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Modern Apprenticeship Talent Development Model and Training Quality: A Systematic Literature Review

Yang Wang *

Faculty of Social Sciences and Liberal Arts, UCSI University, Kuala Lumpur, 55100, Malaysia
ORCID iD: https://orcid.org/0009-0001-1465-4115
Email: breyle@cqtbi.edu.cn

Siti Zobidah Omar
Faculty of Social Sciences and Liberal Arts, UCSI University, Kuala Lumpur, 55100, Malaysia

ORCID iD: https://orcid.org/0009-0006-9607-1947
Email: Siti Zobidah @ucsiuniversity.edu.my

Yue Xiang
Faculty of Social Sciences and Liberal Arts, UCSI University, Kuala Lumpur, 55100, Malaysia
Email: 1002162812@ucsiuniversity.edu.my

Jiaying Liu
Faculty of Social Sciences and Liberal Arts, UCSI University, Kuala Lumpur, 55100, Malaysia
ORCID iD: https://orcid.org/0009-0003-4160-6412
Email: 10021628592@ucsiuniversity.edu.my

*Corresponding Author Email: 1002162748@ucsiuniversity.edu.my

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Abstract
The alignment of educational frameworks with industry requirements has increasingly been facilitated through contemporary apprenticeship models, yet persistent doubts regarding their quality continue to surface. Existing scholarship has drawn attention to issues such as limited success rates and the tendency for apprenticeships to function as

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a source of inexpensive labour rather than genuine learning opportunities. To address these concerns, this systematic review examined 20 peer-reviewed publications indexed in Scopus and Web of Science, applying a rigorous selection and evaluation process. The synthesis of findings revealed eleven principal theoretical foundations and conceptual models shaping current discourse on apprenticeships. Recent investigations have broadened the debate by incorporating multiple perspectives and considering outcomes for diverse groups, including learners, educators, and employers. A recurring theme within the literature is the necessity of robust quality management, which depends upon structured curricula and the professional preparation of mentors. Equally significant is the partnership between small and medium-sized enterprises and public authorities, which plays a decisive role in sustaining programme relevance and supporting apprentices' personal development, particularly during periods of economic uncertainty. Overall, the evidence underscores the urgency of implementing forward-looking strategies that guarantee the integrity and long-term viability of apprenticeship systems internationally.

Keywords: Modern Apprenticeship, Talent Development Model, Training Quality, SLR.

Introduction

In recent decades, governments and international organisations have placed increasing emphasis on modern apprenticeship systems as a strategic response to the demand for technical expertise in the context of economic growth and industrial transformation (Hochmuth et al., 2022; Hori et al., 2020; Ifeanyi, 2021). Modern apprenticeship is characterised as structured, long-term vocational training organised by enterprises or skilled professionals within the framework of a cooperative agreement (Chipman, 2021). Its central aim is to prepare young people for employment and social participation by equipping them with relevant qualifications, typically within a clearly defined learning environment and institutional structure (Steedman, 2001). Such systems often incorporate comprehensive regulatory frameworks, rigorous organisational oversight, mechanisms for sharing costs, and degree-level apprenticeship opportunities aligned with emerging industrial demands (Hochmuth et al., 2022; Hori et al., 2020; Ifeanyi, 2021). These measures have enhanced the adaptability of apprenticeship models and increased their acceptance among families and learners. To ensure effectiveness, guidelines for implementation have also been established to promote consistency and quality in apprenticeship provision across countries (Hochmuth et al., 2022; Hori et al., 2020).

Modern apprenticeship is widely regarded as a significant innovation in strengthening the integration of production, education, and collaboration between schools and enterprises (Daniel et al., 2023; Jabbari et al., 2023). Several nations have pioneered advanced models, such as degree apprenticeships in the United Kingdom, Germany's dual education system, and the United States' registered apprenticeships, particularly in high-demand disciplines like STEM (Daniel et al., 2023; Jabbari et al., 2023). Despite these advancements, questions regarding programme quality persist (Zhou et al., 2023). In the United Kingdom, declining pass rates and the shortening of training periods by

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companies and training institutions have raised concerns (Zhou et al., 2023). Similarly, in China, apprentices are frequently deployed as a low-cost workforce, with practical labour often overshadowing the learning process (Zhou et al., 2023). Consequently, modern apprenticeships in some contexts are perceived as synonymous with low-wage labour for employers (Zhou et al., 2023). Moreover, the quality of graduates trained under these schemes in China has not always aligned with the broader requirements of economic development (Zhang & Liu, 2022).

The challenge of reconciling large-scale expansion with rigorous quality assurance remains unresolved. While many countries, especially those with historically weak apprenticeship traditions, prioritise scaling programmes, long-term sustainability depends on maintaining high training standards (Zhou et al., 2023). The growing recognition of quality assurance has fuelled an increase in scholarship on this topic (Copson et al., 2021; Ullibarriarana-Garate et al., 2023). The literature highlights significant benefits, both economic and personal, accruing to employers and apprentices. In the United States, for instance, robust empirical evidence demonstrates the substantial and statistically significant returns generated by apprenticeship participation (Copson et al., 2021). Employers benefit not only from positive returns during the training phase but also through the retention of highly skilled workers for long-term employment (Ullibarriarana-Garate et al., 2023). Apprenticeships reduce hiring and training costs by building firm-specific human capital (Copson et al., 2021). Furthermore, apprentices completing three-to-four-year programmes have been shown to earn wages 12–16 per cent higher than those without such training (Copson et al., 2021).

Beyond monetary outcomes, apprenticeships contribute meaningfully to personal growth (Duc & Lamamra, 2022; Ross et al., 2021; Wuttke et al., 2024). They provide opportunities to apply classroom learning in real work environments while receiving structured feedback from mentors (Duc & Lamamra, 2022; Wuttke et al., 2024). This enhances professional identity formation and fosters workplace engagement (Wuttke et al., 2024). Evidence suggests that young people who enter apprenticeships early in their careers are less likely to adopt negative work habits (Wuttke et al., 2024). More broadly, vocational training is associated with improvements in self-confidence, health, civic involvement, and job satisfaction (Duc & Lamamra, 2022; Ross et al., 2021). High-quality apprenticeships also play a role in promoting mental well-being (Duc & Lamamra, 2022; Ross et al., 2021; Wuttke et al., 2024).

At the enterprise level, apprenticeship schemes stimulate innovation. Workers with high-quality vocational training are better positioned to understand sophisticated production processes and implement incremental technological improvements (Shuwei & Yong, 2023; Smith et al., 2023). Research on German firms has demonstrated a strong correlation between internal training and subsequent innovation outcomes (Dummert, 2020). Apprenticeships can also improve productivity and reduce workplace accidents (Dummert, 2020). In the United Kingdom, by ensuring a steady pipeline of well-prepared workers with proven skill records, apprenticeship schemes allow firms to confidently introduce higher skill requirements and more complex tasks for new employees (Smith et al., 2023).

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Given the extensive body of research on modern apprenticeship, the use of systematic literature reviews (SLRs) is particularly relevant. SLRs provide a structured, transparent, and replicable methodology for synthesising knowledge (Jennifer & Sophie, 2023). Although narrative reviews continue to have value, SLRs are increasingly recognised as effective tools for addressing complex research questions involving multiple concepts, epistemologies, and data sources (Jennifer & Sophie, 2023). While widely employed in medicine and healthcare, their use in vocational training and apprenticeship research remains limited (Jennifer & Sophie, 2023). This highlights the necessity of developing clear frameworks and best practices for conducting SLRs in apprenticeship studies (Jennifer & Sophie, 2023). The present study responds to this need by examining talent development within modern apprenticeships, underscoring the significance of these evolving educational and industrial arrangements.

Problem Statement

This study undertakes a systematic examination of the quality of modern apprenticeship training, employing the SLR methodology as its guiding framework. The review is designed to identify and address gaps within the existing scholarship, particularly in relation to quality assurance measures, training outcomes, and the adoption of apprenticeship models across countries. Through this analysis, the study seeks to explore how large-scale expansion interacts with quality management within apprenticeship systems. The overarching purpose is to establish a solid foundation for future academic inquiry, offering both a structured template for subsequent research and avenues for developing new perspectives. Additionally, the findings aim to provide valuable insights for policymakers and educators in strengthening the effectiveness and overall quality of international apprenticeship schemes. The central research question guiding this investigation is: What themes and theoretical models underpin existing studies on talent development and training quality in modern apprenticeship systems? Accordingly, the primary objective is to conduct a comprehensive evaluation of apprenticeship programmes, assessing their effectiveness and synthesising global evidence on apprenticeship training.

Methodology

This study employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to guide a systematic evaluation of modern apprenticeship training and its quality. Scopus and Web of Science were utilised as the principal databases to identify and retrieve pertinent literature for the review.

PRISMA

The study employed a systematic review design, conducted in strict accordance with PRISMA guidelines. These guidelines are widely recognised for providing a structured and methodical approach to systematic reviews in the social sciences (Moher et al., 2009). PRISMA offers several key advantages that were instrumental in this review: (a) it facilitates the precise formulation of research questions, (b) it establishes clear criteria for

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study selection, including inclusion and exclusion parameters, and (c) it enables more efficient searching of relevant databases, thereby optimising the review process (Sierra-Correa & Kintz, 2015). The retrieval procedure employed in this study is illustrated in Figure 1.

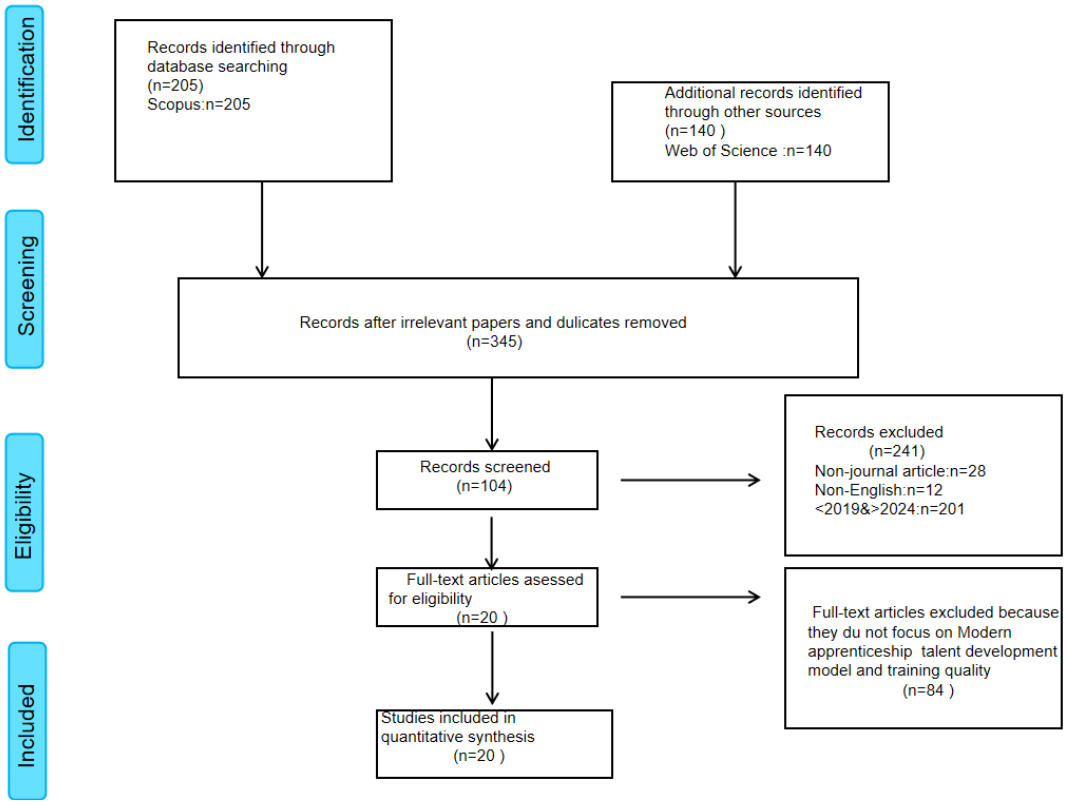

Figure 1: Flow diagram of this Review Study
Source: Adapted from Moher et al. (2009)

Resource

The literature examined in this study addresses both the modern apprenticeship talent development model and the quality of training provided. It specifically investigates the modern apprenticeship system, which was designed to overcome the limitations of traditional vocational education models that often lacked robust master-apprentice relationships and failed to adequately develop technical and practical skills. Modern apprenticeships are characterised by a structured talent development model grounded in enduring master-apprentice relationships and systematic acquisition of practical technical competencies. In contrast, informal or short-term master-apprentice arrangements do not meet the criteria of a modern apprenticeship system.

According to the International Labour Organization, a modern apprenticeship constitutes an educational and training framework formalised through an apprenticeship agreement. This arrangement enables apprentices to undertake structured training, which may be compensated financially, and combines both workplace-based and classroom-based learning. Such training equips participants with the practical skills required for specific occupations while leading to a recognised qualification in

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apprenticeship training. The modern apprenticeship talent development model and associated training quality encompass four principal dimensions:

Formulation of Teaching Standards: Various countries have established comprehensive and standardised teaching frameworks for apprenticeship training. Examples include Switzerland's "Vocational Training Regulations," Germany's "Vocational Training Regulations" and "Framework Teaching Plan" (Flohr & Protsch, 2022), the United Kingdom's "Apprenticeship Framework," and Australia's "Training Package" (Cavaglia et al., 2020; Ross et al., 2022). These standards are collaboratively developed by national ministries, commissions, and relevant stakeholders, providing clear, detailed, and uniform specifications for the knowledge and competencies that apprentices are expected to acquire upon completion of their programmes.

Supervision of the Teaching Process: In numerous countries, apprenticeship training is overseen through a multi-stakeholder supervisory approach, incorporating education departments, labour authorities, industry organisations, and vocational schools. To enhance oversight, several nations have implemented diverse supervisory instruments. For instance, France utilises tools such as the "Liaison/Management Manual" and "Tracking Sheet" to monitor apprentices' learning progress and workplace experiences systematically.

Evaluation of Teaching Results: In countries that adopt a results-oriented approach, the outcomes of apprentice evaluations directly influence the allocation of funding to enterprises and educational institutions. In the United Kingdom, for example, apprentices are required to successfully complete all certification examinations for businesses and institutions to access the final quarter of funding. These assessments, administered by independent third-party organisations separate from vocational schools and employers (Cavaglia et al., 2020), combine practical and theoretical components, employing methods such as on-site performance evaluations, written examinations, and oral assessments.

Guarantee of Teaching Conditions: Ensuring adequate teaching conditions entails establishing standards for educational institutions, enterprises, and instructors. In most jurisdictions, vocational schools bear primary responsibility for delivering apprenticeship training and must meet criteria equivalent to other vocational institutions. Companies intending to offer modern apprenticeships are required to obtain approval from the relevant qualification review authorities, which evaluate facilities and the availability of qualified instructors. Teacher requirements are specified by each country for vocational school educators, whereas standards for corporate masters vary according to national regulations (Workman, 2019).

Literature that discussed the significance of apprenticeships without explicitly linking them to training quality was excluded from this review.

Systematic Literature Process

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For the initial literature search, this study relied on two primary databases: Web of Science and Scopus. These databases were selected due to their extensive coverage, sophisticated search functionalities, and capacity to support replicable systematic review procedures (Jennifer & Sophie, 2023).

Identification

The initial stage of the systematic literature review was carried out in February 2024, focusing primarily on the identification of suitable keywords for retrieving relevant information. A comprehensive list of keywords related to modern apprenticeship talent development and training quality was generated by integrating terms, synonyms suggested in previous studies, thesauri, and database-specific terminology (see Table 1). The preliminary search produced a total of 205 articles from Scopus and 140 from Web of Science. Following the manual removal of duplicates and documents deemed irrelevant, 345 valid articles were retained for subsequent analysis (see Figure 1).

Table 1: Keywords and Information Search Strategy

Database	Keywords
Scopus	TITLE-ABS-KEY("Modern Apprenticeship*" OR "Apprenticeship Training" OR "Apprenticeship Scheme" OR "Vocational Training" OR "Skills Training") AND ("Training Effectiveness" OR "Training Evaluation" OR "Training Quality")
Web of Science	TS=("Modern Apprenticeship*" OR "Apprenticeship Training" OR "Apprenticeship Scheme" OR "Vocational Training" OR "Skills Training") AND TS=("Training Effectiveness" OR "Training Evaluation" OR "Training Quality")

Screening (Inclusion and Exclusion Criteria)

Screening according to inclusion and exclusion criteria constituted the second stage of the systematic review process (see Table 2). First, the temporal scope was limited to publications from 2019 to 2024. Second, only peer-reviewed journal articles were considered; review papers, books, preprints, serial publications, and conference proceedings were excluded. Third, to avoid translation-related distortions and ensure consistency in interpretation, only studies published in English were included. Fourth, the analysis was confined to studies employing quantitative research methodologies.

Table 2: Inclusion and Exclusion Criteria

Criterion	Included	Excluded
Timeline	2019–2024	<2019 and >2024
Literature Type	Journals (Research Articles)	Journals (Review Papers), Books, Preprints, Book Chapters, Series, Theses, and Conference Proceedings
Language	English	Non-English
Country	All Countries	None Specifically Excluded
Research Focus	Modern Apprenticeship or Vocational Training or	Literature Unrelated to Modern Apprenticeship or Vocational Training or Talent Development Model or Training Quality, or Not Linking Apprenticeship to

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	Talent Development Model and Training Quality	Training Quality or Talent Development Model or Vocational Training
Research Method	Quantitative	Qualitative, Mixed

Eligibility

Eligibility refers to the process by which literature is manually assessed and either included or excluded based on criteria aligned with the study's objectives and research questions. In this review, each retrieved item underwent a comprehensive evaluation, and only those fully meeting the predetermined standards were retained. Following the removal of 241 duplicates and irrelevant publications, 104 items remained for the eligibility assessment. Subsequently, a detailed manual screening of titles, abstracts, and full texts, conducted in accordance with the inclusion and exclusion criteria, resulted in 20 publications being selected for final analysis (see Figure 1).

Quality Appraisal

The methodological quality of the 20 selected articles was evaluated using the AXIS tool, a recognised instrument for assessing cross-sectional studies (Downes et al., 2016). Each publication was classified into one of three quality categories: high, medium, or low (Goldsmith et al., 2007). All 20 articles satisfied at least the medium-quality threshold and were therefore deemed suitable for inclusion in the review.

Data Analytic Strategy

A systematic literature review was performed to rigorously evaluate and synthesise the findings from 20 selected studies, incorporating an extensive and critical analysis of the data. The extraction of relevant information was conducted through a sequential three-phase approach: first, titles were examined to assess initial relevance; second, abstracts were scrutinised to identify studies aligned with the research objectives; and third, full-text readings were undertaken to extract detailed data pertinent to the study's specific research questions. The review was explicitly designed to ensure that the collected data corresponded directly to the research objectives, thereby facilitating a focused and coherent synthesis. Although systematic reviews can encompass studies employing qualitative, quantitative, or mixed-methods approaches, this investigation deliberately concentrated on quantitative evidence to maintain methodological consistency and analytical rigor (Whittemore & Knafl, 2005).

Results

The literature on apprenticeships offers a comprehensive and multifaceted perspective, encompassing the effectiveness of vocational training, the challenges faced by apprenticeship systems, and their broader socio-economic implications. Analysis of 20 selected studies revealed eight principal thematic domains within modern

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apprenticeships (Table 3): evaluation and quality assessment of apprenticeship training, apprenticeship retention and motivational factors, economic impacts of apprenticeships, the influence of employers on training quality, structural exploration of apprenticeship systems, curriculum design within apprenticeship programmes, and the effects of evolving work environments on apprentices.

Table 3: Group Characteristics of the Articles Selected for Analysis

Title of Article	References	Scopus	Focus/Topic
"Do Works Councils Improve the Quality of Apprenticeship Training? Evidence from German Workplace Data"	Koch et al. (2019)	Scopus	Labour Boards and Governmental Regulatory Frameworks
"The Predicted Trainer and Training Environment Influence toward Vocational Training Effectiveness in Bahrain"	Yaqoot et al. (2021)	Scopus	Influence of Trainers and the Training Environment on Apprenticeship Outcomes
"Evaluation of Talent Cultivation Quality of Modern Apprenticeship Based on Context-Input-Process-Product Model"	Chen and Dai (2021)	Web of Science	Application of the Context-Input-Process-Product (CIPP) Evaluation Framework
"The Construction of Teaching Quality Evaluation System of Modern Apprenticeship Based on Big Data"	Zhang and Yu (2020)	Scopus	Assessment Models for Evaluating Learner Competencies
"An Empirical Study on the Willingness and Behaviour of Higher Vocational College Students to Participate in Modern Apprenticeship: Based on Theory of Planned Behaviour"	Zhang and Song (2024)	Web of Science	Structure and Quality of the Teaching Environment
"Labour Market Regulations, Changes in Working Life and the Importance of Apprenticeship Training: A Long-Term and Comparative View on Youth Transition from School to Work"	Olofsson and Panican (2019)	Web of Science	Engineering-Specific Learning Environments and Related Legal Regulations
"Supply Shocks in the Market for Apprenticeship Training"	Muehlemann et al., (2022)	Web of Science	Impact of Market Dynamics on Supply, Demand, and Apprenticeship Effectiveness
"Comparison of Dual VET Models in Spain: Analysing Educational Quality from the Perspective of Educational Centres"	Fernández-Salinero et al. (2024)	Web of Science	Coordination of Teaching Teams, Instructional Processes, Assessment Strategies, and Synergies
"Dropout from Initial Vocational Training – A Meta-Synthesis of Reasons from the Apprentice's Point of View"	Böhn and Deutscher (2022)	Web of Science	Determinants of Vocational Training Attrition
"'Invested' Partnerships as Key to High-Quality Apprenticeship Programs as Evidenced in On and Off-the-Job Training"	Brockmann and Smith (2023)	Scopus	Firms' Application of Quality Management Principles to Enhance Training Effectiveness and Objectives
"Transition from School to Work – Explaining Persistence Intention in	Findeisen et al. (2022)	Scopus	Career Self-Efficacy and Alignment with Individual Vocational Interests

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Vocational Education and Training in Switzerland"			
"Potentials and Challenges of Emotionally Sensitive Applications in Apprenticeship"	Haefner et al. (2021)	Web of Science	Emotionally Responsive Approaches within Apprenticeship Programmes
"Influence of person-vocation fit on satisfaction and persistence in vocational training programs"	Michaelis and Findeisen (2022)	Web of Science	Determinants of satisfaction and persistence in vocational training programs
"An Exploration of Construction Craftspeople Apprentice Training: Evidence from the UK"	Daniel et al. (2023)	Scopus	Construction-Focused Apprenticeship Programmes
"Apprenticeship and Product Quality: Empirical Analysis on the Sake Brewing Industry"	Hori et al. (2020)	Scopus	Effect of Apprenticeships on Product and Service Quality
"Analysis of Factors Influencing the Construction of Modern Apprenticeship Management System of Higher Vocational Colleges and Universities on Students' Motivation in the Context of Information Technology"	Wang (2024)	Scopus	Application of Quality Management Theory within Apprenticeship Contexts
"Career Adaptability and Vocational Identity of Commercial Apprentices in the German Dual System"	Kirchknopf (2020)	Web of Science	Use of Career Construction Theory in Vocational Development
"How Training Quality, Trainer Competence, and Satisfaction with Training Affect Vocational Identification of Apprentices in Vocational Education Programs"	Wuttke et al. (2024)	Web of Science	Professional Identity Formation among Apprentices
"Understanding Why Apprentices Consider Dropping Out: Longitudinal Prediction of Apprentices' Workplace Interest and Anxiety"	Powers and Watt (2021)	Web of Science	Analysis of Apprenticeship Dropout Factors
"Constituting an Apprenticeship Curriculum"	Fjellström and Kristmansson (2019)	Web of Science	Design, Structure, and Efficacy of Apprenticeship Curricula

While certain studies concentrated on a single theme, others addressed multiple dimensions simultaneously. For example, two studies investigated the regulatory influence of labour boards and labour market policies on apprenticeships (Koch et al., 2019; Olofsson & Panican, 2019), whereas three examined the processes and outcomes associated with apprenticeship training quality assessment (Chen & Dai, 2021; Fernández-Salinero et al., 2024; Zhang & Liu, 2022). Six studies adopted a psychological lens, analysing variables such as learner motivation and career progression (Böhn & Deutscher, 2022; Haefner et al., 2021; Kirchknopf, 2020; Powers & Watt, 2021; Wuttke et al., 2024; Zhang & Song, 2024). Additionally, three studies evaluated the economic

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ramifications of apprenticeship programmes (Hori et al., 2020) (Muehlemann et al., 2022), while two focused specifically on the role of employers in shaping training quality (Brockmann & Smith, 2023; Yaqoot et al., 2021). Further, two studies addressed the development of apprenticeship systems at a structural level (Daniel et al., 2023; Wang, 2024), one examined curriculum design within apprenticeships (Fjellström & Kristmansson, 2019), and two investigated the impact of dynamic work environments on apprentices' experiences (Findeisen et al., 2022; Olofsson & Panican, 2019).

The reviewed literature spans the period from 2019 to 2024, with a distribution of publications as follows: three in 2019, three in 2020, five in 2021, three in 2022, and three in 2023, reflecting a sustained scholarly interest in the evolution and quality of modern apprenticeship programmes.

Table 4 shows that among 20 reviewed articles, "Quality Management Theory" and "Dropout and Retention Theory" dominate (15% each), while ten other models appear less frequently (5% each). Notably, 25% of studies applied no clear theory. This distribution highlights a research focus on quality management and diverse theoretical inputs, with case studies, interviews, and secondary data commonly used to explore apprenticeship training quality.

Table 4: Summary of Theory/Model Employed in the Reviewed Articles

Theory/Model	References	No. of Articles
Quality Management Theory	Brockmann and Smith (2023); Koch et al. (2019); Wang (2024) Muehlemann, S., & Pfeifer, H. (2019)	3
The Theory of Planned Behaviour	Zhang and Song (2024)	1
Social Cognitive Career Theory	Findeisen et al. (2022)	1
Career Adaptability Theory	Kirchknopf (2020)	1
Context-Input-Process-Product Model	Chen and Dai (2021)	1
Dual VET Model	Fernández-Salinero et al. (2024)	1
Vocational Identification Theory	Wuttke et al. (2024)	1
Dropout and Retention Theory	Böhn and Deutscher (2022); Powers and Watt (2021)	3
Curriculum Theory	Fjellström and Kristmansson (2019)	1
The Assessment Model	Zhang and Yu (2020)	1
Kirkpatrick Model Theory	Yaqoot et al. (2021)	1
None	Daniel et al. (2023); Haefner et al. (2021); Hori et al. (2020); Olofsson and Panican (2019) Muehlemann et al. (2022)	5

Discussion

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As outlined above, a wide array of theoretical frameworks has been applied in research concerning modern apprenticeships and training quality. Examination of the literature reveals that these theories primarily derive from management, psychology, and education disciplines.

Management Theory

Quality management (QM) constitutes one of the central research domains in operations management. Dean Jr and Bowen (1994) highlight the increasing emphasis on QM across diverse sectors, including manufacturing, service industries, healthcare, education, and government. QM is defined by its underlying principles, implemented through specific practices and supported by a range of techniques (Dean Jr & Bowen, 1994). Within apprenticeship research, QM theory is frequently employed to explore training providers' and employers' understanding of apprenticeship frameworks, as well as their experiences in designing and executing effective apprenticeship programmes (Brockmann & Smith, 2023). For instance, studies in higher vocational colleges have applied QM theory to analyse determinants of student motivation (Wang, 2024). Furthermore, the theory has been utilised to examine the influence of labour boards and governmental regulations on apprenticeship training quality (Koch et al., 2019).

Psychology Theory

Vocational psychology posits that personal interests and their alignment with career choices predict a range of outcomes, including educational and occupational selection, persistence, satisfaction, and achievement (Holland, 1997). Strong Jr (1943), through extensive studies across various disciplines and occupations, concluded that high occupational-interest scores correlate with superior performance. Subsequent research, utilising interest assessment in career counselling, has focused on career choice, adjustment, and satisfaction within educational and occupational domains (Betsworth & Fouad, 1997; Campbell, 1971). Vocational psychology thus examines how individuals make career decisions, adapt to work environments, and develop a deep connection between work and personal identity.

Vocational identification, a subset of vocational psychology, refers to an individual's identification with both their organization and chosen career, a key objective of vocational education and training (VET) programmes. For employees, this identification correlates with positive work-related emotions and job satisfaction; for employers, it enhances performance and reduces turnover (Dick et al., 2004). Investigations in apprenticeship research focus on: (1) the degree to which trainees identify with their careers and training organizations, (2) trainee satisfaction with their work and training quality, and (3) how these factors influence intentions to continue in their chosen field or organization (Böhn & Deutscher, 2022). The quality of training and trainer competence has long been central to both scholarly and policy debates. Theoretical models propose relationships between training outcomes (professional skills, social competence, vocational identity) and

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input/process quality, including organizational structures, resources, instructional content, learning methods, and trainer competence (Deutscher et al., 2017). This framework has been applied to study the impact of training quality, trainer competence, and trainee satisfaction on vocational identity in apprentices (Wuttke et al., 2024).

Dropout, defined as the premature cessation of initial VET before formal qualification (Bildungsberichterstattung, 2010), is commonly assessed in apprenticeship research. This definition excludes apprentices with the mere intention to leave (e.g., Gow et al. (2008) and is independent of subsequent career decisions. Researchers distinguish between apprentices who re-enter training, pursue alternative education or employment, or exit into non-qualification-based occupations (Karmel & Mlotkowski, 2010; Molgat et al., 2011). This approach is also used to examine factors affecting dropout and training quality (Böhn & Deutscher, 2022; Michaelis & Findeisen, 2022; Powers & Watt, 2021) .

The Theory of Planned Behaviour (TPB) posits that subjective norms and perceived behavioural control influence the likelihood of behaviour enactment (Ajzen, 1991; Saraih et al., 2018). TPB has been employed to analyse higher vocational students' willingness to participate in modern apprenticeships (Zhang & Song, 2024). Similarly, Social Cognitive Career Theory (SCCT) offers a comprehensive framework for understanding career decision-making, integrating personal, environmental, and cognitive factors. Since its inception in the 1990s, SCCT has evolved into models addressing interest development, choice-making, performance, persistence, satisfaction, and career self-management across the lifespan (Tokar et al., 2007). SCCT has been applied to investigate apprentices' sustained engagement and completion rates in modern apprenticeship programmes (Findeisen et al., 2022). Career Adaptability Theory, developed as a refinement of career maturity, conceptualizes readiness to manage both predictable work tasks and unpredictable changes in work conditions (Savickas, 1997). Researchers employ this theory to study apprentices' career identity and learning motivation within modern apprenticeship settings (Kirchknopf, 2020).

Education Theory

The Context-Input-Process-Product (CIPP) model represents a macro-level framework for evaluating educational interventions. Its four components—context, input, process, and product evaluation—facilitate decision-making at multiple stages: context evaluation identifies unmet needs and opportunities; input evaluation informs planning through alternative designs; process evaluation monitors implementation; and product evaluation assesses goal attainment and causal factors (Smith & Freeman, 2002; Stufflebeam, 1971). The model has been used to examine the alignment between apprenticeship training objectives, employer expectations, and training quality (Chen & Dai, 2021). Many governments, including those of the United States, Russia, and China, are integrating elements of the German dual VET model, which emphasizes shared responsibility between businesses and educational institutions for industrial training. Trainees divide their time between classroom instruction and on-the-job training, receive

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trainee-level compensation, and upon successful certification, are guaranteed secure employment. Labour unions and industry groups regulate occupational credentialing, curriculum content, and delivery, while schools provide government-funded infrastructure and firms supply training resources. This model has been applied to assess apprenticeship training quality (Fernández-Salinero et al., 2024).

Curriculum theory remains in a phase of conceptual exploration, with ongoing debate regarding its scope, purpose, and theoretical foundations (Macdonald, 1971). Curriculum is defined as the structured and regulated educational experiences designed to promote continuous growth in learners' personal and social competence (Tanner & Tanner, 1975). Curriculum provision encompasses course organization, instructional hours, learning objectives, content, and requirements, reflecting the broader training goals of an institution (Ngo, 2018). This framework has been applied to analyse how apprenticeship programs deliver the requisite knowledge for apprentices to achieve learning outcomes (Fjellström & Kristmansson, 2019). Assessment models play a crucial role in curriculum development and evaluation, typically comprising three hierarchical levels. The first level addresses knowledge, skills, and attitudes, serving as the foundation for professional practice. The second level evaluates practical performance, integrating prior knowledge and skills through simulations or authentic contexts. The third level measures individual competence within real-world professional settings, reflecting the culmination of knowledge, skills, personal attributes, and reflective experience (Hager & Butler, 1996). This model has been utilised to study student work, teacher assessments, and evaluation standards (Zhang & Yu, 2020).

The Kirkpatrick model, encompassing four levels—reaction, learning, behaviour, and impact—remains widely applied for assessing apprenticeship and workplace training (Guerci & Vinante, 2011; Kirkpatrick, 1970). Its strengths include clarity in addressing diverse outcomes, practical alignment with organizational objectives, and applicability to complex evaluation processes (Bates, 2004). In the context of modern apprenticeships, this model has been employed to evaluate the influence of trainers and training environments on overall training quality (Yaqoot et al., 2021).

Limitations and Recommendations

There exist substantial gaps in the current understanding of modern apprenticeships and the determinants of training quality. Although existing reviews provide a broad overview of contemporary apprenticeship systems, several limitations merit attention. First, the majority of research has been concentrated on apprenticeship models originating from developed economies, including the United Kingdom, Germany, the United States, and Switzerland. This narrow focus neglects the realities, challenges, and contextual variations encountered in emerging and developing economies, where modern apprenticeship frameworks remain less widespread. Future research should expand its geographical scope to incorporate diverse economic contexts, thereby offering a more holistic understanding of apprenticeship practices and their effectiveness. Second,

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the thematic coverage of existing studies has been relatively restricted. For instance, investigations into modern apprenticeships in China predominantly emphasise talent development models. Subsequent research could address this limitation by broadening the range of inquiry to include topics such as the influence of modern apprenticeships on organisational performance, apprentices' motivations to engage in these programmes, and the contextual characteristics of apprenticeship schemes across various industrial sectors.

Third, methodological constraints present additional limitations. Much of the current literature relies on qualitative approaches, with comparatively fewer studies employing quantitative methods. This methodological imbalance may restrict the generalisability and robustness of findings across diverse contexts. Incorporating secondary quantitative analyses in future investigations would strengthen the empirical foundation, enabling more precise evaluations of apprenticeship effectiveness and offering actionable insights for policy and practice. Fourth, while the PRISMA framework provides a sound basis for examining contemporary apprenticeships and training quality, the review could benefit from a more expansive and nuanced systematic approach. The current analysis is limited to studies published within a relatively narrow timeframe (2019–2024) and primarily sourced from databases such as Scopus, Google Scholar, ScienceDirect, SageJournals, and ProQuest. Expanding both the temporal coverage and database inclusion criteria in subsequent reviews would facilitate a more comprehensive synthesis of the literature and provide a deeper understanding of global apprenticeship practices.

Conclusion

This study employed a PRISMA-guided systematic review, synthesizing insights from 20 empirical articles examining contemporary apprenticeships and the quality of training. The analysis revealed that research on apprenticeship training quality predominantly draws upon management, psychology, and education theories. Based on these findings, several directions for future investigation are recommended. First, expanding the scope to include apprenticeship models in emerging economies and underrepresented regions would provide a more comprehensive and globally inclusive perspective on apprenticeship practices. Second, incorporating a wider range of research methodologies, integrating both qualitative and quantitative approaches, would enhance the robustness and generalizability of conclusions. Third, exploring sector-specific dynamics and the differential impact of diverse apprenticeship models across industries would yield more granular and actionable insights. Finally, conducting empirical studies with participants from varied socio-economic, cultural, and regional backgrounds would produce a richer, more nuanced understanding of apprenticeship systems and their effectiveness across diverse contexts.

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