CHAPTER II
LITERATURE REVIEW

The literature review will explain the theoretical frameworks underpinning the research, synthesize findings from prior studies, and provide a critical analysis that informs the development of the theoretical foundation. Additionally, this section will identify existing gaps or inadequacies within the current literature that the dissertation research aims to address.

2.1. The Essence of Vocational Education

The word vocation is commonly used in adult education writings. It discusses what the field is about, the meaning of work, and how they relate (Dawson, 2005). The concept of vocation is derived from the Latin term "*vocare*," which translates to "to call." The meaning "calling" refers to a deep inner push that motivates each person to live in a way that feels aligned with a divine purpose or God's plan for life survival (Scholes, 2010). The two aspects of a “vocation” or “Calling”, namely the call and response, exhibit variability in their distinct qualities and interrelationship across Christian history. A substantial part of the variety can be linked to the demand for a vocation to bridge the gap between divine calling and an evolving environment. The concept of vocation uniquely bridges both transcendental and immanent dimensions.

Vocational education has a broad range of disciplines in the educational field and has different formations, institutions, and systems in every country or region (Greinert & European Centre for the Development of Vocational Training, 2005). For instance, Germany's *Fachschule* maintains distinct relationships with two types of vocational schools: *Berufsfachschule*, which are full-time secondary vocational institutions, and *Berufsschulen*, typically part-time schools that apprentices attend within the dual education system. The German vocational education system has also become famous for its dual vocational education (Deissinger, 2015). In certain countries, such as Australia, Britain, New Zealand,

and Finland, vocational education is organized through a unique tertiary system, albeit in different ways. Conversely, vocational education is often regarded as an extension of the broader educational system in other countries like Switzerland, Germany, Australia, and Taiwan. Nonetheless, there have been instances in specific countries and at particular times when the vocational education sector has been intentionally separated from other educational sectors. This separation was often justified on the basis that the vocational education sector needed to align more closely with industry requirements than other educational sectors (Billett, 2011).

Vocational education is shaped by various philosophical perspectives. According to Woyessa in his dissertation, the prevailing philosophy in vocational education guides its objectives and direction. The philosophical foundation is crucial for vocational education, as every aspect of its development should align with the educational goals, truths, and needs (Woyessa, 2020). There will be synergy between philosophy, educational theory and its implementation fields to achieve goals that enhance human dignity and educational values (Buheji, 2020) . Philosophically, there are three types of vocational education goals, namely: (1) essentialism, (2) pragmatic, and (3) pragmatic reconstruction. Triangle of Orientation of Vocational Education Philosophy (Moodie, 2002).

The fundamental aim of vocational education is to align its objectives with the demands of the business and industry sectors. The curriculum is structured and developed in a sequential manner, with the necessary infrastructure requiring training and experience that reflects real-world industrial conditions. Furthermore, the pragmatic approach of vocational education seeks to help individuals prepare for a fulfilling life. The curriculum focuses on problem-solving, critical thinking, and is rooted in foundational knowledge. The goal of Technical and Vocational Education and Training (TVET) is to evolve workplaces into democratic and learning-focused organizations, taking a more proactive stance rather than merely maintaining current workplace practices. It advocates against employment-related

injustices and inequalities. Vocational education facilitates education and training reforms that aim to enhance flexibility, innovation, and productivity in skills required by the global labor market. This involves training and retraining personnel and prospective job seekers across all economic sectors, both formal and informal. To develop the necessary characteristics for the workforce, vocational education must foster a society grounded in scientific, technological, and engineering principles, with a focus on application in future industrial contexts. In response to the ongoing reforms in vocational education, it is essential to prepare for 21st-century changes, so educational approaches must be adapted to include 21st Century Skills. A blend of pragmatism and essentialism philosophies is seen as an appropriate approach for the future of vocational education (Verawardina & Jama, 2019).

The complexity of vocational education in the field of education has raised several awareness and is linked to the development of technology, changing workforce demands, and the evolution of policy frameworks. These systems are confronted with several challenges, particularly regarding funding, curriculum development, and the integration of technology. Nevertheless, these challenges simultaneously create opportunities for innovation and growth within vocational education (Qin, 2024; Y. Wang, 2024a). Several previous studies showed that there are concerns that create challenges for the development of vocational education. A study by Gumabay in 2024 emphasized several challenges, including ethical considerations, the need for educators to develop AI competencies, significant investments in infrastructure, and the balance between AI-assisted instruction and nurturing meaningful teacher-student relationships (Gumabay et al., 2024). These elements are crucial for vocational education in fields such as IT, healthcare, or even social science subjects.

The advancement of vocational education systems encounters considerable obstacles, especially in terms of curriculum development and creating effective

connections between industry and education. Tackling these issues calls for a comprehensive strategy that highlights incorporating contemporary skills, aligning educational programs with industry benchmarks, and enhancing collaborations between educational institutions and industry partners (Vasilev, 2024; Yu & Tsao, 2024). By implementing innovative approaches, improving hands-on teaching, and encouraging sustainability, vocational education can more effectively equip students for the requirements of the contemporary job market. Therefore, mastering digital technology has become a crucial skill for vocational education teachers in the current educational field for several decades and has started rising over the past five years (Rahmawati et al., 2024). Digital integration enhances teaching effectiveness and prepares students to tackle the challenges of the digital age, especially in industry. Vocational education also explores the significance of digital competence, its impact on teaching efficiency, specific digital tools utilized in vocational training, and the essential digital skills required across different industries (Y. Wang, 2024b). These studies serve as the foundational basis for this research, which aims to investigate the role of digitalization in vocational education thoroughly and to analyze the competencies essential for success in this domain.

2.2. Lifelong Learning in Educational Settings

Lifelong learning represents a dynamic and increasingly significant paradigm within the contemporary global educational landscape. As articulated by the European Commission, the foundational competencies requisite for lifelong learning emphasized a diverse synthesis of knowledge, skills, and attitudes (Zuo et al., 2025). These competencies must be cultivated through a variety of learning modalities, including formal, non-formal, and informal educational experiences. This multifaceted approach highlights the importance of ongoing personal and professional development in an ever-evolving world (European Commission, 2019). The eight essential competencies encompass literacy, multilingualism,

including competencies in mathematics and science, digital skills, personal and social competencies, citizenship, entrepreneurship, and cultural awareness.

In a recent systematic review by Thwe and Kálmán, lifelong learning is described not just as the process of acquiring knowledge, but also as an intellectual, emotional, and social transformation that individuals undergo throughout their lives (Thwe & Kálmán, 2024). This learning encompasses formal dimensions, such as school education, informal aspects like work experience, and non-formal components, including community-based training. The study also emphasizes the methodological gap in lifelong learning research and underscores the necessity for a more integrative approach in curriculum design and competency development within educational institutions. In the realm of vocational education, lifelong learning is particularly vital, as the demands of a rapidly evolving job market necessitate the continuous updating of knowledge and skills.

The principle of lifelong learning in education serves not only to enhance individual competitiveness in the job market but also to promote inclusive and sustainable social development (Cefalo & Kazepov, 2018). The European Commission underscores that education must prepare individuals to navigate complex and unpredictable changes by fostering cross-sector skills such as critical thinking, collaboration, and digital literacy. This indicates that lifelong learning goes beyond being merely a policy slogan; it represents a strategic approach that should be woven into the fabric of the education system, curriculum, and teacher professional development (European Commission, 2019). As pivotal agents in the educational process, teachers play a crucial role in nurturing a culture of continuous learning within both school environments and broader learning communities. Consequently, enhancing teachers' capacity for ongoing learning and professional growth—particularly in their ability to adapt to technological advancements—should be an integral part of the institutional support system, encompassing

continuous training and the recognition of informal learning experiences (Tømte, 2015).

The concept of lifelong learning has emerged as a fundamental cornerstone in advancing human-centered sustainable development. Another study highlights that global transformations—including technological advancements, the COVID-19 pandemic, and globalization—have altered the dynamics of the workforce, necessitating ongoing skills development (Webb et al., 2022). UNESCO and International Labour Organization (ILO) stress the importance of reforming educational systems to become more inclusive, reflective, and empowering, equipping individuals to navigate the challenges of work and life meaningfully. In this context, lifelong learning transcends the notion of merely extending formal education; it represents a comprehensive approach to enhancing human capacity. A concrete illustration of this is provided by Lim (Lim et al., 2024), who analyze the *SkillsFuture* program in Singapore as a national policy initiative that promotes skills-based lifelong learning. This program illustrates how continuous learning can enhance workforce competitiveness, support adaptation to technological disruptions, and foster personal growth within the ever-changing industry and labor market landscape. Both studies emphasize the crucial importance of integrated lifelong learning policies in equipping individuals—educators included—to adapt and succeed in the digital age.

The evolution of information and communication technology (ICT) has significantly transformed the educational landscape, necessitating that educators possess adequate digital competencies, particularly in the realm of lifelong learning. A study conducted by Garzón-Artacho et al. (2021) indicates that while educators involved in continuing education exhibit fairly strong digital communication and collaboration skills, their proficiency in creating digital content and information literacy remains relatively underdeveloped (Garzón-Artacho et al., 2021). This points to a pressing need for ongoing advanced training. Similarly, Petrenko and

Valasik (2020) highlighted the necessity of adapting vocational education curricula to align with technological advancements, as digital skills are essential for fostering flexible learning, personalizing education, and enhancing employability. Additionally, a study asserted that the integration of digital competencies into vocational education curricula must encompass not only technical skills but also ethical considerations and critical reflection on technology usage (Jiaxia et al., 2025). Collectively, these studies underscore the urgent need for the development of digital competencies among vocational educators to ensure that learning remains relevant and responsive to contemporary demands.

In the realm of vocational education, the principle of lifelong learning holds significant importance due to the dynamic and technology-driven nature of the work environment it seeks to address (Kersh & Huegler, 2018). Educators in vocational institutions are not only responsible for imparting technical skills to their students but also serve as role models in demonstrating learning flexibility and the ability to embrace change. This is where the significance of digital competence in the lifelong learning journey of vocational teachers comes into play—encompassing not just proficiency in educational technologies but also a comprehensive understanding of advancements within digital-based industries (Mbagwu et al., 2020). Lifelong learning is the foundation that encourages teachers to continuously assess, update, and enhance their competencies independently and institutionally, ensuring alignment between curriculum, technology, and industry demands (Stephennbillett & Editors, 2017). Consequently, the digital competence framework developed in this study focuses on pedagogical elements and positions lifelong learning as a fundamental value underpinning all facets of competence.

2.3 Digital Competence in Education and of Educators

Digital competence is described as a comprehensive set of knowledge, skills, attitudes, and critical understanding that empowers individuals to effectively,

safely, and responsibly utilize digital technology in various aspects of life. Building on Paul Gilster's initial concept from 1997 (Gilster & Glister, 1997), digital competence extends beyond mere technical skills; it involves the ability to think critically about digital information, including how to access, evaluate, and apply it judiciously. The European Commission further developed this notion through the DigComp framework (2017), which identifies five key areas: information and data literacy, digital communication and collaboration, digital content creation, digital safety, and digital problem-solving (Redecker, 2017). In the educational context, digital competence serves as the foundation for teachers to design, implement, and reflect on technology-enhanced learning processes that are meaningful, inclusive, and pertinent to the challenges of the 21st century.

The terms digital literacy, digital competence, digital skills, and digital ability are commonly explored in academic discussions, but their definitions and differences are often open to interpretation. While these concepts are frequently used as synonyms, they have specific meanings and consequences for education, policy, and practice (Gilster & Glister, 1997; Santos & Gomes, 2023). This portion examines the theoretical foundations of each term, how they relate to one another, and the subtle distinctions that differentiate them.

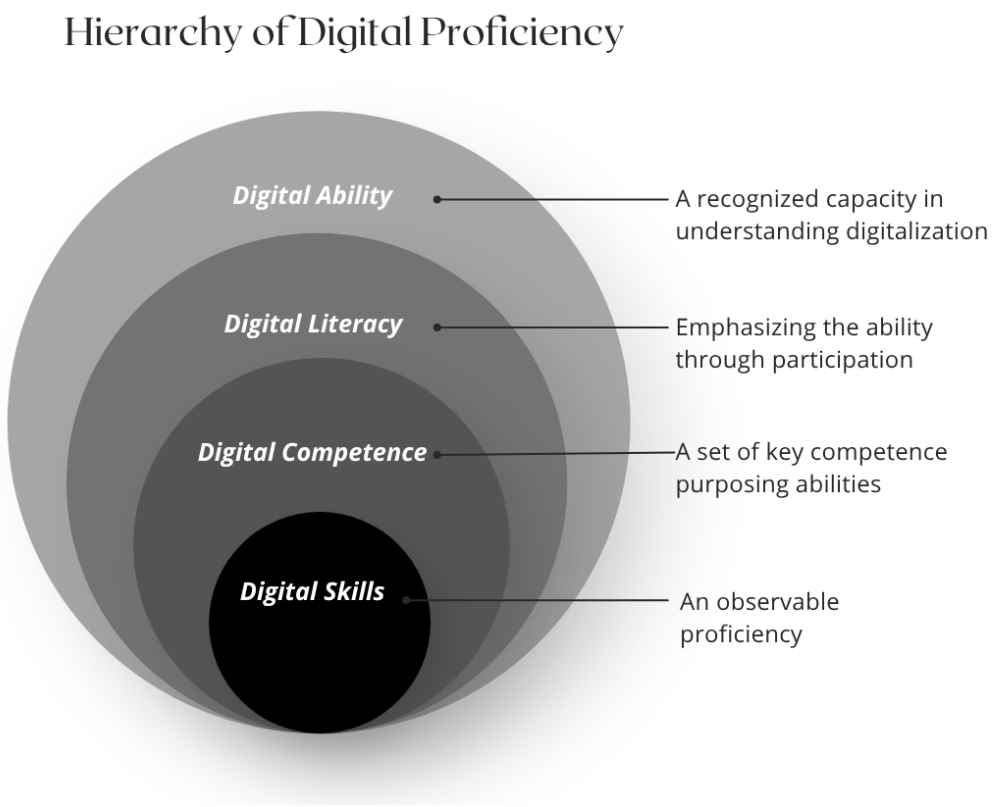

Figure 2.1 Different terms of the digital competence concept

Digital ability constitutes a comprehensive concept that describes an individual's capacity to be acknowledged as digitally proficient. It serves as an umbrella term for three interrelated constructs: digital literacy, digital competence, and digital skills. Digital literacy, a widely recognized term, is defined as the technical capability that an individual must sustain through continuous evaluation, active participation, and consistent practice. Furthermore, digital competence is defined as a set of skills that an individual should master to reach the competencies. Finally, digital skills refer to observable proficiencies that can be demonstrated through practical application.

"Digital competence" is increasingly recognized as a crucial factor for participation in education, employment, and other facets of social life. In our e-permeated society, which is becoming progressively unpredictable and uncertain,

possessing such competence is not only essential but also a means to enhance one's understanding and awareness of the world (Martin & Grudziecki, 2006). Digital literacy, digital skills, and digital ability are often utilized as interchangeable terminology to denote the overarching concept of digital competence. This term encapsulates the requisite knowledge, capabilities, and proficiencies necessary to effectively navigate and engage with digital technologies and environments (Zhao et al., 2021). The framework established by the European Commission includes various essential components that constitute digital literacy. These components consist of the ability to access and evaluate information, communication proficiency, content creation capacity, awareness of safety protocols, and the skills necessary for effective problem-solving within digital environments (Ferrari et al., 2013).

Literacy in information and digital mastery refers to an individual's ability to acquire information through digital methods and effectively process it, typically sourced from the internet. Information literacy and digital competence represent two distinct yet interconnected facets of this broader concept. Essential competencies include browsing, searching, and filtering information, which a person should be proficient in. Furthermore, individuals should be able to cite sources found online properly. Another crucial component of digital literacy is communication literacy, which involves engaging with technology, sharing content, and participating in online activities through social media and other platforms. It is essential to recognize that content development is a crucial competency in digital literacy, playing a vital role in today's digital landscape.

This discussion pertains to the materials presented regarding content production. There are four essential aspects of content development that one must understand—and, ideally, master—to achieve a competent level of literacy in this field. These aspects include programming, copyright and licensing, content creation, and integrating and elaborating existing content. Individuals are expected to engage in the content creation process, starting with content preparation and

concluding with the delivery of the final product. Various media tools can be utilized in this process, including video editors, photo editors, applications, online quizzes, and other forms of interactive media. Additionally, digital security is emerging as a critical competency within the realm of digital competence. Table 2.1 gives an overview of the existing frameworks.

Table 2.2 Frameworks of Digital Competence

No	Framework name	Institutions	Authors	Years	Components
1	DigEuLit	European Commission	Allan Martin	2006	- Digital competence **(Level 1)** - Digital usage **(Level 2)** - Digital transformation **(Level 3)**
2	DigComp 2.0	European Commission	Anusca Ferrari	2013	- Information - Communication - Content Creation - Safety - Problem-solving
3	DigComp 2.1	European Commission	Stephani Carretero	2017	- Information and data literacy - Communication and Collaboration - Digital content creation - Safety - Problem-solving
4	DigCompEdu	European Commission	Christine Redecker	2017	- Professional engagement - Digital resources - Teaching and learning - Assessment - Empowering learners - Facilitating learners' digital competence
5	Common Digital Competence Framework for Teachers	INTEF (Instituto Nacional de Technologias Educativas y de Formacion Del Profesorado / Institute of Educational Technologies and Teacher training)	Ministry of Education and Cultures, Spain	2017	- Information and data literacy - Communication and Collaboration - Digital content creation - Safety - Problem-solving
6	A Global Framework of Reference on Digital Literacy	UNESCO	Nancy Law	2018	- Information and data literacy - Communication and Collaboration

No	Framework name	Institutions	Authors	Years	Components
	Skills for Indicator				- Digital content creation - Safety - Problem-solving
7	Digital Literacy Skills Framework	Australian Government	Philippa McLean	2020	- Digital technologies and systems - Access, organize, present, and problem-solving - Personal and community - Workplace and employment - Education and training
8	Digital Comp 2.2	European Commission	Riina Vuorikari	2022	- Information and data literacy - Communication and Collaboration - Digital content creation - Safety Problem-solving
9	TAWOCK Conceptual Model (Arifin et al., 2020)	International Journal of Evaluation and Research in Education	Arifin et al	2020	- Technology Knowledge - Andragogy Knowledge - Work Knowledge - Content Knowledge

Protecting data, devices, and digital identities is the three most critical aspects of digital security that individuals should understand. Additionally, the ability to solve problems is the final competency outlined in the digital competence framework. To cultivate problem-solving skills, individuals must be capable of addressing digital issues that may arise from technical errors, technology updates, innovations, or new technologies. In addition, several institutions and commissions worldwide have developed frameworks for digital competencies. Notable examples include those from the National Institute of Educational Technologies and Teacher Training (INTEF) in Spain (2012), the United Nations Educational, Scientific and Cultural Organization (UNESCO) (2008), the General Office of the Central Committee of the Chinese Communist Party and the General Office of the State Council (2017), the Ministry of Education of China (2018), the European

Commission (2006 – 2017), and the Australian Government (2020) (Zhao et al., 2021).

2.4. Technology Integration Models in the Teaching Process

Mishra and Koehler came up with the idea of TPACK in 2006. It combines three types of knowledge: technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK). These three types of knowledge are then combined into technological content knowledge (TCK), pedagogical content knowledge (PCK), and technological pedagogical knowledge (TPK). This idea of interconnection isn't new in education, but it is still important and has an impact (Mishra & Koehler, 2006). The TPACK framework emphasizes how important it is for teachers to understand these related fields comprehensively. By doing this, teachers can improve their methods of education and create a more stimulating and productive learning environment. In the end, this all-encompassing strategy improves student outcomes by preparing teachers to handle the challenges of teaching in the digital age.

Historically, the primary focus of teacher education has been on teachers' content knowledge (Shulman, 1986). In the past few years, there has been a clear shift toward focusing only on pedagogy, which focuses on general teaching methods that often ignore the details of the subject matter, which hurts content competence (McDiarmid, G. Williamson, 1989). Different types of education have mostly focused on either content knowledge (C) or pedagogical knowledge (P). Shulman (1986) made a big contribution to the conversation about what teachers should know by coming up with the idea of pedagogical content knowledge (PCK). He said that research in these areas has often seen subject knowledge and teaching as separate areas. This exclusion has led to the creation of teacher education programs that focus on either subject matter or teaching methods. Shulman

suggested that the two should be looked at together to see how they are connected, which led to the idea of PCK.

PCK is the point where content and pedagogy intersect. It goes beyond viewing content and pedagogy as separate entities. PCK combines knowledge of the subject matter and teaching methods to understand how different parts of a subject are organized, adapted, and delivered. Shulman (1986) noted that knowing the subject and general teaching strategies is essential, but it doesn't encompass everything that makes a good teacher. He introduced the term "pedagogical content knowledge" to describe the complex ways teachers think about teaching specific subjects, including "the ways of representing and articulating the subject to make it easier for others to understand" (page 9). Teachers must focus on both subject and pedagogy simultaneously to succeed. They need to “embody the content components most pertinent to its teachability" (p. 9). The key idea of PCK is modifying the subject matter for teaching. This occurs when teachers examine the subject and develop multiple ways to explain it so students can understand.

Pedagogical knowledge involves teachers' understanding of effective teaching and learning methods, with or without technology, that aim to achieve educational purposes, values, and targets. An educator with deep pedagogical expertise understands how students acquire skills and develop positive cognitive habits and attitudes toward learning (Koehler & Mishra, 2009). The necessity to enhance vocational education and training pedagogical practices emerges for several fundamental reasons. As the TVET sector is tasked with achieving more ambitious government objectives, the necessity for sophisticated pedagogical approaches to accommodate the diverse needs of students from various backgrounds becomes increasingly critical (Nepembe & Simuja, 2023). The connections between the vocational sector and the workplace render it more intricate than academic instruction, as it entails collaboration with different clients in diverse contexts and across multiple learning environments. Consequently, the

job of the TVET educator has transformed to cultivate industrial alliances and collaborate with specialized service providers.

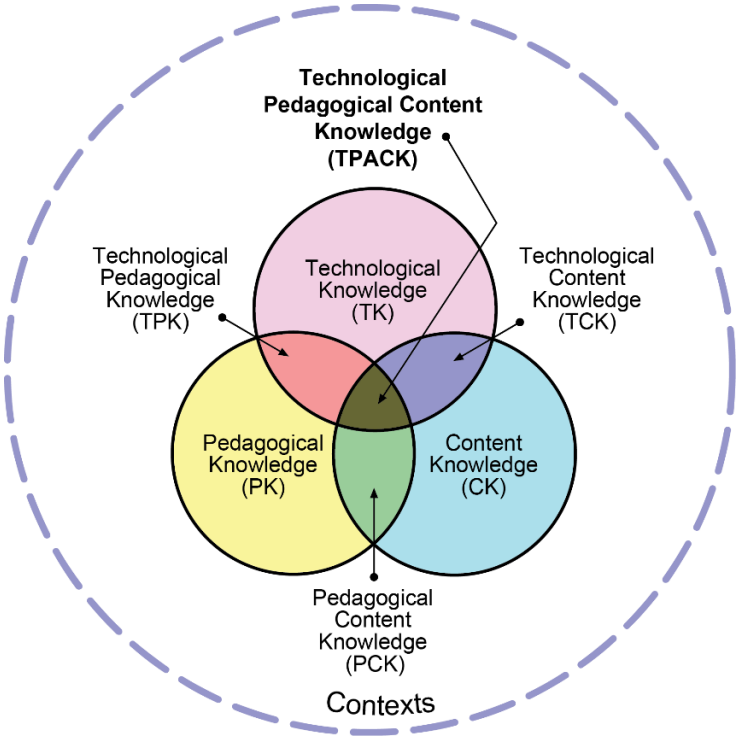

Figure 2.2 TPACK Model (Koehler, 2006)

There have been several existing developed TPACKs for vocational education, which several researchers have previously studied. The TPACK model is broad, whereas the requirements for vocational education vary significantly across different fields. TPACK exhibits a deficiency in rigor when implemented within the vocational domain. The TPACK framework emphasizes the integration of technology knowledge, pedagogical knowledge, and content knowledge within the learning context. Nevertheless, work objectives or proficiency do not materialize when this concept is implemented in vocational

education. A philosophical perspective on vocational education might utilize the idea of work as a reference point. Furthermore, TPACK employs a pedagogical framework, whereas vocational education pertains to adult education (V. C. X. Wang, 2012).

The first one is from Arifin in 2020, who developed the TAWOCK model. The four main categories are referred to by academics as TAWOCK. The domain is established with the following comprehension. Technology Knowledge (TK) refers to the ability to utilize technology as a tool to facilitate learning. Technology facilitates the simplicity of acquiring knowledge in both theory and practice. The subsequent component is the Andragogy Knowledge (AK), which delineates how educators instruct competency-based, work-oriented learning materials. Learning employs an adult-oriented methodology that fosters independence through approaches such as Problem-Based Learning (PBL), Project-Based Learning (PjBL), constructivism, and cooperation. Furthermore, Content Knowledge (CK) constitutes another significant aspect to be acquired in accordance with the expert competency unit. The final domain is job Knowledge (WK), which pertains to the nature of the job to be undertaken. Each of the four domains exhibits integration with the neighboring domain. Thus, sub-divisions emerge, specifically Andragogy Content Knowledge (ACK), Technology Andragogy Knowledge (TAK), Technology Work Knowledge (TWK), and Work Content Knowledge (WCK). Researchers elucidate the relationship between domains and subdomains through the creation of four circles that represent dominance and mutual integration (Arifin et al., 2020).

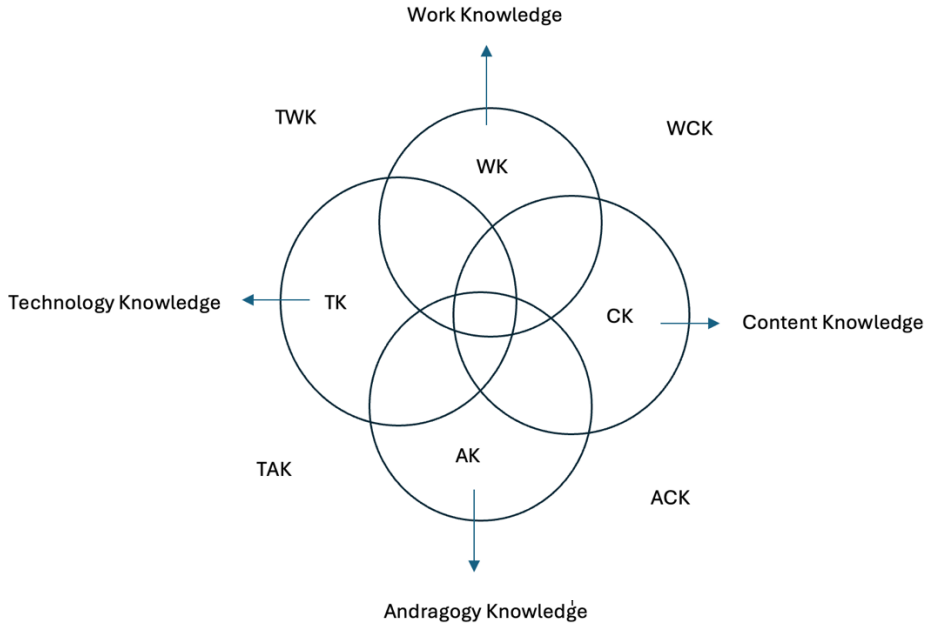

Figure 2.3 TAWOCK Model (Arifin et al., 2020)

The second new proposed model is N-TPACK from Carmen in 2023. N-TPACK is based initially on TPACK, but this study modified it by adding N as the "*Networking and Collaborative Knowledge*". This model emphasizes how educators build their competence in networking and collaborating with industry, or linking and matching in this technological era. Emerging digital technologies are transforming work and business processes and our methods of information acquisition, learning (m-learning), communication, and consumption, resulting in significant implications for technological, economic, and social interactions. Industry 4.0 pertains to advancements in industry as well as the intelligent interconnection and collaboration among individuals, machines, and objects through information and communication systems, which are applied purposefully in novel work and manufacturing processes.

During this Fourth Industrial Revolution, information technology and software elements are progressively integrated with mechanical and electronic devices through data infrastructures such as the internet. As work environments,

technologies, work modalities, and customer engagement methods evolve, the competency requirements for employees and, consequently, the expectations for vocational education and training (VET) also transform (Euler & Severing, 2019). Due to its connectivity to the employment sector, Networking and Collaborative expertise (NK) increasingly assumes a significant role in TVET as a distinct aspect of vocational educators' professional expertise. This can be interpreted as knowledge of an increasingly digitally interconnected labor market with numerous networked systems and the capacity to connect and collaborate with various stakeholders in the TVET system in Germany, adequately preparing trainees for a world of work 4.0. These examples showed the importance of digital integration both in general and vocational education.

2.5. The Importance of Ethics in Digital Competence of AI Era

The opportunities for AI tools in education have been increasing in recent years. AI has transformed instructional pedagogy in learning (Luckin et al., 2022). This phenomenon increased the concern about the ethics of AI utilization, especially in education. Historically, the development of digital media ethics developed as a part of the broader domain of computer ethics (Lau & Yuen, 2014). However, technological advancements have precipitated the emergence of Internet ethics as a central component of the field of computer ethics. In scholarly discourse, Internet ethics has often been delineated as a framework aimed at constraining both the utilization and abuse of Internet technologies (Spinello, 2020). Subsequently, pervasive digital devices—such as computers, tablets, and mobile phones—have become ubiquitous across diverse demographic and age groups, facilitating communication and information dissemination through digital media. A 2020 study operationally defined digital media ethics as the spectrum of ethical dilemmas pertaining to the communication and information exchange potential enabled by the Internet.

Within this ethical framework, digital etiquette has transitioned from being a supplementary value to a fundamental component of digital literacy. As artificial intelligence tools progressively mediate communication, decision-making processes, and personalized learning experiences, the practice of respectful, transparent, and responsible digital interaction emerges as an indispensable requirement for both educators and learners. As online interactions continue to proliferate, adherence to ethical principles—namely respect, responsibility, and accountability—becomes increasingly critical. Digital ethics thus elevates digital etiquette to a core competency, particularly within learning environments mediated by AI, where the delineation between human and machine interaction becomes progressively ambiguous.

More recent scholarly discussions conceptualize digital media ethics as a systematic and scientific exploration of ethical perspectives and issues associated with the usage of digital media and emergent technologies. It is pertinent to recognize digital media ethics as an integral component of digital literacy endeavors. Within academic literature, digital competence is an emerging construct characterized by an individual's proficiency in deploying digital tools and understanding the implications of digital progress on personal and societal levels (Ilomäki et al., 2016).

The conceptualization of digital competence as an autonomous skill set has been subject to academic debate. As daily activities increasingly rely on digital technology within digital environments, digital competence has become inextricable from other essential skills necessary for digital engagement (Pettersson, 2018). Nonetheless, digital competence functions as a boundary object among policymakers, practitioners, and researchers engaged in discussions on the digitization of education (Ilomäki et al., 2016). A study from Calvani in 2008 identified three distinct dimensions of digital competence: technological, cognitive,

and ethical, with foundational importance as the management of digital technologies.

Internet-connected technology enables communication and is used in employment, education, commerce, social contact, and recreation. Students are currently raised in a mobile digital environment, with adolescents spending a significant amount of time on online activities, and they are naturally digital natives. The Internet serves as the main space for young adults to live, work, relax, build friendships, and meet potential spouses. However, the rise of the Internet and online social interactions has introduced new challenges to our moral understanding. As human activities move online, all related moral and ethical issues in social interactions also shift (Dyson & Andrews, 2013).

New ethical dilemmas caused by online behavior have emerged, including hacking, Internet trolling, catfishing, prank videos, cyberbullying, grooming, revenge porn, online shaming, and misinformation. Digital media ethics has become a branch of applied ethics dedicated to systematically examining the ethical problems associated with digital media. Several studies have studied this field, and educational settings are one area where these issues are prevalent (Dyson & Andrews, 2013; Loui & Michael C., 2002; Richard A. Spinello, 2001; Spinello, 2020).

Adolescents spend a large portion of their time online. People aged 11 to 19 use the Internet extensively, with 77% accessing it daily. Girls mostly connect through social media, while for boys, watching YouTube is the main activity. However, boys also frequently use social media. Thus, children and teenagers appear vulnerable to becoming victims online (Ansary, 2020). Although there is a clear need for guidance on ethical issues related to the Internet, digital media ethics remains relatively underexplored in educational research. From a scientific perspective, studying our attitudes toward digital media and our online behavior is crucial. Additionally, it is important to analyze ethical perspectives on specific

situations from a normative point of view, such as the moral responsibility involved in sharing copyrighted material (Ess, 2013).

The topic of ethics has arisen because the use of AI has expanded rapidly across all areas of human needs, such as education, the economy, industry, and security. AI consists of tools and systems that learn from existing data, adapt to new inputs, and perform tasks similar to humans by mimicking human intelligence.

AI is a pattern recognition algorithm that makes predictions and decisions based on the information provided (Walasik & Petrenko, 2023). Examples of AI systems in everyday life include research tools in academia, navigation tools, voice response systems, smartwatches, and search engines. Additionally, generative AI tools can produce a wide range of content: text paragraphs, images, audio, and video. These systems elevate AI technology to a new level. By using deep learning techniques, generative models can create new content from existing datasets that is often indistinguishable from human-generated content (Jovanovic & Campbell, 2022). Ethics play an important role in digital competence since current technology users should understand that technology is a tool to assist with work, not to replace it.

2.6 Technology Acceptance Model (TAM) for Educators

The Technology Acceptance Model (TAM), first introduced by F. D. Davis in the 1980s, offers a theoretical framework for understanding and improving user acceptance of technology adoption (Fred D. Davis, 1980). This model aims to elucidate the factors that influence individuals' willingness to adopt new technologies, thereby helping to improve the effective deployment of technological innovations in different settings. This TAM study by Davis focused on how employees' motivation and acceptance of technology in their work environment. The core elements of TAM introduced by Davis are twofold: 1) perceived usefulness, which is defined as a person's belief that using a tool can improve their

performance in a specific task or activity, and 2) perceived ease of use, which refers to a person's belief about how simple it is to use the tools, along with 3) attitude (Davis, 1989).

Since the introduction of the TAM, numerous studies have tested and applied the theory across various fields. Davis conducted extensive experiments to validate the model, focusing specifically on two key variables: Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), and attitude towards technology (Davis et al., 1989). The findings indicated that both variables were significantly correlated with actual usage, with PU showing a stronger correlation than PEOU. In 1996, Davis further explored the use of TAM by examining it as an instrument for grouping and intermixing items. The results suggested that applying the TAM measurement to grouped items was more effective, as intermixing tended to confuse and frustrate participants (Beer & Mulder, 2020; Davis & Venkatesh, 1996).

Numerous previous studies have explored the application of the TAM in educational environments as a framework for evaluation. One such study employed TAM as a basis for empirical research on digital competence within the context of vocational education. This research aimed to assess the effectiveness of TAM in vocational settings and evaluate educators' acceptance of technology concerning their digital competencies through the qualitative data analysis.

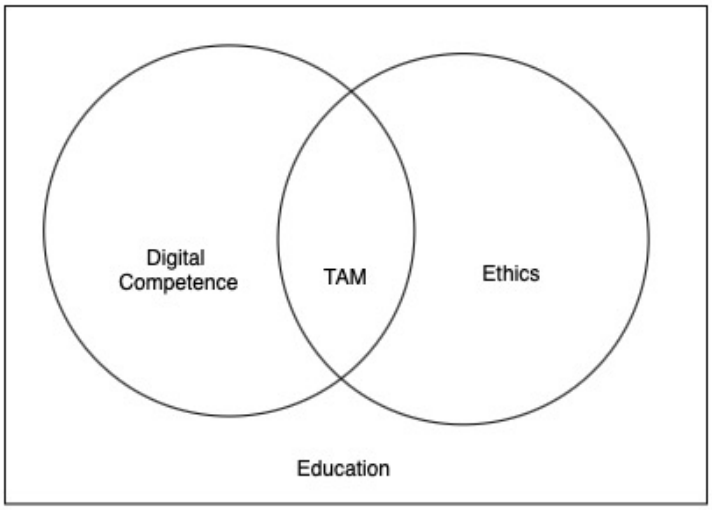

Figure 2.4 Theoretical Framework

This approach facilitated a comprehensive examination of the relationships among the variables under investigation (Antonietti et al., 2022b). However, this study draws upon the Technology Acceptance Model (TAM) to elucidate the motivations and beliefs of vocational educators regarding digital competence. This study will utilize qualitative methodology to examine the impact of digital competence on teachers' perceptions of personal utility, structured through a series of grouped questions bounding the three TAM areas of: 1) perceived usefulness, 2) perceived ease of use, and 3) attitudes (Davis, 1989).