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Research Article

Defining Functional Expertise Within the VFC Competence Framework: A Systematic Review and Structure for Key Dimensions of Functional Expertise

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Abstract

In this paper we introduce the Functional Expertise Dimension as a corner stone of VFC competence framework. Based on the systematic review of scientific papers and practical models, the concept of Functional Expertise is theoretically specified along three dimensions: Role-Specific Domain, Digital Agility Domain, and Interdisciplinary Domain. These dimensions are comparable to the ability of the person for constant renewal of roles, of technology utilization, and inter disciplinary work. The paper anchors Functional Expertise in Classical Cognitive Psychology and in the Visionary Management literatures, to provide an integration of behavioral characteristics with developmental requirements and with strategic consequences. This study consolidates the theoretical foundations, empirical evidence, and strategic implications of these areas through a systematic literature review. It then organizes them much like a coherent dimension that this interacts with the Cognitive Psychology Dimension (mindset, adaptability, self-regulation) and in addition the Visionary Management Dimension (strategic alignment, leadership, scalability). Interpretatively, the descriptions provide an understanding of the notion of how Functional Expertise grows, functions and how it supports both individual performance and organizational readiness; it becomes a key connector of the dots in creating future-focused competence ecosystems at the nexus of intentions and work and organizational action. Results suggest that mindset and direction are critical enablers in the creation of capability. The study implements an objectivist qualitative analysis structure and concepts Functional Expertise as a scalable, well-founded construct for workforce development in the future.

Keywords

Functional Expertise, Digital Agility, Workforce Development, Competence Framework, Adaptive Performance

1. Introduction

With continuous advances in technology, cross-functional collaboration and evolving workplace expectations, the nature of work has transformed drastically in the 21st Century, emphasizing the need for new models of workforce skills. Indeed, although existing frameworks have made significant strides in the mapping of skills, behaviors, and psychological traits in the current pool of competencies, most are limited towards an overarching structure capable of expressing the current ex-

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pectations of the modern workforce. In particular, there are few frameworks that explain how people convert cognitive and strategic capabilities into effective performance in their roles.

In this paper, we propose the Functional Expertise Dimension as part of a competent framework to build another inhabitant of the functional competence framework. It addresses the widening gulf between static skill taxonomies and the perennially changing reality of how professionals work —both in and across emerging roles. Functional Expertise is refitment understood as a multi-domain capacity built off three interdependent constructs: Role-Specific Competence, Digital Agility, and Interdisciplinary Competence, rather than a set of technical competencies.

This study consolidates the theoretical foundations, empirical evidence, and strategic implications of these areas through a systematic literature review. It then organizes them much like a coherent dimension that this interacts with the Cognitive Psychology Dimension (mindset, adaptability, self-regulation) and in addition the Visionary Management Dimension (strategic alignment, leadership, scalability). Interpretatively, the descriptions provide an understanding of the notion of how Functional Expertise grows, functions and how it supports both individual performance and organizational readiness; it becomes a key connector of the dots in creating future-focused competence ecosystems at the nexus of intentions and work and organizational action.

2. Methodology

This study used the objective structural qualitative analysis method through a literature review to define and structure the Functional Expertise Dimension as part of a future competence framework. The goal is to compile existing theoretical frameworks, empirical studies, and applied structures that underpin how Functional Expertise and its three primary dimensions (i.e. Role-Specific Competence, Digital Agility, and Interdisciplinary Competence) should be conceptualized.

A structured protocol was followed to minimize bias in selection of studies, relevance and analytical rigor. Sources were found in a thorough search of academic databases, including Scopus, Web of Science, and Google Scholar. Related search terms included key constructs (eg, functional competence, workforce competence, digital dexterity, interdisciplinary learning, role performance) in the field. And we used peer-reviewed articles, conference papers, institutional reports, published articles between 2000 and 2024, in English and the article must relate to competencies development or apps at the level of professional, education or organization.

Articles were filtered for relevance; duplicates and studies irrelevant to this review were excluded. The remaining corpus was subjected to thematic analysis with codes generated inductively to identify patterns, frameworks and conceptual insights. These themes shaped both the theoretical formulation (Section 5) and the domain-based analytical synthesis (Section 6) of the paper.

All quoted sources are properly cited and only openly accessible documents in the public domain, without proprietary or copyrighted documents, were utilized to guarantee ethical and scholarly integrity. There were no human subjects, so institutional review board approval was not required.

A limitation of this methodology is that it may exclude grey literature (published grey literature or grey literature that has yet to be indexed), and practitioners whose insights have yet to be published in peer-reviewed literature. Also while the review distinguishes a strong conceptual foundation, no empirical validation or field testing of the proposed framework is provided, which has been singled out for future inquiry.

Nevertheless, these constraints notwithstanding, the systematic approach provides a strong, evidence-informed grounding for the development of the Functional Expertise Dimension It allows one to weave together the many lenses of various research disciplines to form a unifying framework suitable in making oneself relevant to work needs of the future and intrinsically aligned to other broader disciplines of psychology and strategy.

3. Research Problem & Objectives

The fast-paced evolution of global labor markets — fuelled by digitization, automation, and interdisciplinary convergence — has put exceptional strain on organizations to identify and cultivate competencies that mirror the new era of work. Though there are many frameworks that categorize different skills and traits, few focus specifically on how individual capabilities align with role performance within dynamic ecosystems [27, 4], Consequently, organizations find it challenging to systematize workforce development, align competency models with performance outcomes, and further prepare talent for future cross-disciplinary and digital needs [20, 16].

Current approaches divide competence into technical, behavioural, and emotional competencies; contextualization is limited to a specific job function. This gap creates dissonance between what organizations expect from their workforces, and what workforces can deliver, especially in a world where jobs are changing more rapidly than ever. And although studies on emotional intelligence [12], adaptability [22], and interdisciplinary thinking [24], explore the diverse facets of problem-solving, there has been little synthesis into a coherent, actionable model.

In this context, the study answers the following main question:

How can Functional Expertise be defined, structured, and integrated as a distinct yet interconnected dimension within a broader Competence Framework to support workforce readiness, organizational adaptability, and interdisciplinary innovation?

This inquiry is driven by the recognition that Functional Expertise is not merely a collection of technical proficiencies,

but a dynamic dimension shaped by cognitive and strategic capacities, requiring an integrated understanding of how individuals acquire, apply, and evolve their role-based competencies.

Research Objectives

To address this challenge, the study adopts a systematic literature review and proposes the following research objectives:

1) To define Functional Expertise as a standalone yet interdependent dimension of competence that encompasses role-based mastery, digital adaptability, and interdisciplinary effectiveness.
2) To identify and structure its core domains—Role-Specific Competence, Digital Agility, and Interdisciplinary Competence—drawing on empirical evidence and validated models.
3) To examine the interrelationships between Functional Expertise and other dimensions, particularly Cognitive Psychology and Visionary Management, to understand reciprocal developmental influence.
4) To synthesize a conceptual model that situates Functional Expertise within a comprehensive Competence Framework tailored for future workforce development.
5) To explore practical implications for training, organizational strategy, and policy in applying the Functional Expertise Dimension to foster innovation and adaptability.

Through these objectives, the paper contributes to refining how competence is framed and applied in evolving work environments, offering a model that is both theoretically grounded and practically actionable.

4. Literature Review

4.1. Conceptualizing Functional Expertise

Functional Expertise has been well covered in terms of job performance, domain-specific knowledge, and technical mastery. Based on human capital theory [4], it is often perceived to be the capacity of individuals to do particular jobs well based on the knowledge, skills, and experience they have acquired. But in a dynamic, diverse, complex, cross-disciplinary world, Functional Expertise needs a far more active and interleaved view.

Early models, like [18] competency-based model, focused on observable and measurable skills rather than cognitive ability. This viewpoint established the foundation for how to think about expertise in terms of job performance. However, as [30] demonstrate using the mind-role fit model, the fit of psychological abilities to the specific requirements of the job is equally important for ensuring both effectiveness and engagement. As such, role-fit is not merely the technical aspects of mastery, but also the emotional, cognitive, and adaptive components that are part of sustainable performance.

Functional Expertise has also been connected to higher-level strategic constructs. [27] Dynamic Capabilities Theory calls to rethink specialism not as an asset to further exploit, but rather, part of an organization's ability to adapt, integrate, and reconfigure internal and external competencies to address the challenges posed by a rapidly changing environment. It means that Functional Expertise is not constant; it changes with the revolutionary changes and transformations in industries, technologies, and strategic contexts. Similarly, [22], adaptive performance is argued to be most vital to functional success particularly when working under conditions of uncertainty and change.

Though Functional Expertise is described, broadly speaking, through these theoretical lenses, it is rarely treated in its own right in literature, or is stripped apart into technical competencies versus cognitive and behavioural competencies e.g., [29], or is lumped in with other abilities while failing to distinguish it as a unique dimension that interacts with emotional intelligence [12], or visionary leadership [3]. As a result, the majority of existing frameworks do not provide a formalized working definition that combines domain-specific knowledge, digital responsiveness, and interdisciplinary collaboration in a singular operational dimension of Functional Expertise.

Drawing from these theoretical foundations, this paper develops Functional Expertise into a multidimensional construct that comprises three interrelated domains: (1) Role-Specific Domain; (2) Digital Agility; and (3) Interdisciplinary Domain. Such reconceptualization solves for the specialized, agile, cross-functional and strategically aligned competencies that this outcome-driven workforce calls for. In so doing it downgrades Functional Expertise from being just a skill set, to a rich capability informed by role, digital devastation and multi-disciplinary problem solving — a critical aspect of any future-fit skills framework.

4.2. Role-specific Domain

The concept of Role-Specific Competence has its intellectual roots in classical models of job performance and role theory, where competence is viewed as the intersection of task expectations and an individual's capabilities. Grounded in McClelland [18] behavioral competency approach, role-specific competence is often tied to the observable knowledge, skills, and behaviors that predict effective performance in a given occupational context. McClelland emphasized performance-based indicators over abstract intelligence metrics, a shift that has since influenced numerous competency models within human resource development.

Human Capital Theory [4], further supports the rationale for investing in role-specific skills, linking an individual's technical proficiency and knowledge acquisition directly to productivity and organizational value. This theory provides an economic justification for organizations to define, train, and measure role-specific competencies as a means of maximizing return on talent investment.

A more recent evolution of this thinking can be seen in the mind-role fit model [30], which integrates psychological dimensions such as cognitive load, emotional resilience, and motivation into assessments of whether an employee is effectively positioned within a specific functional role. This model highlights the growing consensus that competence in modern roles extends beyond technical skill to include alignment with psychological and behavioral requirements of the job.

From a systems perspective, Eraut [8] emphasizes that professional competence in the workplace is developed not only through formal education but also through informal learning embedded in task performance and social interaction. This dynamic understanding reinforces the need for adaptable frameworks that accommodate both structured role definitions and the evolving nature of job tasks.

In terms of empirical evidence, Switasarra and Astanti [25] argue that job descriptions continue to play a foundational role in establishing the minimum skill thresholds for professional performance, particularly in large organizations. Their study links structured job documentation with improved alignment between employee capabilities and organizational goals. Furthermore, Pulakos et al. [22] introduce the concept of adaptive performance; it highlights the significance for employees to adjust their execution of input in line with the demands, technologies, or disturbances they face; this is becoming more and more essential in role-specific output.

European e-Competence Framework [9] contributes to the operationalization of this area by providing a structured classification of ICT-related competencies associated with jobs. Its focus on competence granularity, role alignment and progression levels, while limited to the digital sector, provides a useful precedent for defining and benchmarking functional competence in other sectors. While much has been written regarding models and frameworks tuned for specific roles, the literature points to an important gap: that most studies examining role performance in isolation, failing to adequately contextualize to the broader dynamic frameworks accounting for digital disruption or inter-disciplinary integration. This highlights the need for a more holistic conceptualization of Role-Specific Competence – part of a larger dimension of Functional Expertise, as a continuum or spectrum of defined levels of Functionality – something we hope to tackle with the subsequent sections of this paper.

4.3. Digital Agility Domain

The frictionless pace of technology advances, especially driven by a digital transformation, has made a powerful case for another form of workforce competence—Digital Agility. Digital Agility, which is derived from wider constructs like organizational agility and dynamic capabilities, is an individual's ability to quickly learn, fuse, and implement digital tools and technologies in context of changing conditions [2]. It's not just digital literacy or skills, it is the cognitive and behavioral flexibility needed to navigate successfully in a technology-rich world.

This line of thought finds expansion within the Dynamic Capabilities perspective, where Teece, Peteraf and Leih [28] position Digital Agility, proposing that in a volatile and competitive environment, individuals/organizations should sense, seize and reconfigure resources. At the individual level, this means the capacity to experiment with new technologies and manage uncertainty, as well as the urge to continuously upskill digitally — all traits that we find in areas that are knowledge-intensive and flourish in dynamic environments.

Theoretical foundations of Digital Agility are also based on the Technology Acceptance Model (TAM) [6], which asserts that perceived ease of use and perceived usefulness affect individuals' voluntary willingness to use/digital systems. Although traditionally applied to system adoption in organizational contexts, the logic of TAM moving argumentation upward is increasingly apt for understanding personal digital adaptability and proactive engagement with emerging tools.

Empirically, the literature is showing increasing consensus on the strategic relevance of Digital Agility. Digital skills and ability to use technology rank among the highest demanded skills by employers, driven by automation, AI, and remote work models according to the World Economic Forum [26]. As data from the Digital Agility Report [7] highlights, agility is crucial to success as those who adapt to digital systems, experiment with new digital capabilities and incorporate data-driven insights are likely to drive innovation and strategic decision-making in a business.

Upskilling and reskilling to use the right tools of technology has become foundational, as opposed to ancillary [16] — without which individual performance suffers in the era of Industry 4.0. Digital agility is about adapting to the digital world, both in terms of learning fast and being able to sense-change, while learning agility is all about the ability to learn in any new context.

However, challenges to digital agility remain. As Leonard-Barton [15] points out, such inertia regarding technology due to established routines, organizational culture and legacy systems are larger challenges when adapting to new digital workflows. At the individual level, gaps in motivation, in access to training, and in fear of failure are obstacles to digital upskilling as well [6, 20]. These challenges emphasize the importance of looking at Digital Agility as more than a set of technical skills, but as cognitive and behavioral competence shaped by an internal mindset and external enablers.

Overall, the literature serves as a solid basis to consider Digital Agility as a multi-faceted competence. It is synthesized from information systems, organizational behavior and strategic management theories, culminating to its increasing importance in the field of workforce development. Yet only a few studies provide a framework for adopting Digital Agility through a holistic set of competences—showing a hole this paper aims to fill.

4.4. Interdisciplinary Domain

As global challenges become increasingly complex, a shift is needed from disciplinary specialization to integrative knowledge and cross-domain collaboration. In this light, interdisciplinary competence has become one of the most important workforce capabilities—whereby individuals draw on knowledge, skills and perspectives from multiple fields to solve multifaceted problems. Cognitive flexibility, systems thinking and communicative capacity stand out as a highly relevant group of competencies – as highlighted in a large number of educational, organizational and psychological research.

Interdisciplinary theory provides the theoretical foundation for interdisciplinary competence by framing integration as the core process by which knowledge from various disciplines can be synthesized into more integrated understandings [21, 23]. Gibbons et al.'s [11] concept of Mode 2 knowledge production [11], even further characterizes interdisciplinarity as a contextual and problem-driven approach, involving knowledge that is socially distributed, co-produced across disciplines, institutions and stakeholders.

In education, case studies abound which indicate that interdisciplinary approaches provide invaluable cross-disciplinary skills including problem-solving, critical thinking and adaptability. Spelt et al. In a systematic review [24] proposed five foundational elements of interdisciplinary competence in higher education: disciplinary grounding, integration, critical awareness, reflection, and collaboration. These strands are seen as fundamental in equipping learners to tackle the increasingly complex challenges that are beyond the remit of individual disciplines.

The work of Wang and Sang [29] also highlights the importance of interdisciplinary learning, as they were able to study the interdisciplinary competence between primary and secondary school teachers. Their findings underlined the importance of both pedagogical flexibility and epistemological openness in applying cross-disciplinary connections, critical skills in an accelerating landscape that extends far beyond education into health, sustainability and innovation ecosystems.

One important cognitive facilitator of interdisciplinary competence is systems thinking, which will enable individuals to discover interrelations, feedback loops, and long-term effects within complex systems [14]. This more holistic view is of particular use in solving “wicked problems” that need coordinated input from different areas of knowledge. Jacobs and Frickel [13] note that effective interdisciplinary collaboration relies not only on mastery of technical skills but also calls for epistemic humility and recognition of the value of each disparate area of work by colleagues.

On the communicative level, Novikova et al. [31] introduced the notion of interdisciplinarity communicative competence, which relies on 1) a common language, through which not only is a common language created, but also the 2) openness to the conceptual framework of the others, as well as 3) the clarity of how that framework is to operate. In this way their model actively translates the inter-personal and cognitive behavior types that enhance successful effective interprofessional engagement into a framework and something to measure and develop professionally.

While there are strong theoretical and empirical benefits that support this argument, interdisciplinary competence was still not heavily represented in many workforce development frameworks. Many models place it as a nice-to-have or a circle in team dynamics versus a key enabler of innovation, problem-solving, and knowledge integration. The lack of a comprehensive insight found in this literature gap indicates the need for its systematic inclusion under wider competence frameworks especially as organizations now operating in an environment that requests adaptive, cross-functional responses.

4.5. Synthesis and Identified Gaps

The previous review highlights some of the principal theories and empirical contributions motivating the recognition of Functional Expertise as a building block of workforce competence. Looking across the literature, we find several key themes converging: the need to balance employee capabilities with job needs [4, 30]; the need to create agile and digitally capable labor pools [28, 16]; and the awareness that interdisciplinary thought benefits innovation and solutions thinking [23, 24].

Although conceptually these competencies are more developed than knowledge or preferences, they are not cohesively treated in the literature. Role-Specific Competence is usually very niche and buried in occupational or technical training models, and has not been widely noticed how this is evolving within dynamic, cross-sectoral situations. Digital Agility, sweeping across the literature in technology management and also HR however, tends to be inert, addressing behavioral elasticity as a standalone rather than a prepared to be followed, cross pollinated, erected to behave, cross bound unharness. Likewise, Interdisciplinary Competence has been extensively articulated within an educational context, but almost never as a component of frameworks aimed at organizational or workforce application.

Notably, the majority of the models reviewed conceptualized these competencies as independent variables as opposed to integrated dimensions that need to co-inhabit modern job profiles. We have old constructs i.e. Human Capital Theory [4], Dynamic Capabilities [27] and Systems Thinking [14] to inform our work, but few of the existing frameworks attempt to draw them together to create a functional template on which we can base the expectations of the work we will be required to do for now and into the future.

Furthermore, the literature barely addresses how these domains interrelate with other psychological and strategic aspects of competence, including cognitive adaptability,

emotional intelligence, or visionary leadership. There is, thus, an obvious gap between the elements examined and a holistic competence model directed towards future needs.

Although efforts have been made to classify over time, there remain several competing frameworks across different disciplines which can make the field fragmented. Instead, this framework frames Functional Expertise as a cornerstone, an active and emergent construct that sits at the intersection of Workforce Development, Digital Transformation, and Interdisciplinary Innovation.

5. Theoretical Framework

5.1. Introduction to the Functional Expertise Dimension

The increasingly dynamic nature of work—driven by technological and transformative change, cross-disciplinary complexity and amplified performance expectations—means organizations need collective capabilities to evolve beyond mere collections of skills taxonomies or vaguely-defined behavioral traits [26, 16]. It is therefore imperative that competence frameworks provide structured, dynamic and operable schemas that are able to change with the context [27, 4]. In this context, the Functional Expertise Dimension is presented as a foundational Competing Business Competence Foundation Alongside Cognitive Psychology and Visionary Management.

Although existing models like McClelland's [18] behavioral competence approach or the European e-Competence Framework [9] have both been useful, they typically focus on personal level characteristics or to be further changed role/labor market requirements. Few provide a tightly unified framework for the integration of domain-specific, digital and cross-functional competencies necessary for 21st century professional success. Functional Expertise addresses this by emphasizing applied, role-specific and change-oriented capabilities that facilitate job performance and adaptability in professional environments [30, 22].

This will be particularly significant given the context of rapid automation, hybrid work dynamics, and a growing need for agile and interdisciplinary teams [20]. It approaches workforce readiness and employability not just as a matter of technical proficiency, but rather as a living, breathing interplay of knowledge application, adaptability, and organization alignment. Functional Expertise also feeds on, and works with the Cognitive Psychology Element which gives the mindset, metacognition and emotional direction needed for learning and self-management [12] and the Visionary Management Element provides the strategic climate and foresight that directs expertise towards the future [3, 28].

The Functional Expertise Dimension aims to bridge this gap conceptually and practically by creating a connection between cognitive adaptability, role-specific competence, and strategic execution, ultimately establishing the groundwork for a more cohesive and forward-thinking approach to workforce development.

5.2. Defining the Dimension

Functional Expertise is defined in this framework as:

> The dynamic capacity of an individual to apply role-specific, digital, and interdisciplinary competencies in ways that align with organizational objectives, adapt to evolving contexts, and contribute to collaborative problem-solving.

This is based on the understanding that in the modern professional world, competence is not static and is more than just technical knowledge or expertise. It is a multidimensional construct in nature — adaptive, context-sensitive, and consistent with strategic intent and operational realities.

This dimension is based on diverse academic traditions. The competency-based approach first widely articulated by McClelland [18], recognized that effective job performance is not necessarily predicted by raw intelligence: it is not the general IQ, but rather demonstrable, role-specific behaviors that predict effective job performance. His work established the groundwork upon which behavioral competency models are now widely used in education, talent development, and performance management.

Further, Becker's [4] Human Capital Theory provided an economic justification for the acquirement of skills, thus positioning individuals' technical and functional abilities as drivers of productivity and competitive advantage. Such insights highlight the importance of role-related competencies in determining workforce preparedness over the long term.

But, in a dynamic world, static skillsets are not sustainable. There is one more dimension to the understanding of expertise, which relates to the Theory of Dynamic Capabilities [27]. From this perspective, both people and organizations need to not only have functional capability but also reconfigured and adapted what these competencies look like in the face of technological disruption, market volatility, and changing role requirements. Functional Expertise, thus takes on the nature of an evolving construct tempered by the formative aspects of learning, feedback and context complexity.

In addition, the domain of adaptive performance was articulated by Pulakos et al. [22], which integrates behavioral plasticity into the functional capacity. Their taxonomy highlights dimensions like struggling with unexpected work scenarios, learning new tasks—dimensions in which each has become a core aspect of functional success in modern-day workplaces.

This construct is also informed by psychological literature on mind-role fit, which suggests that when an individual's capabilities align with a role's cognitive, emotional, and behavioral expectations, performance, satisfaction, and retention over time is predicted [30]. In this sense, role-specific expertise is a mixture of technical, psychological, and social understanding.

In addition, the growing presence of digital transformation and interdisciplinary collaboration as work tasks suggests a wider lens of what it means to be "functionally competent." As pointed out by Li [16] and Morandini et al. [20], today's domain of expertise must incorporate digital fluency, systems imagination, and the ability to work horizontally across disciplines—thus transforming the boundaries of conventional functional domains.

Therefore, in this framework, Functional Expertise is organized around three interdependent domains:

1) Role-Specific Competence, which addresses task execution and occupational alignment;
2) Digital Agility, which enables adaptability and engagement with technology-driven environments;
3) Interdisciplinary Competence, which supports collaboration across disciplinary and functional boundaries.

The following sections will elaborate, describe, and position these domains. In unison they form an integrative body of competence which serves as the bridge between existential capacity (psychological readiness) and external-based execution (tactical alignment).

5.3. Internal Structure: The Three Domains

Function Dimension is defined by three interlinked domains (See Figure 1): Role Domain, Digital Domain, and Interdisciplinary Domain. Each domain addresses an important sector of applied professional work and they together represent the foundational operational aspects of personal effectiveness within the wider Competence Framework. These domains are not stand-alone skill categories but rather function as a fluid triad, with each other interrelating, informing, and changing each other due to contextual needs.

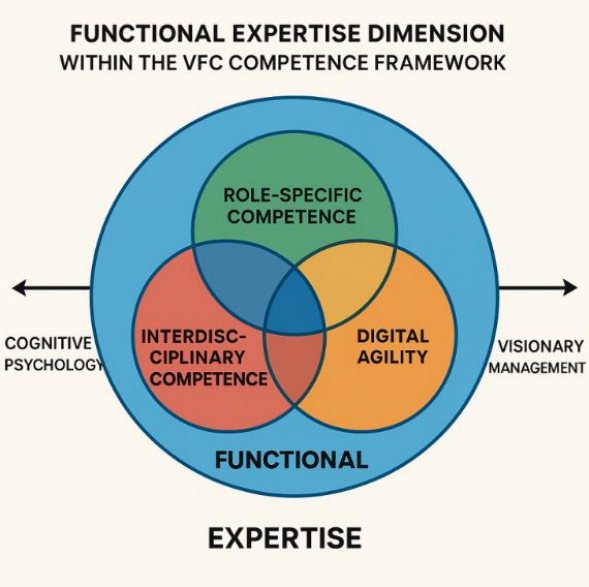

Figure 1. *Functional Expertise within the VFC Competence Framework.*

This visual represents the internal structure of the Functional Expertise Dimension, illustrating its composition from three interrelated domains: Role-Specific Competence, Digital Agility, and Interdisciplinary Competence. The diagram also reflects how this dimension is influenced by both the Cognitive Psychology and Visionary Management dimensions.

5.3.1. Role-specific Competence

Role-Specific Competence: The Technical, Procedural, and Occupational Skills Necessary for Optimal Performance in A Defined Professional Role This encompasses work-related knowledge and executional precision, as well as consistency with anticipated standards of quality, compliance, and responsibility. It is rooted in formalized role expectations and is often associated with formal training, job descriptions, and performance appraisal systems.

This domain constitutes the foundational level of Functional Expertise. This means ensuring that employees are not just adequately trained to meet the basic needs of their roles, but that they can add value through relevant and consistent use of their skills when needed. Crucially, Role-Specific Competence specifically incorporates performance threshold alignment — i.e., the degree to which it establishes the minimum viable threshold of professional contribution for a given function.

The domain is informed by frameworks such as the European e-Competence Framework [9], which connects occupational roles to competency definitions in technical domains, and is underpinned by human capital theory and performance-based models of skill acquisition. It is influenced by psychological constructs such as mind-role fit, which underscore the alignment between individual capacity and role complexity [30].

5.3.2. Digital Agility

Digital Agility describes the ability of a person to adapt his or her interaction with digital applications, technologies, and workflows to optimize responsiveness at the individual and organization levels. It conveys not just the capacity to learn a new technology in practice, but also the behavioral agility and self-efficacy needed to function in rapidly evolving digital contexts.

This domain deals with the accelerating digitization of work — where the ability to respond to new tools, including AI systems, data dashboards and cloud-based platforms, is no longer a nice-to-have but an existential requirement. Digital Agility is not about digital literacy or technical fluency. This includes cognitive readiness, continuous learning and the ability to harness digital systems for collaboration, decision-making and problem-solving.

This domain draws on theorization built on the form of Technology Acceptance Model [6], Dynamic Capabilities Framework [27], as well as with more modernized models of digital transformation and workforce adaptability [16, 20].

Digital Agility is the key enabler of long term role relevance as digital ecosystems become central to professional functioning across sectors.

5.3.3. Interdisciplinary Domain

Interdisciplinary Competence refers to the ability to integrate knowledge, methods, and perspectives from multiple disciplines to address complex problems and collaborate across boundaries. It emphasizes systems thinking, communicative flexibility, and the capacity to function effectively in cross-functional or multi-sectoral teams.

Challenge has become increasingly critical in a world where modern work environments are increasingly multi-modal in nature. No longer are professionals expected to excel in their domain only; they need also to create constructive interfacing with neighboring knowledge domains, be they in project management, innovation, sustainability, or digital product development.

The body of theory supporting this area of work comes from interdisciplinary theory [21], Mode 2 knowledge production [11], and practical educational practices [24] There are also recent advances in exploratory interdisciplinary communicative competence [17] highlighting the role played by interpersonal and reflexive dimensions helping professionals to cross disciplinary diversity with confidence and clarity.

5.3.4. Integration of Domains

These domains are presented in parallel with the intention of conceptual clarity, but in practice operate interdependently (See Table 1). As an example, a person with an expertise in their field may need to customize digital tools (Digital Agility) working with colleagues with diverse skills (Interdisciplinary Competence). In this context, the Functional Expertise Dimension is not a checklist of skills but rather a structural model for how core-professional capacities come together, interact and evolve over time.

It provides organizations and educators alike, a scalable, integrative architecture for developing competencies. It also helps identify and define areas in need of functional performance improvement and serves as a guide to build the right learning programmes, assessment tools and strategic workforce initiatives.

Table 1. *Core Domains of Functional Expertise.*

Domain	Definition	Key Traits	Theoretical Foundations
Role-Specific Competence	Mastery of technical and procedural skills for a defined role.	Precision, compliance, adaptability	[18, 4]
Digital Agility	Ability to adapt to and leverage digital tools in evolving contexts.	Curiosity, learning agility, resilience	[27, 6]
Interdisciplinary Competence	Integration of knowledge across disciplines for problem-solving.	Systems thinking, collaboration	[21, 11]

Summarize the three domains (Role-Specific Competence, Digital Agility, Interdisciplinary Competence) with definitions, key traits, and theoretical foundations.

5.4. Positioning Within the VFC Competence Framework

The Functional Expertise Dimension exists as the foundation of the broader VFC Competence Framework, providing the functional interface through which cognitive capabilities and strategic intent are transformed into effective performance [1]. Where the Cognitive Psychology Dimension emphasizes personal awareness, emotional intelligence and cognitive agility, and the Visionary Management Dimension addresses foresight, leadership and overarching strategy, the Functional Expertise Dimension balances all this with the execution of all of the above: the practical application of competencies in real-world contexts.

Functionally, it occupies the middle layer of the framework's logic:

1) The Cognitive Psychology Dimension (CPD) equips individuals with the mindset, metacognitive capacity, and emotional resilience required to engage with learning, collaboration, and uncertainty.
2) The Visionary Management Dimension (VMD) provides the strategic compass—vision alignment, leadership, and scalability.
3) The Functional Expertise Dimension, situated between these, ensures that competence is activated and applied, through the mastery of roles, responsiveness to digital disruption, and interdisciplinary integration.

Importantly, the three dimensions are interdependent, not hierarchical. Functional Expertise is shaped by Psychological Readiness and Strategic Clarity but also helps manifest them. And cognitive adaptability improves digital agility, and em-

powerment reinforces leadership credibility. This kind of visionary thinking, in turn, determines what kinds of expertise get prioritized and cultivated."

The model integrates Functional Expertise into the framework structurally, creating a continuous competence development process that maintains the relationship between individual performance aspects, i.e. between thinking you, acting you, and leading you, as opposed to separate pieces of competencies that are to be stitched together to best deliver business grades. This theoretical framework sets the stage for the analytical discussion in the following section.

After presenting functional expertise as a well-structured and interdependent concept of role-specific competence, digital agility and interdisciplinary competence, we need to expand what this construct means in situ. Competence cannot be construed solely as a theoretical construct when, as Eraut [8] pointed out, it also reflects how we respond to real- world challenges, applying skill, adapting, exercising the professional judgment required.

In the subsequent section, we have presented the summary of imported knowledge gained from the systematic review performed in this work. Based on a literature review spanning organizational behavior, workforce development and digital transformation, it isolates patterns, thematic connections and ways that each domain manifests in practice. These models constrain our understanding of how Functional Expertise manifests in different roles and in different industries, as well as their interaction with cognitive and visionary dimensions in complex work environments [22, 27].

Through this activity, the paper moves between the conceptual underpinning of its framework, and analytical and interpretative applications—demonstrating that the domains are not simply design factors in a model, but are also active factors in both professional development, as well as resilience and performance.

6. Data Analysis

This part of the paper provides a thematic synthesis of findings obtained from the systematic literature review and moves beyond a conceptual definition of Functional Expertise instead exploring the emergence of its three domains—Role-Specific Competence, Digital Agility, and Interdisciplinary Competence—in practice. Whereas the prior section provided a theoretical basis, this analysis offers contextualized interpretations of patterns, challenges, and opportunities in the published literature.

Performance at work and the definition of competence must thus go hand in hand [8] and not just be seen as a theoretical definition of competence. Likewise, Pulakos et al. [22] stress the effective performance of function is grounded in situational context. So this section is accordingly structured to go through each one of these domains individually, to explore their interrelationships, relationships with other framework dimensions and consequent strategic implications.

The synthesis articulated here gives a context-sensitive view of Functional Expertise as a living, applied perspective—emerging from environmental demands, individual responsiveness and organizational pulls.

6.1. Functional Expertise by Domain – Results & Discussion

By defining that notion, the remaining part of this paper delivers the analytical synthesis of the Functional Expertise Dimension and explores its three constitutive domains (Role-Specific Competence, Digital Agility, and Interdisciplinary Competence) as autonomous but interdependent applied functional competencies. Based on the systematic review, the following analysis highlights key findings, thematic patterns, and developmental challenges unique to each domain.

Literature-based evidence is intertwined in each subsection with interpretive analysis, demonstrating the ways competencies are formed by shifting role demands, technological adaptation, and cross-disciplinary complexity. Instead of redefining the domains, this section interprets their behavioral relevance and strategic implications in terms of competence development, organizational design, and learning systems.

6.1.1. Role-specific Domain

In the literature, Role-Specific Competence is consistently described as a cornerstone of professional functionality. The results underscore its basic importance as a device guaranteeing working greatness and job-part arrangement. This domain is typically formalized by a job description, task-specific training, and occupational standards [4, 9]. However, a stable analytical insight that emerges is that role-based expectations are not static, but subject to being rapidly redefined as a result of automation technology, hybrid work formats, and an expanding set of possible tasks [20].

It is no longer satisfactory to think about Role-Specific Competence as a stale technical inventory. Adaptive application, learning agility, and contextual role awareness [22] have emerged as significant behavioral extensions. The nature of roles is always evolving and practitioners must constantly realign their skills with the changing expectations — an indication that competence is simultaneously recursive and fractals.

A key theme is the greater focus on mind-role fit — the degree of cognitive and emotional congruence between the capacities of individuals and the psychological demands that they encounter in the role [30]. Competence misalignment in this sense can occur not only in underperformance but also in psychological strain, disengagement, and turnover.

Moreover, the analysis reveals that workforce development approaches do not keep pace with changing job tasks and newly opened role definitions. Even as the functional context around them becomes more technologically integrated, standard operating procedures may not change. This discord

is indicative of a dormant skills gap, and subsequently, long-term performance resilience.

Consequently, Role-Specific Competence must not be considered solely as a back-office execution of technical tasks, but rather as a behavioral engagement with role expectations in its full complexity. In line with organizational realities, competence development needs to itself reflect on, be context sensitive and iterative.

6.1.2. Digital Agility

Digital Agility has evolved from being an ICT topic of concern to a cross-functional must-have. It encompasses much more than digital literacy—it signifies the behavioral ability to adapt, incorporate, and maximize digital instruments instantaneously, which is necessary while the technological and organizational context is changing [2, 16].

From an analytic perspective, three key findings are noteworthy. First, digital agility is strongly related to adaptive performance [22] in environments of high pace change and low standardization in tools, platforms, and digital processes. Second, the review highlights behavioral traits like curiosity, tolerance for uncertainty and experimentation. Such traits bolster the agility required to contend with more frequent changes in software systems, data tools and collaborative platforms [6, 20].

Third, organizations do not know the difference between digital competence and digital agility. Other training models emphasize tool-specific hard skills over the development of learning mindsets and strategic reflexes that allow employees to re-learn, troubleshoot, and digitally adapt across contexts [15, 28].

The latter is affirmed by the review which suggests that access to digital learning environments and individual learning readiness has a substantial impact on digital agility. Many organizations fail to tackle motivational and psychological barriers to digital learning, particularly among mid-career professionals. The ability to handle emotionally threatening situations effectively [12] and self-efficacy are important enablers of confidence and engagement with new technologies.

Put simply, digital agility is not a technical upskilling exercise. It takes an ecosystem approach: one that encompasses real-time feedback, microlearning, peer mentoring, and the naturalization of adaptive behaviors. It is this behavioral-operational fusion that makes digital agility a true domain of Functional Expertise.

6.1.3. Interdisciplinary Competence

Lastly, the final domain that seems to emerge from the literature is titled Interdisciplinary Competence, which may be seen as a unique form of adaptive expertise. It allows people to work across disciplinary boundaries, integrate disparate knowledge, and produce solutions collaboratively in team-oriented or complex contexts [21, 24]. This domain is especially pertinent in jobs relating to innovation, public policy, sustainability, and organizational design.

The analysis identifies two main trends. In the first place, interdisciplinary competence is highly related to the systems' thinking and to the cognitive flexibility. It demands not only a comfort with complexity, but also a willingness to distill principles within one discipline and deploy them in another [14, 23]. Second, productive Collaborations depend on interdisciplinary communicative behaviors [17] such as reflective dialogue, shared Vocabulary Construction, and perspective-taking.

Lack of development frameworks and assessment tools to measure that interdisciplinary performance is highlighted as a key challenge in the literature. While education institutions have promoted integrated learning/Problem-based learning models, such systems have not translated well into workplace performance systems [29].

The review also identifies a tendency of conflating interdisciplinary teamwork with real interdisciplinary competency. Participation in a multi-functional team does not imply the ability to integrate perspectives meaningfully. Overall, our results indicate an intentional need for training in cross-disciplinary synthesis, reflection, and communicative flexibility in order for this intersectional space to be functional and impactful.

From an organisational perspective, inter-disciplinary competence becomes increasingly important in project design, cross-sectoral collaboration, and innovation sprints. In this context, when this thinking is embedded in role profiles and performance criteria, it supports the agility and creativity needed in uncertain and fast changing contexts.

6.2. Interplay Among the Three Domains

Although Role-Specific Competence, Digital Agility and Interdisciplinary Competence can be considered in isolation, the literature and thematic synthesis indicates that they do not exist in a silo. Rather, they embody an interdependent triad, where the presence — or absence — of one domain greatly affects the effectiveness of the others (See Table 2). The mutual reinforcement between these elements produces a dynamic structure that allows individuals to migrate functionally in VUCA (volatile, uncertain, complex, and ambiguous) environments.

The clearest link is between Role-Specific Competence and Digital Agility. As the performance of domain-specific tasks now increasingly relies on evolving technological infrastructures—ranging from automation tools and data platforms to remote communication systems—digital systems have transitioned from being mere support tools to core components of role execution. Thus, professionals must not only master their core duties but also adapt their execution to evolving digital contexts [16, 28]. Digital Agility becomes particularly meaningful when applied to well-defined occupational functions, reinforcing the importance of strong role clarity in achieving digital fluency. The literature indicates

that, for role execution, digital platforms have evolved from support systems to integrated components. Thus, professionals have to not just know how to do their work, but be able to do that work differently with new technologies as well. On the flip side, Digital Agility matters most when applied to well-defined occupational tasks—hinting at the role clarity that grounds digital nimbleness.

The second strong connection to make is between Digital Agility and Interdisciplinary Competence. Working across platforms and streamlining into digital workflows creates greater collaboration across departments and disciplines. It has been increasingly reported in the literature on cross-functional teams that such teams use shared digital ecosystems for coordination, planning, and execution [2, 20]. Digital fluency allows boundary-spanning and interdisciplinary awareness enables sensemaking and response to information.

Finally, the connection between Role-Specific Competence and Interdisciplinary Competence is one of contention between depth and breadth. Each professional needs enough domain-specific expertise, but they should also cultivate the reflexive ability to move their knowledge from one function to another [23, 24]. Domino and Leonardi [32] indicate that people who thrive in diverse teams tend to have some firm expertise in at least one area of interest, which then grounds their attempts to integrate. This tension between functional domain depth and functional domain breadth is the key towards innovation and problem solving in complex contexts.

The connections of these three domains implies the scaffolded Functional Expertise Development Model. Role-specific mastery gives you the technical grounding; digital agility adds responsiveness and continuous learning; and interdisciplinary competence brings you cognitive flexibility and strategic alignment. Cultivated in tandem, they form a mutually reinforcing ecosystem, one that can drive operational execution, adaptation, and innovation.

This interdependence has important implications from a development perspective. Competency models and training programs that silo one domain at the expense of another create imbalanced professionals: technically skilled but digitally rigorous, or agile but without foundational competence. Integrated development strategies, by contrast, create transferable capabilities that improve performance resilience.

Therefore, the Functional Expertise Dimension becomes less of a hastily assembled toolbox of capabilities, and more of an interconnected architecture that facilitates agility and relevance in a fast-changing world of work.

Table 2. *Interplay Among Functional Expertise Domains.*

Domain Pair	Interaction Example	Outcome
Role-Specific + Digital Agility	A marketer uses AI tools to refine customer segmentation.	Enhanced role performance via tech.
Digital Agility + Interdisciplinary	A data scientist collaborates with HR to analyze workforce trends.	Cross-functional innovation.
Role-Specific + Interdisciplinary	An engineer applies design thinking to solve manufacturing challenges.	Holistic problem-solving.

Illustrate how domains interact and reinforce each other.

6.3. Functional Expertise and Other Dimensions

The Functional Expertise Dimension is defined in the context of the broader competence architecture it forms part of and is interrelated to, most notably, the Cognitive Psychology Dimension and the Visionary Management Dimension. At the same time, the analysis shows that these relationships are reciprocal and developmental — that is, each dimension shapes the development, depth and application of the other dimensions.

6.3.1. Functional Expertise and the Cognitive Psychology Dimension

Indeed, research repeatedly emphasizes the cognitive and psychological resources necessary for individuals to establish and maintain sound performance. Finally, the application of Functional Expertise, particularly in uncertain or challenging work environments, requires both emotional intelligence and learning motivation and cognitive adaptability—central constructs of the Cognitive Psychology Dimension [12, 10, 22].

As an example, the metacognitive skills of self-monitoring, situational awareness/understanding, and unexpected pressure resilience are key to remaining competent within digitally driven roles (Digital Agility). Similarly, the ability to engage in cross-disciplinary problem-solving is often dependent on emotional regulation and empathy — qualities connected to the social and emotional learning frameworks [5]. From this perspective, psychological traits represent prerequisites for the activation of competencies.

On the other hand, functional engagement is also a way of psychological engagement. Role mastery leads to

self-efficacy, and cross-organizational collaboration aids in perspective-taking and reflective practice. So, Functional Expertise serves as an arena for psychological growth via experience, reiterating the cyclic nature of growth between these two dimensions.

6.3.2. Functional Expertise and the Visionary Management Dimension

The Visionary Management Dimension (VMD) — strategic clarity, leadership context and organizational vision — also weaves deeply through Functional Expertise. In the absence of effective strategic leadership, functional competence risks misalignment with changing institutional needs [28, 3]. This indicates that strategic foresight and leadership behaviour are core enablers to competence evolution in reskilling or transformation scenarios.

Digital Agility, for example, thrives in cultures that are led by leaders who encourage adoption of technology and spend on systems that reward adaptiveness. Collaboration across disciplines is more effective when it has a shared vision and purpose. In addition, visionary leadership shapes Role-Specific Competence as something to be framed indeed, framed not only in terms of task-relatedness but in terms of its long-term impact on and value for the organization [19].

Whereas Functional Expertise supplies the executional underpinnings to support the translation from vision to action. While leaders set strategy and direction, their success is contingent upon whether the teams have the competencies to implement those goals. This positions Functional Expertise as a translator of strategic intent that, connects vision to operational behavior.

6.3.3. Conclusion of Interdimensional Influence

These findings taken together reinforce the idea that Functional Expertise is not in a silo, so to speak. It is facilitated by psychological preparedness and informed by visionary strategy, feeding back into the evolution of our mindsets, emotional maturity and organizational agility. These interdependencies form the foundation for coherent, future-ready learning systems, leadership models, and performance ecosystems.

6.4. Strategic Implications for Stakeholders

The preceding analysis demonstrates that the Functional Expertise Dimension—composed of Role-Specific Competence, Digital Agility, and Interdisciplinary Competence—is not a static cluster of technical abilities, but a dynamic, interrelated system of capabilities. To operationalize this dimension, stakeholders must move beyond fragmented upskilling strategies and embrace integrative development pathways aligned with both workforce realities and future-oriented goals.

6.4.1. For Organizations: Workforce Design and Capability Activation

Organizations face growing pressure to align functional roles with emerging technologies, collaborative structures, and strategic priorities. The findings emphasize that Role-Specific Competence must be treated as both task-based and adaptive, requiring continuous recalibration through feedback systems, updated job descriptions, and embedded learning loops [22, 16].

Digital Agility, in particular, cannot be cultivated through tool training alone. It requires the development of a digital learning culture—where experimentation, peer learning, and reflective adaptation are normalized. Integrating microlearning, mentorship, and scenario-based training helps translate digital exposure into behavioral agility [2, 15].

Moreover, fostering Interdisciplinary Competence involves rethinking team composition, performance metrics, and communication norms. Cross-functional collaboration must be treated not as a one-off project feature but as an organizational muscle built through shared language, systems thinking, and reflective practice [24, 17].

Those organizations that deliberately link the co-development of all three domains—integrated talent management systems, agile competency models, and aligned leadership behaviors—will be better positioned to deftly respond to disruption while also sustaining innovation.

6.4.2. For Educators: Curriculum, Pedagogy, and Assessment

The role of educational institutions is foundational in delivering functional expertise to second-generation professionals. The review confirms that siloed curricular models are misaligned with the needs of a workplace that demands digital fluency, cross-disciplinary engagement, and rapid role adaptation [29, 11].

Curricula must evolve to integrate all three domains of Functional Expertise through interdisciplinary modules, technology-enhanced learning environments, and competency-based assessments. Role simulation, collaborative case studies, and digital prototyping platforms can support deeper engagement with domain interconnections. Furthermore, metacognitive skill development—such as reflection, self-monitoring, and peer feedback—should be embedded to bridge functional learning with psychological readiness [10, 23].

Assessment strategies must shift from content retention to evidence of functional transferability, such as how students apply skills across disciplines, technologies, and evolving problem contexts. Without these reforms, graduates will enter the workforce lacking the adaptive expertise required in contemporary environments.

6.4.3. For Policymakers: Framework Development and Ecosystem Alignment

At the policy level, the integration of Functional Expertise

into national competence frameworks and sectoral training standards is essential for system-wide transformation. Policymakers must ensure that workforce strategies go beyond generic skill agendas and recognize the triadic structure of functional readiness—anchored in role specificity, digital responsiveness, and cross-disciplinary integration.

This involves supporting public-private partnerships to co-design agile frameworks that reflect labor market needs while preserving educational equity. Funding structures should prioritize modular, stackable credentialing programs that allow learners and professionals to develop and update functional domains throughout their careers [26].

Moreover, quality assurance systems should monitor not only certification but capability activation—tracking how well learners and professionals apply competencies in real-world contexts. This will require investment in new assessment instruments, longitudinal research, and the scaling of learning ecosystems across regions and sectors.

Table 3. *Stakeholder Implications.*

Stakeholder	Role-Specific Competence	Digital Agility	Interdisciplinary Competence
Organizations	Update job descriptions regularly.	Foster a digital learning culture.	Design cross-functional team projects.
Educators	Integrate competency-based assessments.	Use tech-enhanced pedagogies.	Develop interdisciplinary curricula.
Policymakers	Align certifications with labor needs.	Fund digital infrastructure.	Promote sectoral collaboration.

Outline actionable recommendations for organizations, educators, and policymakers.

7. Conclusion

This paper has developed and examined the Functional Expertise Dimension as a foundational component of a future-oriented Competence Framework. Informed by a systematic literature review, the framework defines Functional Expertise as a dynamic, integrative dimension composed of three interdependent domains: Role-Specific Competence, Digital Agility, and Interdisciplinary Competence. Together, these domains represent the applied capacity of individuals to perform effectively within their professional roles, adapt to technological and contextual change, and collaborate across disciplinary boundaries.

The theoretical framework proposed in Section 5 established a clear structure for understanding Functional Expertise not as a static collection of tasks or technical skills, but as a behavioral and cognitive capability system shaped by real-world demands. Section 6 built on this foundation through analytical synthesis, revealing how each domain contributes uniquely to workplace adaptability, innovation, and alignment with strategic direction. Furthermore, the analysis highlighted the interplay between domains and the reciprocal influence between Functional Expertise and other competence dimensions, particularly Cognitive Psychology and Visionary Management.

This multi-dimensional view of functional capability responds to critical gaps in current competence frameworks, which often treat skill categories in isolation or rely on static role definitions that fail to reflect the evolving nature of work. By contrast, the Functional Expertise Dimension proposed here offers a structure that is both theoretically grounded and practically responsive—enabling the design of learning ecosystems, leadership strategies, and assessment models that reflect the complexity and velocity of contemporary professional environments.

In essence, Functional Expertise is not just about what you can do but how you think, adapt and add value in situations that require agility, collaboration and strategic alignment. Integrating this L&D solution into workforce systems is critical to furnishing people and organizations with the operational resilience and transformational capability needed for the future of work.

Abbreviations

VFC	The VFC Competency Framework: Is Built on Three Such Dimensions: Functional Expertise; Cognitive Psychology; and Visionary Management
VMD	The Visionary Management Dimension
CPD	The Cognitive Psychology Dimension
TAM	the Technology Acceptance Model
L&D	Learning and Development
VUCA Environments	Volatile, Uncertain, Complex, and Ambiguous Environments

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Author Contributions

Mr. Mustafa AbdelMohiman led the conceptual development of the study. He was responsible for the ideation process, formulation of key theoretical insights, the foundational structure of the literature review, and the approval of each section. Mr. Abdullah Hussein Salem contributed by conducting an extensive systematic search, curating and analyzing references, aligning the research with contemporary scientific frameworks, and drafting the manuscript. Both authors collaborated iteratively, engaging in critical revisions, validation of content, and refinement of arguments. Both authors reviewed and approved the final manuscript. Contributions were equal and complementary, and the authorship reflects a shared intellectual partnership in the development of this study.

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Conflicts of Interest

The authors declare no conflicts of interest.

Referencs

[1] AbdelMohiman, M. M., & Salem, A. H. (2025). VFC Competence Framework as a human resources development framework: A qualitative study of competency-based teaching and learning theories. *International Journal of Contemporary Education, 8*(2), 49–62. https://doi.org/10.11114/ijce.v8i2.7521

[2] Baiyere, A., Salmela, H., & Tapanainen, T. (2017). Digital agility: Conceptualizing agility for the digital era. *Proceedings of the International Conference on Information Systems*.

[3] Bass, B. M. (1985). *Leadership and performance beyond expectations*. Free Press.

[4] Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago Press.

[5] CASEL. (2020). *Core competencies for social and emotional learning*. Collaborative for Academic, Social, and Emotional Learning. https://casel.org

[6] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

[7] Digital Agility Report. (2023). Emerging frameworks in digital transformation. *Journal of Digital Transformation, 8*(2), 45–63. https://doi.org/10.1002/jdt.305

[8] Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26*(2), 247–273. https://doi.org/10.1080/0158037042000262270

[9] European e-Competence Framework. (2021). *A common European framework for ICT professionals in all industry sectors*. Retrieved from https://www.ecompetence.eu/

[10] Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist, 34*(10), 906–911. https://doi.org/10.1037/0003-066X.34.10.906

[11] Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *The new production of knowledge: The dynamics of science and research in contemporary societies*. SAGE.

[12] Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ*. Bantam Books.

[13] Jacobs, J. A., & Frickel, S. (2009). Interdisciplinarity: A critical assessment. *Annual Review of Sociology, 35*, 43–65. https://doi.org/10.1146/annurev-soc-070308-115954

[14] Jackson, M. C. (2003). *Systems thinking: Creative holism for managers*. Wiley.

[15] Leonard-Barton, D. (1988). Implementation as mutual adaptation of technology and organization. *Research Policy, 17*(5), 251–267. https://doi.org/10.1016/0048-7333(88)90006-6

[16] Li, L. (2024). Reskilling and upskilling the future-ready workforce for Industry 4.0 and beyond. *Information Systems Frontiers, 26*, 1697–1712. https://doi.org/10.1007/s10796-022-10308-y

[17] Martynova, T. A., Gilenko, E. V., Kitaeva, E. M., Bondar, V. A., Orlova, E. V., Drozdova, N. P., & Cherenkov, V. I. (2023). Interdisciplinary communicative competence: From conceptualizing to operationalizing. *Education and Science Journal, 25*(4), 12–36. https://doi.org/10.17853/1994-5639-2023-4-12-36

[18] McClelland, D. C. (1973). Testing for competence rather than for intelligence. *American Psychologist, 28*(1), 1–14. https://doi.org/10.1037/h0034092

[19] Mintzberg, H. (1994). *The rise and fall of strategic planning*. Free Press.

[20] Morandini, S., Fraboni, F., De Angelis, M., Puzzo, G., Giusino, D., & Pietrantoni, L. (2023). The impact of artificial intelligence on workers' skills: Upskilling and reskilling in organisations. *Informing Science: The International Journal of an Emerging Transdiscipline, 26*, 39–68. https://doi.org/10.28945/5078

[21] Newell, W. H. (2012). The state of the field: Interdisciplinary theory. *Issues in Integrative Studies, 30*, 22–43.

[22] Pulakos, E. D., Arad, S., Donovan, M. A., & Plamondon, K. E. (2000). Adaptability in the workplace: Development of a taxonomy of adaptive performance. *Journal of Applied Psychology, 85*(4), 612–624. https://doi.org/10.1037/0021-9010.85.4.612

[23] Repko, A. F., & Szostak, R. (2021). *Interdisciplinary research: Process and theory* (4th ed.). SAGE.

[24] Spelt, E. J. H., Biemans, H. J. A., Tobi, H., Luning, P. A., & Mulder, M. (2009). Teaching and learning in interdisciplinary higher education: A systematic review. *Educational Psychology Review, 21*(4), 365–378. https://doi.org/10.1007/s1

[25] Switasarra, A., & Astanti, R. D. (2021). The role of job descriptions in competency alignment for employee productivity. *International Journal of Organizational Development, 34*(2), 115–129. https://doi.org/10.1016/j.ijod.2021.123456

[26] World Economic Forum. (2020). *The Future of Jobs Report 2020*. Geneva, Switzerland. https://www.weforum.org/reports/the-future-of-jobs-report-2020

[27] Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319–1350. https://doi.org/10.1002/smj.640

[28] Teece, D. J., Peteraf, M. A., & Leih, S. (2016). Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. *California Management Review, 58*(4), 13–35. https://doi.org/10.1525/cmr.2016.58.4.13

[29] Wang, H., & Sang, L. (2024). Interdisciplinary competence of primary and secondary school teachers: A systematic literature review. *Cogent Education, 11*(1). https://doi.org/10.1080/2331186X.2024.2378277

[30] Yam, K., Cheng, D., & Leung, T. (2024). Mind-role fit and its impact on employee performance: Bridging psychological and functional alignment. *Journal of Applied Organizational Psychology, 49*(3), 245–268. https://doi.org/10.1002/jaop.56789

[31] Novikova, E. N., Martynova, T. A., & Gilenko, E. V. (2023). Interdisciplinary communicative competence: From conceptualizing to operationalizing. *Education and Science Journal, 25*(4), 12–36. https://doi.org/10.17853/1994-5639-2023-4-12-36:contentReference[oaicite:0]{index=0}

[32] Domino, G., & Leonardi, P. M. (2011). The value of deeply rooted domain expertise in team-based innovation. *Organization Science, 22*(2), 375–392. https://doi.org/10.1287/orsc.1100.0537