. This approach initiated the consideration of vocational education quality through its capacity to generate economic value, where a specialist's training level serves as a metric for their future efficiency. The subsequent stage of scientific thought, represented by neoclassicists Alfred Marshall and Irving Fisher, deepened this investment approach by viewing education as a

national investment that ensures long-term returns not only for the individual but for the state as a whole (Khimchenko & Liekh, 2019).

A profound conceptual revolution in defining the parameters of specialist training quality occurred in the mid-20th century, when Theodore Schultz and Gary Becker formalised human capital theory (Table 1.1).

Table 1.1. Evolution of Human Capital Content in the Context of Educational Demands

Historical Stage	Key Theorists	Interpretation of Education's Role	Quality Priority
Classical (18th–19th c.)	A. Smith, D. Ricardo, W. Petty	Education as a means to increase labour productivity	Acquisition of basic labour skills
Neoclassical (Early 20th c.)	A. Marshall, I. Fisher	Education as a long-term investment in a "national asset"	Alignment with occupational standards of the era
Formal (Mid-20th c.)	T. Schultz, G. Becker	Education as a source of capitalised individual income	Economic efficiency and ROI of training
Contemporary (Early 21st c.)	Knowledge economy representatives	Education as a foundation for cognitive flexibility and adaptability	Lifelong learning, digital, and soft skills

Schultz substantiated the proposition that human capital is a form of capital because it serves as a source of future earnings or satisfactions, and it is "human" because it constitutes an integral part of the individual. He defined human capital as the stock of knowledge, skills, experience, health, abilities, and energy inherent in every individual, proving the economic expediency of vocational training expenditures (Yalovyi, 2015). Within this context, education quality began to be interpreted as a process of asset accumulation, where every educational component must aim to increase the future specialist's market value. The genesis of this theory confirms that educational system development is a logical result of recognising the decisive role of intellectual resources in economic progress, where quality acts as a guarantor of the return on invested resources. The contemporary state of human capital theory is characterised by a transition from the quantitative accumulation of knowledge to the qualitative transformation of competencies amidst digitalisation and the shift toward a knowledge economy. Given the rapid obsolescence of knowledge, the human capital concept emphasises the importance of continuous lifelong learning. Thus, investments in vocational education are now directed not only toward obtaining primary qualifications but also toward

fostering an individual's adaptive potential, enabling them to remain competitive in the Industry 4.0 era.

The further development of human capital theory necessitates expanding its analytical framework, particularly by integrating competence-based, behavioural, and innovative approaches. Researchers focus primarily on cultivating so-called "meta-competencies" – the capacity for self-organisation, digital literacy, emotional intelligence, communication, and interdisciplinary interaction. These characteristics are increasingly viewed as key determinants of human capital efficiency, defining a worker's readiness to participate in high-tech production processes and adapt rapidly to innovative changes. Scientific literature emphasises that cultivating such universal competencies becomes possible only through the creation of a sophisticated educational ecosystem oriented toward the integration of formal, non-formal, and informal learning.

Simultaneously, modern human capital assessment models are gradually shifting from traditional econometric approaches toward complex indicators that account for the quality of the social environment, access to digital infrastructure, and levels of innovative activity. Approaches based on measuring the "creative" and "intellectual" potential of the population allow for a deeper investigation into the relationship between educational investments and economic development, highlighting the importance of social capital, network interactions, and trust. In this context, human capital is increasingly viewed as a dynamic system developing through interaction with technological, cultural, and institutional factors, while its efficiency is determined by the degree of human participation in innovative processes and social progress. Analysing the quality of vocational education requires a clear definition of this category, which modern scientific paradigms view as a multifaceted phenomenon encompassing philosophical, social, and economic aspects. Education quality is an integrative characteristic certifying an educational institution's ability to achieve established goals in specialist training while meeting defined state standards and stakeholder expectations. It is represented through the quality of life within society and acts as a recurrent phenomenon, where each stage of educational activity influences the next, forming a holistic result. According to international approaches, notably UNESCO and ISO (Centre for Academic Ethics and Excellence in Education "Ethos", 2019), quality in vocational training involves not only the final result (learner knowledge) but also processuality – the functioning of academic programmes, staffing, the state of material and technical facilities, and the internal educational environment.

The economic dimension of vocational education quality focuses on the degree to which actual learning outcomes align with market conditions and the investment attractiveness of a specific educational programme. This implies that quality is defined as the most effective use of human and material resources to prepare a specialist capable of immediate integration into production processes. Here, a mutual determination arises

between funding levels (investments) and quality standards: high standards require appropriate resource provision, while an effective quality assurance system guarantees the return on these investments based on high personnel qualifications (Sydorchenko, 2023). Furthermore, quality is viewed as the satisfaction of the needs of all educational service clients – the state, employers, and the learners themselves – where each possesses unique criteria for evaluating the outcome. Additionally, the economic approach to interpreting vocational education quality emphasises the importance of mechanisms for evaluating educational investment efficiency, including graduate employment rates, professional productivity, and the alignment of cultivated competencies with regional labour market needs. Thus, the economic dimension of vocational education quality transitions from formal resource control to strategic management of educational outcomes, where the priority is ensuring long-term socio-economic impact from educational activities.

The pedagogical demarcation of the quality concept concentrates on internal processes of professional personality development and the implementation of the competence approach. In this context, quality is a set of core competencies, rights, and responsibilities necessary for professional activity, as well as the alignment of learning goals and outcomes at the individual institutional level (Oliferuk, 2020). It encompasses the quality of applicants, scientific and pedagogical potential, the information-educational environment, and the management system. The internal quality assurance system holds particular significance, as it must include mechanisms for maintaining academic integrity, monitoring, and periodically reviewing educational programmes to update them according to labour market needs. Educational activity quality is therefore a dynamic category, constantly adjusted based on feedback from the production sphere and scientific research.

To deeply understand the structure of vocational education quality, it is expedient to consider the comparative characteristics of descriptors in the National Qualifications Framework (NQF) and the European Qualifications Framework (EQF), as they define the benchmarks for measuring learning outcome quality (Table 1.2).

The NQF surpasses its European counterpart in scope because, in addition to standard categories such as “knowledge”, “skills”, and “responsibility and autonomy”, it contains a “communication” descriptor, highlighting the importance of a specialist's capacity for social interaction and collaboration. This indicates the national system's orientation toward fostering holistic human capital, where socio-communicative skills are an integral component of professional quality. It is vital to emphasise that comparing the NQF and EQF has not only conceptual but also practical significance for ensuring vocational education quality, as descriptor alignment determines the opportunities for academic and professional mobility for learners. The European Qualifications Framework, built on the principle of learning outcomes, focuses on transparency and qualification comparability across EU countries,

while the NQF simultaneously serves as an internal regulator and a tool for harmonisation with the European education area (European Commission, 2023b).

Table 1.2. Comparison of Quality Descriptors in the NQF and EQF

Descriptors	EQF Interpretation	NQF Interpretation	Impact on Assessment
Knowledge	Theoretical and/or factual	Cognitive mastery of theory and practice	Fundamental qualification base
Skills	Cognitive and practical	Ability to apply knowledge to tasks	Operational readiness for work
Communication	(Included in other descriptors)	Capacity for interaction and data exchange	Social integration of the specialist
Responsibility and autonomy	Ability to act independently	Capacity for self-control and decision-making	Professional maturity and agency

The presence of the additional "communication" descriptor in the NQF strengthens the emphasis on social competence development, which is particularly crucial for modern vocational education where effective interaction, teamwork, and the ability to present results are key elements of professional success. In this context, the NQF structure demonstrates a drive toward a comprehensive assessment of vocational training quality, where technical, cognitive, and social components of professional competence are viewed as interconnected and equally important.

The consolidation of the competence paradigm in the vocational education system marked a transition from evaluating the volume of material taught to assessing the learner's actual achievements. Competence is viewed as a dynamic combination of knowledge, understanding, skills, abilities, values, and emotions that ensures the successful execution of tasks in real-life and professional situations. Unlike the traditional system oriented toward knowledge accumulation, competence-based learning directs learners toward working with information and mastering skills that make them competitive in the labour market (Grechyna, 2024). The role of the vocational educator in this model is transformed: they cease to be a mere transmitter of knowledge and become a facilitator of the process of independent skill mastery, which is critically important given the high intensity of technological change.

The transformation of human capital content in the digital age necessitates including new skill groups within learning outcomes: digital competencies, soft skills, and meta-skills. In an environment where routine tasks are automated, the value of empathy, leadership, teamwork, and critical thinking increases, as these qualities are the most difficult to

algorithmise. Human capital now includes the ability to work effectively in distributed teams and utilise digital platforms for collaboration in hybrid production processes. Thus, the quality of vocational education is evaluated by the degree to which a learner develops interdisciplinary thinking and the ethical use of technologies, specifically artificial intelligence. The modern paradigm of vocational education development is based on the concept of an educational ecosystem – a dynamic network of interconnected actors, resources, and technologies that ensure conditions for lifelong learning (Khomenko et al., 2023). The quality of such an ecosystem is defined by its integrity and capacity for synergy between the academic sector, business, and the state. Key components of a vocational institution's ecosystem include infrastructure (computer equipment, STEM labs), digital pedagogy (teacher competence), digital content, e-services, and transparent management based on qualitative data. Only through the harmonious development of all these elements is it possible to create a safe and effective digital environment that meets contemporary challenges.

Digitalisation acts not merely as a technical tool but as a leading organisational and pedagogical condition for improving vocational education quality. It enables the decentralisation of access to knowledge, ensuring equal opportunities for all citizens, and increases management efficiency through the use of big data for strategic decision-making. The digital transformation strategy for vocational colleges involves transitioning to paperless administration, utilizing systems like “Diia” and “Mriia”, integrating with the Unified State Electronic Database on Education (USEDE), and developing adaptive educational platforms (Guraliuk, 2023). A critical aspect is the quality of Educational Technology (EdTech) design (Foster et al., 2023): these must not only automate processes but also stimulate new teaching methodologies – personalised, authentic, and student-centred instruction. To systematise the factors determining the quality of the educational ecosystem in modern conditions, it is expedient to identify its key components and indicators (Table 1.3).

An indispensable vector for the development of the modern educational ecosystem is inclusivity, which guarantees access to high-quality vocational education for all students, including those with special educational needs. Digital technologies, such as artificial intelligence and augmented reality, create unique opportunities to adapt content to the individual physical, cognitive, or sensory characteristics of learners. The implementation of inclusive practices facilitates social integration and allows for the maximisation of society's human potential, preventing the “loss” of talent due to environmental accessibility barriers. The quality of inclusive learning in vocational education is determined not only by the presence of ramps but also by teachers' preparedness to work with assistive technologies and the creation of inclusive digital content.

The foresight (predictability) of vocational education quality becomes a critical success factor in conditions of uncertainty. It consists of the system's ability to anticipate

future labour market needs and prepare specialists whose skills will be relevant not only today but also in 5–10 years (Murashenko, 2024).

Table 1.3. Components and Indicators of College Educational Ecosystem Quality

Ecosystem Component	Key Quality Indicators	Expected Human Capital Impact
Infrastructural	Availability of STEM labs, high-speed Internet	Technological literacy, resource access
Pedagogical	Level of teachers' digital and soft skills	High teaching quality, innovative methods
Content-related	Adaptability of programmes, micro-qualifications	Knowledge relevance, learning flexibility
Socio-inclusive	Barrier-free access, use of assistive IT	Equal access, social justice
Data-driven Management	Use of Big Data, administrative transparency	Evidence-based decisions, debureaucratisation

The predictive quality model in vocational institutions is based on analysing technological development trends and fostering students' readiness for constant knowledge renewal. This requires high proactivity and mobility from teachers, along with the ability to model pedagogical processes considering probable future scenarios. Thus, foresight becomes a management principle where quality is evaluated not by compliance with past models but by the graduate's capacity for successful life activity amidst post-war recovery and global transformations (National Agency of Ukraine on Civil Service, 2023).

Expanding on the institutional conditions for ensuring vocational education quality, emphasis should be placed on the transition from purely academic criteria toward professionally-oriented tools for verifying professional qualifications. Modern occupational standards serve as the foundation for developing high-quality vocational education programmes. As of early 2024, the development of next-generation occupational standards has become a continuous process, facilitating rapid adjustments to training content (Ministry of Education and Science of Ukraine, 2023a). This ensures the validity of educational outcomes: information obtained during the analysis of learning task performance must contain reliable data for predicting future professional success. The use of occupational standards enables a transition toward assessment based on specific labour functions, making graduate training quality as close as possible to industrial realities. Independent assessment of professional qualifications acts as a tool for external quality confirmation, neutralising the subjectivity of the vocational institution. The implementation of professional qualifications awarded by accredited qualification centres allows for the recognition of skills acquired

through non-formal and informal education. Qualification centres conduct learning outcome assessments following established procedures. These encompass theoretical and practical testing, ensuring the issuance of certificates recognised on the national labour market. The National Qualifications Agency plays a vital role in this process as a tripartite body, acting as a guarantor of transparency and procedural compliance with state requirements.

European integration is a powerful stimulus for modernising vocational education quality assurance systems in Ukraine. The Copenhagen Process, initiated in 2002, became the foundation for strengthening European cooperation in vocational education and training, promoting transparency and mutual recognition of qualifications. The evolution from the Copenhagen (Council of the European Union, 2020b) to the recently adopted Herning Declaration 2026–2030 demonstrates a shift in emphasis toward digital and green transformation, social inclusion, and increasing the attractiveness of vocational education. The Herning Declaration defines vocational education as the engine of Europe's future competitiveness, highlighting the need for measurable learning outcomes and strengthened educational system accountability. The declaration emphasises that vocational education should not be a "secondary choice" compared to higher education but should become a modern sector preparing specialists for a high-tech economy (Council of the European Union, 2025). In this context, the shift toward "VET-S" policies (vocational education and skills development) reflects the broader needs of the adult population for continuous retraining and upskilling throughout their careers. Ukraine, possessing a stable National Qualifications Framework aligned with the European Qualifications Framework, demonstrates readiness for the fair and transparent recognition of qualifications, which is critical for the cross-border careers of specialists. Accordingly, centres of vocational excellence are becoming network structures to support national reforms based on best practice exchange, innovation implementation, and close cooperation with the business environment (Radkevych, 2025b).

In summary, it can be asserted that vocational education quality in modern conditions is an integral category combining the economic expediency of human capital investment with the pedagogical effectiveness of the competence approach. The evolution from static knowledge to dynamic competencies, the development of digital and inclusive educational ecosystems, and the orientation toward occupational standards and independent assessment are the strategic vectors defining the viability of the educational system. The transformation of human capital in the digital era requires not only new technical solutions but also a change in the very philosophy of vocational education quality: it must be proactive, oriented toward the needs of the individual, and capable of ensuring the sustainable development of society amidst global challenges. The establishment of such a quality model is a guarantor of economic security and social progress, where vocational education becomes the true foundation for forming the nation's intellectual and professional potential.