



Paradigms and Theories of Career Development in Technology and Vocational Education and Training (TVET)

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ABSTRACT

Technical and Vocational Education and Training (TVET) face fundamental challenges in preparing learners to navigate an increasingly non-linear and disruptive digital career landscape. This study critically analyzes classical and contemporary career development theories within a constructivist paradigm framework and formulates their implications for TVET career guidance in the industry 4.0 and 5.0 era. A systematic literature review with critical-conceptual analysis using an adapted PRISMA protocol was employed. The findings reveal that classical theories by Super, Holland, Srebalus et al., Osipow, and Herr and Cramer retain fundamental value; however, their positivistic assumptions are insufficient to address the complexity of digital-era careers. The constructivist paradigm, manifested in Savickas' Career Construction Theory and Lent, Brown, and Hackett's Social Cognitive Career Theory, offers more relevant perspectives by positioning individuals as active agents in constructing career meaning. This article proposes the Integrative Career Guidance Model for TVE in the Digital Era (ICGM-Digital), built upon three pillars: constructivist foundation, adaptive competency development, and systemic contextualization, as a practical framework for TVE institutions in designing holistic and adaptive career guidance programs.

1. Introduction

Technical and Vocational Education and Training (TVET) is one of the strategic educational pathways historically designed to bridge the gap between the world of education and the world of work through the provision of applicable and measurable technical competencies. (Billett, 2011) affirms that TVET does not merely function as a producer of skilled workers, but also as a vehicle for the formation of a sustainable professional identity. In the context of global transformation driven by the Fourth Industrial Revolution and the transition toward Industry 5.0, the landscape of the labor market is undergoing fundamental and irreversible shifts. The World Economic Forum (2023) projects that 44% of the core competencies of the global workforce will be significantly disrupted within the next five years, while approximately 97 million new job roles requiring high adaptive capabilities are expected to emerge. This reality demands that TVET transcend the paradigm of purely technical training and move toward shaping individuals capable of constructing career meaning independently, reflectively, and sustainably (European Commission, 2021).

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For several decades, career development in TVET has been dominated by theories rooted in the positivistic paradigm. Holland's (1959, 1997) Person–Environment Fit Theory regards career as a process of matching individual personality types with appropriate work environments, while Super's (1957, 1990) Life-Span, Life-Space Theory describes career development as a series of linear and predictable stages. The procedural framework of (Srebalus, Marinelli, and Messing ,1982) provides practical guidance on career decision-making, whereas Osipow's (1983) meta-theoretical taxonomy offers a useful conceptual map for understanding the landscape of career theories as a whole. (Herr and Cramer, 1992) further emphasize the importance of career guidance as a systematic component that must be integrated throughout the entire span of an individual's educational life. These theories have undeniably made foundational contributions to the initial understanding of career development; however, (Savickas, 2005) and Patton and (McMahon, 2014) caution that their underlying assumptions of stability, linearity, and predictability are no longer adequate for explaining the realities of contemporary careers, which are inherently flexible, fragmentary, and fraught with uncertainty.

In response to the limitations of the positivistic paradigm, constructivism has emerged as an epistemological perspective offering a richer and more contextual understanding of career development. Rooted in the philosophical traditions of Vico, Kant, Piaget, and Vygotsky, constructivism holds that knowledge about careers is not an entity discovered outside the individual, but is actively constructed through the interaction between the individual and their social and cultural environment (Young & Collin, 2004). Within the domain of career theory, this paradigm has given rise to perspectives highly relevant to the demands of the contemporary era. Savickas's (2005, 2011) Narrative Career Theory views career as a narrative actively constructed through the process of meaning-making from individual life experiences, while offering the concept of career adaptability as a framework far more responsive to the non-linear dynamics of contemporary careers. Meanwhile, Social Cognitive Career Theory (SCCT), developed by Lent, Brown, and Hackett (1994, 2002), integrates Bandura's social learning theory with individual cognitive processes—encompassing self-efficacy, outcome expectations, and personal goals—to explain how individuals construct their career choices and development within a specific social context.

The relevance of constructivism to TVET is, in fact, highly significant; however, its systematic application remains severely limited. The majority of career guidance programs in TVET institutions—particularly in developing countries including Indonesia—continue to rely on informative and directive approaches that merely provide labor market information and steer students toward certain occupational choices without facilitating deep career meaning-making processes (Kemendikbudristek, 2022; UNESCO-UNEVOC, 2021). Hooley, Sultana, and (Thomsen, 2018) affirm that constructivist career guidance possesses genuine transformative potential in promoting social justice through education, by enabling each individual to construct their career trajectory in accordance with their unique values, experiences, and life context. It is precisely this gap between the theoretical potential of constructivism and the reality of career guidance practice in TVET that constitutes the critical point of departure for the present review.

On the basis of the theoretical and practical gaps outlined above, this article seeks to address them through a systematic and critical conceptual review of various career development theories within the constructivism paradigm. This article argues that constructivism is not merely relevant, but rather epistemologically essential as a foundation for the development of career development theory and practice in TVET in the digital era. Specifically, this article aims to: first, critically analyze classical and contemporary career development theories from a paradigmatic perspective; second, examine the relevance of the constructivism paradigm to the career development needs of TVET students in the era of Industry 4.0 and 5.0; third, formulate theoretical and practical implications for the

development of constructivism-based career guidance programs; and fourth, propose an Integrative Career Guidance Model for TVET in the Digital Era (ICGM-Digital) as a practical framework adaptable by TVET institutions. It is anticipated that this article will make a meaningful contribution to the advancement of academic discourse in the field of TVET while also serving as a practical reference for stakeholders in designing career guidance programs that are more holistic, adaptive, and meaningful.

2. Methodology

This article employs a systematic literature review approach with a critical-conceptual analytical perspective as its methodological framework. The selection of this approach is grounded in the nature of an article that aims to analyze, compare, and synthesize various career development theories within the constructivism paradigm, rather than to generate new empirical findings. Snyder (2019) affirms that systematic literature review is an appropriate and academically recognized method for developing deep conceptual understanding within a given field of inquiry, particularly when the primary objective is to construct or extend existing theoretical frameworks. A comparable approach was employed by Patton and (McMahon, 2014) in developing the Systems Theory Framework of Career Development, demonstrating that conceptual literature-based reviews are capable of generating substantial theoretical contributions with broad and enduring impact on the advancement of knowledge.

The data sources in this review consist of two primary categories: primary and secondary sources. Primary sources include the original works of career theory scholars who constitute the objects of analysis, encompassing the writings of Super (1957, 1990), Holland (1959, 1997), Srebalus, Marinelli, and (Messing, 1982), (Osipow, 1983), Herr and (Cramer, 1992), (Savickas, 2005, 2011), and Lent, Brown, and Hackett (1994, 2002). Secondary sources include peer-reviewed journal articles, academic textbooks, international institutional reports, and policy documents relevant to the topic. Literature searches were conducted through the academic databases Google Scholar, ERIC (Education Resources Information Center), Scopus, and ProQuest, using primary keywords such as career development theory, constructivism in vocational education, career guidance, TVET career development, Social Cognitive Career Theory, and narrative career counseling. The temporal range of the literature encompasses publications from 1957 to 2023, with particular emphasis on seminal foundational works and recent publications relevant to the contexts of Industry 4.0 and 5.0.

The literature selection process followed four stages based on an adapted PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol for conceptual reviews. The first stage was identification, comprising initial literature searches based on keywords that yielded a number of potential sources from various databases. The second stage was screening, wherein sources irrelevant to the topic were filtered based on their titles and abstracts. The third stage was eligibility, involving an in-depth evaluation of the content of sources that passed the screening stage against pre-established inclusion criteria. The fourth stage was inclusion, in which sources meeting all criteria were designated as primary review materials. The inclusion criteria applied were: (1) direct relevance to career development theory and the constructivism paradigm; (2) substantive contribution to the development of career guidance in the context of vocational education; and (3) recognized academic authority, encompassing seminal works with extensive citation records as well as publications in reputable journals.

Data analysis was conducted through three interrelated stages. First, descriptive-comparative analysis: the core propositions of each career theory were systematically elaborated and subsequently compared based on epistemological assumptions, analytical focus, and practical implications for TVET. Second, critical-paradigmatic analysis: the theories were examined from the

perspective of positivistic versus constructivist paradigms to identify the strengths, limitations, and relevance of each within the digital era context. Third, integrative synthesis: findings from the comparative and critical analyses were synthesized to produce a new and more comprehensive conceptual framework, operationalized in this article as the Integrative Career Guidance Model for TVET in the Digital Era (ICGM-Digital). The entirety of the analytical process adheres to the conceptual analysis framework developed by (Jabareen, 2009), which emphasizes the importance of critically and systematically deconstructing, categorizing, integrating, and synthesizing theoretical concepts.

To ensure the quality and credibility of the review, this article applies a number of validation strategies commonly employed in qualitative and conceptual research. First, source triangulation: every argument or conceptual claim advanced is supported by a minimum of two to three independent, mutually corroborating sources. Second, audit trail: the entirety of the decision-making process in literature selection and argument development is documented transparently so as to be traceable and verifiable. Third, conceptual member checking: the consistency of the resulting conceptual framework is confirmed against the source theories that constitute its reference base. The limitations of this review warrant honest acknowledgment: as a conceptual-theoretical inquiry, the findings and propositions generated still require further empirical testing within the diverse institutional contexts of TVET, both in Indonesia and at the international level. This article thus positions itself as a theoretical foundation that opens space for subsequent empirical investigations.

3. Results

3.1 Classical Career Theories and Their Foundations in TVET

The development of career theory in the context of TVET cannot be separated from the contributions of classical scholars who have laid a robust and enduring conceptual foundation. Although these classical theories emerged in a socio-economic context quite different from the contemporary era, they continue to provide an essential framework for understanding how individuals develop their careers throughout their lives. Analysis of these theories is important not only for understanding the intellectual roots of existing career guidance practice, but also for identifying the limitations that need to be addressed through more contemporary paradigmatic perspectives.

Donald Super (1957, 1990), through his Life-Span, Life-Space Theory, proposes that career development is a lifelong process encompassing multiple, interacting life roles. Super identifies five principal stages of career development—growth, exploration, establishment, maintenance, and decline—each of which involves specific developmental tasks to be accomplished by the individual. The concept of career maturity introduced by Super constitutes one of his most significant contributions, providing TVET with a framework for longitudinally assessing the career readiness of students. In the context of TVET, Super's theory is highly relevant for designing career guidance programs that are developmental and continuous, spanning from secondary education through the early stages of workforce entry. Nevertheless, the assumption of stage linearity that characterizes this theory is increasingly questioned with respect to its applicability in the context of digital-era careers, which are non-linear and replete with unforeseen transitions.

John Holland (1959, 1997), through his Person–Environment Fit Theory, advances the proposition that individual career satisfaction and success are substantially determined by the congruence between personality type and the selected work environment. Holland classifies personality types into six categories known by the acronym RIASEC—Realistic, Investigative, Artistic, Social, Enterprising, and Conventional—each possessing distinct characteristics, preferences, and corresponding work environments. Holland's theory has been widely implemented in TVET career assessment practice through various instruments such as the Self-Directed Search (SDS) and the

Vocational Preference Inventory (VPI). The primary strength of this approach lies in its simplicity, which enables practical implementation at scale. However, (Gottfredson, 2002) notes that the Holland model tends to overlook the influence of social, cultural, and structural factors that significantly shape individual career choices and development, particularly among socio-economically marginalized groups.

Srebalus, Marinelli, and (Messing, 1982) make an important contribution through their procedural framework for career decision-making, which emphasizes the importance of systematic process in assisting individuals to make rational and well-informed career choices. This framework positions career decision-making as a process that can be learned and trained, rendering it highly compatible with TVET's orientation toward practical competencies. (Osipow, 1983), through his meta-theoretical taxonomy, provides a comprehensive conceptual map of the various perspectives in career theory, enabling practitioners and researchers to systematically understand the interrelationships among theories. Herr and Cramer (1992) complement this foundation with a systemic framework asserting that career guidance must be regarded as an integrated system, rather than a series of incidental activities, and must take into account the multiple contextual factors that holistically influence individual career development.

3.2 Contemporary Career Theories and the Constructivist Perspective

In response to the limitations of classical theories in addressing the complexity of contemporary career realities, a number of new theoretical perspectives have emerged, adopting more flexible and contextual constructivist assumptions. These perspectives collectively constitute a new wave in career theory that positions the individual not as a passive object of external forces, but as an active agent who continuously constructs and reconstructs the meaning of their career through dynamic interaction with their social environment.

Mark Savickas (2005, 2011), through his Narrative Career Theory—or Career Construction Theory—proposes a fundamental paradigmatic shift from a descriptive toward a constructive approach to understanding career development. Savickas argues that career is, at its core, a narrative constructed by the individual through the process of meaning-making from their life experiences. The central concept of this theory is career adaptability, defined as the individual's psychosocial readiness to cope with upcoming career developmental tasks, unanticipated career transitions, and traumas that may arise in the course of a career. Career adaptability encompasses four dimensions: concern (awareness of and engagement with one's career future), control (belief in one's ability to direct one's own career), curiosity (active exploration of diverse career possibilities), and confidence (self-assurance in confronting career challenges). In the context of TVET, Savickas's theory offers a highly relevant framework for preparing students to navigate the non-linear and uncertain career realities of the digital era, as it emphasizes the development of adaptive capacity and the construction of a dynamic career identity.

Social Cognitive Career Theory (SCCT), developed by Lent, Brown, and Hackett (1994, 2002), offers a perspective that is distinct yet complementary to Savickas's theory. By integrating Bandura's social learning theory into the context of career development, SCCT positions three cognitive-personal variables as the central mechanisms mediating the relationship between individual learning experiences and career choices and development. The first variable is self-efficacy, referring to the individual's belief in their capacity to succeed at particular career-related tasks; the second is outcome expectations, referring to the individual's anticipation of the consequences of their career-related actions; and the third is personal goals, referring to the individual's intention to engage in specific activities or attain particular career-related outcomes. SCCT is highly relevant to TVET because it provides a comprehensive explanation of how learning experiences within vocational

education environments—including workplace internships, industry-based projects, and mentoring by practitioners—can directly shape students' self-efficacy and outcome expectations, which in turn determine their career interests, choices, and achievements.

3.3 Relevance of Career Theory in the Context of the Digital Labor Market and Industry 4.0/5.0

A comparative analysis of the career theories reviewed above reveals that each perspective possesses a varying degree of relevance in responding to the demands of the digital labor market and Industry 4.0/5.0. Mapping this relevance is important for providing more targeted guidance to TVET institutions in selecting and integrating the theoretical perspectives most appropriate to the needs of their students.

Classical theories such as Super's Life-Span Theory and Holland's Person–Environment Fit Theory retain a fundamental value that cannot be disregarded. Super's concept of career maturity provides a useful assessment framework for identifying the career readiness of TVET students, while Holland's RIASEC taxonomy can be employed as an initial point of career interest exploration that subsequently needs to be deepened through more constructivist approaches. Nevertheless, in the context of Industry 4.0, characterized by the gig economy, portfolio careers, and boundaryless careers, the assumptions of linearity and stability that underpin classical theories are clearly no longer adequate (Arthur & Rousseau, 1996). The reality that a TVET graduate may change careers as many as five to seven times throughout their working life, and that many of the occupations they will pursue in the future do not yet exist, demands a theoretical framework far more flexible and adaptive than the positivistic paradigm can offer.

In this context, constructivist theories demonstrate considerably stronger relevance. Savickas's (2005, 2011) Career Construction Theory, with its concept of career adaptability, directly addresses the challenges of digital-era careers that require individuals capable of adapting rapidly and constructively to change. The capacity to construct a coherent career narrative amid fragmentary and non-linear work experiences is becoming an increasingly crucial career competency in the industry 4.0 era (Savickas et al., 2009). SCCT also demonstrates high relevance, particularly in explaining how TVET can proactively build students' self-efficacy with respect to digital competencies that are increasingly demanded by the labor market. Lent and Brown (2013) affirm that SCCT-based interventions designed to enhance self-efficacy and outcome expectations in the domain of digital competencies can significantly expand the range of career options considered by students, particularly those from groups historically underrepresented in technology-related fields.

Industry 5.0's emphasis on the synergistic collaboration between human intelligence and machine intelligence grounded in humanistic values introduces new dimensions that further reinforce the relevance of the constructivist paradigm. The European Commission (2021) affirms that Industry 5.0 places human well-being as the primary objective, not merely productive efficiency. In this context, the individual's capacity to construct a meaningful career identity, to maintain professional autonomy amid massive automation, and to integrate personal values into work practice are becoming increasingly vital career competencies. TVET institutions that adopt the constructivist paradigm will be better positioned to prepare students not only to survive within the Industry 5.0 work ecosystem, but to thrive as agents capable of making meaningful contributions that cannot be replaced by machines.

3.4 Integrative Career Guidance Model for TVET in the Digital Era (ICGM-Digital)

On the basis of the comparative and critical analysis of the various career development theories reviewed above, this article proposes the Integrative Career Guidance Model for TVET in the Digital Era (ICGM-Digital) as a conceptual framework that endeavors to integrate the strengths of various theoretical perspectives into a holistic, adaptive, and digitally relevant career guidance system. This model is constructed upon three principal pillars that interact with and reinforce one another.

The first pillar is the Constructivist Foundation, which positions constructivism as the epistemological paradigm underpinning all career guidance practice within the model. The implication is that the career guidance process must be designed as a dialogical space in which students are facilitated to actively construct their understanding of themselves, the world of work, and the relationship between the two, rather than passively receiving career information. Savickas's (2011) narrative approach serves as the primary methodology within this pillar, wherein TVET career counselors function as co-constructors who assist students in building coherent and meaningful career narratives from their life experiences.

The second pillar is Adaptive Competency Development, which integrates Savickas's concept of career adaptability with the dimensions of digital competency required in the era of Industry 4.0 and 5.0. Adaptive competency within the ICGM-Digital framework encompasses five dimensions: (1) digital self-efficacy, defined as the individual's belief in their capacity to succeed in an increasingly digital work environment; (2) career resilience, defined as the capacity to recover and adapt in response to unforeseen career disruptions; (3) reflective practice, defined as the capacity to critically reflect on work experiences and to learn from them; (4) collaborative intelligence, defined as the capacity to collaborate effectively with other human beings as well as with artificial intelligence systems; and (5) ethical agency, defined as the capacity to make career decisions that not only serve the individual's own interests but also contribute to broader social well-being.

The third pillar is Systemic Contextualization, which adopts Herr and Cramer's (1992) systemic framework to ensure that TVET career guidance programs do not operate in isolation, but are organically integrated into the entirety of the educational ecosystem—encompassing curriculum, learning practice, institutional culture, industry partnerships, and community engagement. Systemic contextualization also means that career guidance programs must be responsive to the specific social, cultural, and economic contexts of students, acknowledging that career development does not occur in a vacuum but is always situated within concrete and meaningful social contexts. Within the ICGM-Digital framework, these three pillars interact dynamically and reinforce one another, forming a career guidance ecosystem capable of responding holistically and effectively to the complexity of digital-era career development.

4. Conclusions

This conceptual review affirms that the classical career theories developed by Super (1957, 1990), Holland (1959, 1997), Srebalus, Marinelli, and Messing (1982), Osipow (1983), and Herr and Cramer (1992) retain fundamental value as an initial foundation for TVET career guidance practice. Nevertheless, the positivistic assumptions that underpin these theories—particularly those concerning the linearity, stability, and predictability of careers—are demonstrably insufficient for explaining the realities of digital-era careers, which are inherently non-linear, disruptive, and fraught with uncertainty. The constructivism paradigm, as manifested in Savickas's (2005, 2011) Career Construction Theory and Lent, Brown, and Hackett's (1994, 2002) Social Cognitive Career Theory, offers a far more relevant and responsive perspective, as it positions the individual as an active agent who continuously constructs the meaning of their career through dynamic interaction with their

social environment. Accordingly, the constructivism paradigm is not merely a theoretical alternative, but an urgent epistemological necessity for TVET in confronting the demands of Industry 4.0 and 5.0.

A significant gap persists between the theoretical potential of the constructivism paradigm and the reality of career guidance practice in TVET institutions, particularly in Indonesia, where most still operate within an informative and directive positivistic framework. To bridge this gap, this article proposes the Integrative Career Guidance Model for TVET in the Digital Era (ICGM-Digital), constructed upon three interacting pillars: a constructivist foundation, adaptive competency development, and systemic contextualization. This model is not intended as a rigid or universal framework, but rather as a flexible guide adaptable to the specific institutional, socio-cultural, and economic contexts of individual TVET institutions. The implementation of the ICGM-Digital demands comprehensive transformation—not only at the level of career guidance programs, but also at the levels of curriculum, institutional culture, counselor professional development, and strategic industry partnerships—so that TVET may genuinely prepare graduates who are adaptive, reflective, and competitive in the twenty-first century labor market.

On the basis of the findings of this review, several important recommendations warrant attention from various TVET stakeholders. At the policy level, the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) should revise the TVET career guidance curriculum framework to explicitly integrate constructivist principles, including the development of career adaptability and career self-efficacy as standardized graduate competencies. At the institutional level, every TVET institution should conduct a critical evaluation of its ongoing career guidance programs and redesign them with reference to the ICGM-Digital framework. At the research level, there is a need for empirical studies that systematically test the effectiveness of constructivist approaches in the Indonesian TVET context, the development of locally validated career adaptability assessment instruments, and explorations of how digital technology can be integrated into a constructivism-based career guidance system. Ultimately, the transformation of TVET career guidance from a positivistic to a constructivist paradigm constitutes an indispensable response if TVET is to remain relevant, adaptive, and capable of making a meaningful contribution to preparing a generation of workers ready to confront the complexity of the industry 5.0 era.

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