



DIGITAL LITERACY, DIGITAL COMPETENCIES, AND DIGITAL SKILLS: A CONCEPTUAL FRAMEWORK FOR VOCATIONAL EDUCATION IN THE DIGITAL ERA

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Abstract

The rapid developments in digital technologies have meant that labor market needs are altered significantly; therefore, vocational teacher education strategies require a rethinking of competency frameworks. Three different yet distinct constructs: digital literacy, digital competencies, and digital skills are taken up in this paper together with their different theoretical considerations. The aim is to illustrate the extent to which digital competency contributes to job skill sets — a key need in digital workplaces today. Employing theories from connectivism, constructivism, cognitivism, and humanistic pedagogical approaches, the study also defines a hierarchical conceptual framework which organizes the relationships between these constructs. Digital literacy is defined as the basic understanding of digital tools and platforms and digital competencies as critical thinking, ethical reasoning and skills for situational application; digital skills are the practical technical skills involved in certain actions. Utilizing international standards, such as the EU DigComp 2.1, and the EU DigComp 2.2 guidelines, such a framework serves to clear operational definitions that are contextually appropriate to vocational education. The analysis shows that digital skills development is effective when we take a comprehensive approach which addresses these three dimensions together. This conceptual clarification provides



vocational education institutions the theoretical base for developing coherent curricula and strategies, designing and evaluating a student's success in the modern labor market and for ensuring that current and future students are prepared to enter the digital ecosystem.

Keywords: Digital literacy, digital competencies, digital skills, vocational education, conceptual framework, DigComp, labor market readiness, pedagogical theory.

Introduction

The modern labor market is undergoing unprecedented economic changes, facilitated by rapid development of digital technology. Within this context, vocational education institutions face a critical challenge at once: preparing students with competencies that go beyond technical knowledge to including comprehensive digital capabilities. Digital literacy, digital competencies as well as digital skills have become necessary foundations of vocational training. They represent far more than mere supplemental items of study; they are essential for making future graduates employable and successful in the job market as well (Dai, 2024). Despite an enduring acknowledgment in both professional literature and educational praxis of the importance of these concepts, there still exists significant conceptual confusion. The terms 'digital literacy', 'digital competencies' and 'digital skills' are frequently used interchangeably, obscuring their meanings and the unique pedagogical approaches each calls for. Such ambiguities in terminology are practically problematic: curriculum designers are unable to clearly set goals, methods of assessment have weak theoretical foundation, and mismatch between educational objectives and job market is still problematic.

In the years since digital literacy gained its initial conception, it has been conceptualized in several senses. Simply put, it is actually about the ability to search, assess and represent information on digital platforms. But modern definitions no longer just mean basic computer skills but also an understanding of digital content and how to read digital content and what it entails. Dai (2024) indicates that digital literacy in pursuit of personal as well as professional development entails the management of information, communication, and



problem solving with technology and digital tools, for achieving personal and professionally oriented objectives. This concept has shifted to include elements of critical thinking. According to Lopushniak and Mylyanyk (2023), digital literacy involves locating, assessing, producing and communicating information digitally. This covers learning and building on technical competencies as well as the ability to critically assess the reliability of information and digital security skills. Dharmayanti et al. (2024) also advocate that for digital literacy in vocational contexts, so students can effectively engage with digital learning environments and resources.

Structured approaches to digital literacy have emerged in international frameworks. The European Union's DigCompEdu and DigComp 2.2 frameworks contain systematic guidelines tailored to address digital competencies, focusing on communication, cooperation and technological learning (Casadomet, 2024; Mattar et al., 2022). It is now widely recognised that these frameworks became the reference points in the development of the vocational education programs around the world.

Digital skills are the particular abilities needed to employ digital devices and digital media and software services. These are described as tangible, practical knowledge in terms of operating systems, programming and digital content. These are the key skills that serve as the concrete infrastructure for the development of digital literacy and competencies. Digital skills are more than just technical knowledge; they are the ability to problem-solve and think critically. Modern frameworks acknowledge that digital skills involve capacities to quantify and predict skill gaps in developing fields, tailored to the requirements of digital transformation in the workplace (Audrin et al., 2024). These skills are crucial for vocational education students working in fields that require specialized expertise and experience.

Digital competencies are a wider concept which are the knowledge, skills and attitudes of the user of digital technology to act responsibly and effectively. Competencies rather than discrete skills in the field encompass cognitive, social and ethical characteristics for critical cognitive engagement of critical and ethical digital texts. The European Union's DigComp 2.1 and 2.2 frameworks have defined digital competencies from low to high level and outlined them as a framework for vocational education programs (Mattar et al., 2022). These



frameworks remind us that digital skill, and therefore competency, should encompass technical skill, digital ethics, legal considerations, personal data protection, and digital citizenship. For vocational education candidates, digital competencies remain crucial for adapting to the labor market, especially for the creative and responsible use of digital tools in professional lives. Casadomet (2024) highlights how European frameworks provide comprehensive guidelines for developing these competencies across different educational levels.

Based on four theories, we provide the basis of the process of digital skills in vocational context. Connectivism is all about learning through digital networks and social ties—which is an important feature when working in networked learning environments. This attitude is in line with humanism's belief in personal cognitive development as well as emotional well-being. Thus it calls for educating people on an individual level at all times in order to cater to each person individually as possible. Cognitivism is concerned with learning with an eye to mental processes, and with digital gadgets providing students the tools to retain and deal effectively with information. Constructivism also promotes experiential learning and social interaction, which can help people develop digital skills using collaborative tools and virtual simulations.

This article addresses this conceptual gap by systematically analyzing these three constructs in terms of how they come together within a theoretical structure that is entirely designed for vocational education purposes. This research leverages four significant pedagogical theories: connectivism, constructivism, cognitivism, and humanism - to offer the theoretical grounding to explore how digital capacities emerge and how can they be practically developed in vocational programs. The scope of this study is threefold, firstly providing clear operational definitions of digital literacy, digital competencies and digital skills; secondly establishing the hierarchical and interrelated relationships between these constructs; and finally, the theoretical integration of this conceptual framework into the current framework of pedagogical theory to give vocational educators a theoretical and practical guidance for designing digital capability programs.

2. Methods

This paper used systematic literature review process and the concepts analysis approach to inform the framework to be proposed. The study took three stages: searching of the literature, comparison of construct definitions and construction



of the framework. Literature was identified in academic databases, including Scopus, Web of Science, and Google Scholar and searched for terms used which included: 'digital literacy'; 'digital competencies'; 'digital skills' and 'vocational education'. Peer-reviewed articles published between 2018 and 2024 were selected as the focus of the review, with greater emphasis on conceptual papers, studies into framework development, and empirical studies in the context of vocational education.

Comparative analysis was conducted to systematically extract and compare definitions, dimensions, and proposed relationships between the three constructs. Framework synthesis synthesized results with existing pedagogical theories to create operational definitions and a hierarchical model suitable for vocational education use. It was analyzed by reference of the established framework with international standards in particular the European DigComp frameworks and validated.

3. Results

3.1 Operational Definitions

Based on comprehensive literature analysis, the following operational definitions are proposed for vocational education contexts:

Digital Literacy is a framework for the description of digital literacy and as well as to the definition of 'digital literacy' in education contexts. This includes as much as the fundamental application of technology, to critical reasoning, ethical problem-solving and analyzing - synthesizing digital content. It is indispensable for obtaining personal, academic and professional targets.

Digital Competencies refer to the ability to possess, with time, cognitive, social, and ethical skills for critically, creatively, and responsibly interacting with digital technologies beyond technical skills. That entails critical thinking, creative problem-solving, and creative uses of digital tools.

Digital Skills are described as the practical and technological skill that is appropriate for using digital products, software, and platforms. Those capabilities are managing/developing, programming, creating and writing content, and also using communication tools. These are the fundamental skills required for digital literacy and competencies to fit the modern jobs market.

3.2 Comparative Analysis

Table 1 presents a comparative analysis of the three constructs across key dimensions.

Dimension	Digital Literacy	Digital Competencies	Digital Skills
Description	Basic understanding and safe utilization	Critical and responsible application	Technical task execution
Difficulty Level	Basic/Foundational	Broad and Contextual	Specialized and Technical
Scope	Information search and utilization	Ethical use and creativity	Technical device operation
Focus Areas	Information management, communication, critical evaluation	Adaptation, collaboration, critical assessment	Coding, data analysis, content creation

Table 1. Comparative Analysis of Digital Literacy, Competencies, and Skills

3.3 Hierarchical Relationships

The examination indicates three constructs are hierarchically dependent. Digital literacy provides a basis of knowledge of basic concepts. Digital competencies build on this foundation to help students learn to use digital technologies effectively, responsibly and critically. Digital skills are the applied technical competencies that derive from, and underlie, literacy and competencies. We can characterize the relationship as follows: Digital literacy facilitates core conceptualization of information, promoting basic understanding and safe use of information. Digital competencies build on this foundation and also help responsibly and critically develop applied skills. Digital skills, or technical competencies, evolve and consolidate literacy and competencies. The constructs are mutually reinforcing; holistic digital capability building must simultaneously address all three dimensions.

3.4 Key Components for Vocational Education

With the framework analysis, we extract five critical areas of elements which are pertinent in the digital skills development during vocational education.

Technical Proficiency: A core aspect of effective digital tool usage is the development of technical skills in relation to digital transformations, digital



information management, and digital content management (Audrin et al., 2024).

Communication Capability: Digital skills include the capacity to communicate and cooperate in digital environments which necessitates effective information transfer, teamwork and communication aided digital tools.

Problem Solving and Creativity: With the use of digital technology, students require problem solving and creative skills including digital content development, and learning to apply digital tools such as software solutions to creative solutions.

Information Literacy: Students need to develop their understanding of and ability to manipulate information provided on digital forms, such as digital information platforms, which needs the use of proper and ethical methods for use and manipulation of information technology (Lopushniak & Mylyanyk, 2023).

Information Security and Ethics: The knowledge of ethical digital technology use and ethical information security will be fundamental. Students are required to learn to keep personal information confidential, to protect the confidentiality of information and to behave responsibly with it.

4. Discussion

The proposed framework makes several important theoretical and practical contributions to vocational education. First, the framework helps to clarify conceptual categorization by providing conceptual differentiation between digital literacy, competencies, and skills that has historically hindered curriculum and assessment design. Such differences matter, then, are not just semantic, but have meaningful implications for pedagogical approaches – digital literacy needs exposure and familiarization, digital competencies are contextually situated and require application opportunities, and digital skills need hands-on practice and repetition.

Second, the hierarchical model is useful for guidelines on the sequence of the curriculum. Vocational programs should give students foundational digital literacy in the form of the basic skill sets they will need in order to advance forward into competency development and specialized skill training. This sequence is also consistent with well-known learning theories, and specifically the zone of proximal development theory, where students experience an increase in complexity through scaffolding, moving towards more sophisticated levels of digital capability.



Third, the amalgamation of four pedagogical theories provides a strong theoretical basis to varying pedagogical approaches. Connectivism upholds networked and collaborative learning; constructivism supports project-based and experiential learning; cognitivism guides digital information management instruction; humanism ensures individual student attention and holistic development. Hence, the framework allows for methodological pluralism responsive to varied learning outcomes as found in vocational education.

The framework also responds to the major dilemma of vocational education's relevance to labor market needs. The framework therefore provides employers with a flexible approach that describes their digital capabilities using work-relevant vocabulary and is capable of providing graduate students with valid indicators of employability when in development of curriculum. The focus on technical skills and ethical, responsible digital practice mirror today's employer demands moving beyond a superficial technical competence.

There are a number of limitations that should be noted. The framework is mostly conceptual and therefore needs empirical verification in form of implementation studies. Adaptation of the framework to any specific national or regional context might need to be considered if differences exist as to access and use of digital technology; depending on the cultural setting and context. Furthermore, the speed at which digital technology changes indicates that the concrete content of each construct will have to be updated routinely with the structural connections remaining relatively stable.

This paper identified a conceptual framework that distinguishes digital literacy, digital competencies, and digital skills in vocational education contexts. The framework provides well-defined operational definitions, hierarchical relationships, and theoretical frameworks by the synthesis between connectivism, constructivism, cognitivism, and humanistic pedagogical theory. Digital technologies are part of the bedrock of the modern labor market, so it is crucial for students to adapt accordingly. This process of developing digital skills in vocational education institutions guarantees the positive experience using new technologies while leading to the development of their analytical and problem-solving skills as well as innovative methods.

Digital literacy, digital competencies, and digital skills are key dimensions of student development in one area or another - both personal and professional. By



integrating digital tools and educational technologies into vocational education, the prepared workforce in industry is competitive and up to date appropriate. On the basis of theories like connectivism, humanism, cognitivism and constructivism, the active involvement and creative activity for students in their studies expand. This in turn provides an opportunity for the promotion of labor market competitiveness, enhancement of employment opportunities, and contribution at large. As a result, vocational education institutions will have to establish/deploy strategies that will help make digital technologies effectively integrated into their teaching and learning. This is where pedagogical practices and the application of new educational technologies play a crucial key role and it is the pedagogical orientation and new technological innovations are key in said evolution. For future studies the empirical validation of the framework through implementation studies, development of assessments corresponding to the three constructs, and identifying the optimal pedagogical strategies relevant to each domain of digital capability development must be pursued.

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