



## Adaptive Youth Development Systems: A Multi-Level Mechanism Model of Scouting Education in the Digital Era

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### Abstrak

*This study develops an integrative conceptual framework that reconceptualizes scouting education as an adaptive youth development system operating across multiple levels in the digital era. The rapid transformation of learning environments driven by digitalization and increasing systemic complexity has created a need for models that go beyond linear and fragmented approaches to youth development. Existing literature on Positive Youth Development, learning ecosystems, and digital transformation remains theoretically disconnected, limiting the ability to explain how developmental processes unfold in contemporary contexts. This study addresses this gap by adopting a theory synthesis approach that integrates complexity theory, learning ecosystem perspectives, and developmental frameworks into a coherent multi-level model. The framework identifies key mechanisms at the individual, group, and organizational levels, including engagement, reflective learning, social interaction, and leadership systems, with digital mediation functioning as a cross level enabler. The proposed model contributes theoretically by offering a mechanism based and multi-level explanation of youth development, and practically by providing guidance for designing adaptive and digitally integrated scouting programs. The framework also establishes a foundation for future empirical research using multi-level and mixed method approaches.*

### Keywords

adaptive youth development; scouting education; learning ecosystems; digital mediation; positive youth development; complex adaptive systems

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# 1. Introduction

The transformation of youth development systems in the 21st century has accelerated under the combined pressures of digitalization, socio-cultural change, and increasing institutional complexity. Contemporary educational environments are no longer confined to formal settings but operate within interconnected systems that span formal, nonformal, and informal domains. This shift has intensified expectations placed on youth organizations to cultivate not only cognitive competencies but also character, resilience, and civic responsibility within highly dynamic contexts (Bond *et al.*, 2020; Darling-Hammond *et al.*, 2020; OECD, 2023). As a result, the effectiveness of youth development initiatives increasingly depends on their capacity to function as adaptive systems rather than static programmatic structures.

Within this evolving landscape, scouting education represents a distinctive and historically grounded model of nonformal learning that integrates experiential activities with value-based development. Its emphasis on learning by doing, peer interaction, and leadership development positions it as a critical context for examining how developmental processes unfold beyond traditional schooling structures. However, despite its global reach and longstanding influence, scouting remains under-theorized in contemporary academic discourse, particularly in relation to systemic adaptation and digital transformation. This limitation is especially evident when considering the growing complexity of youth engagement patterns in hybrid learning environments.

Theoretical foundations of youth development have been predominantly shaped by Positive Youth Development (PYD), which conceptualizes development as a strengths-based process emerging from interactions between individuals and their environments (Lerner *et al.*, 2015; Damon, 2004). Central to this framework is the 5Cs model—competence, confidence, character, connection, and caring—which collectively contribute to positive developmental outcomes (Bowers *et al.*, 2015; Geldhof *et al.*, 2013). More recent extensions of PYD emphasize relational developmental systems, highlighting that developmental trajectories are co-constructed through dynamic interactions between personal attributes and ecological contexts (Lerner *et al.*, 2021; Overton, 2015). While these perspectives provide a robust foundation, they tend to prioritize individual-level outcomes and offer limited insight into how multi-level systemic interactions shape development.

Parallel to this, research in complexity and systems theory has reconceptualized education as a complex adaptive system characterized by nonlinearity, feedback loops, and emergent outcomes (Jacobson *et al.*, 2019; Koh & Askell-Williams, 2021; Davis & Sumara, 2022). This perspective shifts the analytical focus from isolated variables to relational dynamics, suggesting that learning and development emerge from ongoing interactions among system components. Similarly, the concept of learning ecosystems has gained prominence, emphasizing the distributed and networked nature of learning across contexts, platforms, and experiences (Sangrà *et al.*, 2019; Peters *et al.*, 2022; Siemens, 2022). These developments highlight the need to move beyond linear and reductionist models toward integrative frameworks capable of capturing systemic complexity.

At the same time, digital transformation has fundamentally altered the structure and dynamics of learning environments. The proliferation of digital technologies has enabled hybrid learning systems that extend participation across spatial and temporal boundaries, reshaping how youth engage with content, peers, and institutions (Crompton & Burke, 2023; Bond *et al.*, 2023). These technologies function not only as tools but as structural components that mediate interactions and influence developmental processes. Empirical evidence suggests that digital environments can enhance engagement through personalization, connectivity, and real-time feedback, yet they also introduce challenges related to equity, attention, and quality of participation (Kahu & Nelson, 2020; Van Dijk,

2020). Despite their significance, digital dimensions remain insufficiently integrated into existing youth development models.

Taken together, these streams of literature reveal a critical theoretical gap. Research on youth development, learning ecosystems, and digital transformation has largely evolved in parallel rather than in integration. PYD frameworks emphasize individual outcomes without adequately capturing systemic dynamics, while complexity and ecosystem perspectives provide macro-level insights but often lack specification of developmental mechanisms. Digital education research, in turn, focuses heavily on technological affordances without fully linking them to long-term developmental trajectories. This fragmentation limits the ability to explain how developmental processes operate across levels within complex and digitally mediated environments.

The absence of mechanism-based explanations further exacerbates this limitation. Much of the existing literature relies on descriptive or correlational approaches, identifying relationships between constructs without explicating the underlying causal processes that drive developmental outcomes (Durlak *et al.*, 2010; Larson, 2000). In the context of nonformal education such as scouting, this results in a lack of clarity regarding how program structures, social interactions, and individual experiences interact to produce character formation, leadership development, and civic engagement. Without such understanding, efforts to modernize youth development systems risk being fragmented and insufficiently responsive to contemporary challenges.

This gap is particularly significant in large-scale youth organizations such as Indonesia's Gerakan Pramuka, where the need for coherent and adaptive development models is intensified by the scale and diversity of participation. In such contexts, the integration of digital technologies, organizational structures, and experiential learning processes becomes critical for sustaining engagement and achieving developmental outcomes. Addressing this challenge requires a reconceptualization of scouting education as a dynamic system in which processes at multiple levels interact and co-evolve.

In response, this article proposes an integrative conceptual framework that reconceptualizes scouting education as an adaptive youth development system operating across micro, meso, and macro levels. Drawing on complexity theory, learning ecosystem perspectives, digital transformation literature, and Positive Youth Development frameworks, the model articulates how developmental mechanisms unfold through interactions between individual engagement, group dynamics, and organizational structures, with digital mediation functioning as a cross-level enabler. This approach enables a more comprehensive understanding of how adaptive processes generate developmental outcomes in contemporary contexts.

The contributions of this study are threefold. First, it advances theoretical understanding by integrating previously fragmented perspectives into a coherent, mechanism-based, multi-level framework. Second, it provides a structured foundation for future empirical research by specifying key constructs and relationships that can be tested using multi-level and mixed-method approaches. Third, it offers practical insights for designing adaptive youth development programs that align with the realities of digital transformation and evolving youth engagement patterns. These contributions are directly relevant to global development priorities, particularly SDG 4 (Quality Education), SDG 16 (Strong Institutions), and SDG 17 (Partnerships).

The remainder of this article is structured as follows. The next section reviews the theoretical foundations underlying the proposed framework, including complexity theory, learning ecosystems, digital transformation, and youth development. This is followed by the identification of key theoretical gaps and the development of the conceptual approach. Subsequent sections elaborate the conceptual model and propositions, before concluding

with a discussion of theoretical implications, practical applications, and directions for future research.

## 2. Literature Review

This section develops a theoretically integrated foundation for conceptualizing scouting education as an adaptive youth development system. Rather than presenting isolated streams of literature, this review synthesizes four key domains—complex adaptive systems, learning ecosystems, digital transformation, and Positive Youth Development—into a coherent explanatory architecture. The objective is to identify not only key constructs but also the underlying mechanisms through which developmental processes emerge across levels in dynamic and digitally mediated environments (Jacobson *et al.*, 2019; Sangrà *et al.*, 2019; Peters *et al.*, 2022).

### 2.1 Education as a Complex Adaptive System

Contemporary educational research increasingly conceptualizes learning environments as complex adaptive systems characterized by nonlinearity, interdependence, and emergent behavior (Jacobson *et al.*, 2019; Koh & Askill-Williams, 2021; Davis & Sumara, 2022). Within this perspective, educational outcomes are not the product of linear cause–effect relationships but arise from recursive interactions among diverse system components, including individuals, groups, institutional structures, and contextual conditions.

A defining feature of complex systems is the presence of feedback loops that enable continuous adaptation. These feedback mechanisms allow systems to respond dynamically to internal variations and external pressures, thereby sustaining functionality under changing conditions (Burns & Köster, 2021). In youth development contexts, such adaptive capacity is reflected in the ability of programs to evolve in response to participant needs, socio-cultural shifts, and technological advancements. Importantly, adaptation is not centrally controlled but distributed across actors, highlighting the role of agency at multiple levels.

The concept of emergence further deepens this perspective by suggesting that developmental outcomes cannot be fully predicted based on initial inputs. Instead, they arise from ongoing interactions that produce new patterns of behavior and learning (Davis & Sumara, 2022). This has significant implications for youth development, as it challenges deterministic models and underscores the importance of designing environments that enable interaction, experimentation, and reflection.

However, while complexity theory provides a powerful macro-level lens, it often lacks specificity regarding the mechanisms through which individual developmental processes occur. This limitation necessitates integration with theories that explain how engagement, identity formation, and learning operate at the micro and meso levels.

### 2.2 Learning Ecosystems and Distributed Development

The concept of learning ecosystems extends the systems perspective by emphasizing that learning occurs across interconnected environments rather than within isolated institutions (Sangrà *et al.*, 2019; Peters *et al.*, 2022). These ecosystems are composed of diverse learning nodes—including schools, communities, digital platforms, and nonformal organizations—that collectively shape developmental trajectories.

Recent research on learning ecologies highlights that effective ecosystems are characterized by three key features: connectivity, continuity, and learner agency (Jackson, 2021; Siemens, 2022). Connectivity refers to the integration of multiple learning contexts, continuity reflects the sustained nature of learning experiences across time, and agency denotes the capacity

of learners to navigate and shape their own learning pathways. Together, these features transform learning into an active, distributed, and context-sensitive process.

Nonformal education plays a pivotal role within these ecosystems by providing flexible and experiential learning opportunities that complement formal schooling. Unlike standardized curricular systems, nonformal settings enable adaptive learning processes that are responsive to participant needs and contextual realities (Rogers, 2005; Kiilakoski & Kivijärvi, 2015). Scouting, in particular, exemplifies this approach through its emphasis on experiential learning, peer collaboration, and value-based development.

From a mechanism perspective, learning ecosystems facilitate development by enabling cross-contextual transfer of knowledge and skills. Individuals integrate experiences from different environments, constructing meaning through interaction and reflection. This process aligns with constructivist and experiential learning theories, which emphasize the active role of learners in shaping their developmental trajectories.

Despite these advances, the literature on learning ecosystems often remains descriptive, with limited articulation of how ecosystem structures translate into measurable developmental outcomes. This gap reinforces the need for models that explicitly link ecosystem dynamics with youth development mechanisms.

### **2.3 Digital Transformation and Hybrid Learning Systems**

Digital transformation has become a defining force in reshaping educational systems, introducing new modes of interaction, participation, and knowledge construction (Crompton & Burke, 2023; OECD, 2023). The emergence of hybrid learning environments, combining physical and digital spaces, has expanded the boundaries of learning, enabling continuous engagement across contexts.

Empirical research indicates that digital environments influence learning not only through access but also through engagement quality. Features such as personalization, real-time feedback, and social connectivity enhance participation and motivation, thereby strengthening learning outcomes (Bond *et al.*, 2023; Kahu & Nelson, 2020). At the same time, digital transformation introduces structural challenges related to inequality, digital literacy, and cognitive overload (Van Dijk, 2020; Selwyn, 2016).

A critical insight from recent scholarship is that digital technologies function as more than tools; they act as structural mediators that reshape relationships within learning systems (Williamson *et al.*, 2020; Castañeda & Selwyn, 2018). By enabling communication across spatial and temporal boundaries, digital platforms facilitate new forms of interaction between individuals, groups, and organizations. This positions digital mediation as a cross-level mechanism that influences how developmental processes unfold.

Frameworks such as Technological Pedagogical Content Knowledge (TPACK) further emphasize that the effectiveness of digital integration depends on alignment between technology, pedagogy, and content (Mishra & Koehler, 2006; Laurillard, 2012). In youth development contexts, this implies that digital tools must be integrated in ways that enhance—not replace—experiential and social learning processes.

Despite its significance, digital transformation remains insufficiently integrated into youth development theory. Existing models often treat technology as an external variable rather than as an intrinsic component of the developmental system. This limits the ability to understand how digital mediation interacts with social and organizational mechanisms.

### **2.4 Positive Youth Development and Mechanisms of Growth**

Positive Youth Development (PYD) provides a foundational framework for understanding how developmental outcomes emerge through interactions between individuals and their

environments (Lerner *et al.*, 2015; Damon, 2004). Unlike deficit-based approaches, PYD emphasizes strengths, potential, and the role of supportive contexts in fostering development.

The 5Cs model, competence, confidence, connection, character, and caring: serves as a core conceptualization of positive development, with empirical evidence linking these dimensions to long-term well-being and civic engagement (Bowers *et al.*, 2015; Geldhof *et al.*, 2013). More recent extensions of PYD adopt a relational developmental systems perspective, emphasizing that development is co-constructed through dynamic interactions between individuals and ecological systems (Lerner *et al.*, 2021; Overton, 2015).

A key mechanism within PYD is engagement, defined as the behavioral, emotional, and cognitive involvement in developmental activities (Fredricks *et al.*, 2004; Skinner *et al.*, 2009). Engagement is not merely participation but reflects the depth of involvement and investment in learning processes. Self-determination theory further explains that engagement is strengthened when psychological needs for autonomy, competence, and relatedness are satisfied (Ryan & Deci, 2020).

Another critical mechanism is reflective learning, through which individuals interpret experiences, construct meaning, and integrate new knowledge into their identity and behavior. Reflection transforms activity into development, making it a central process in experiential learning environments such as scouting (Durlak *et al.*, 2010; Nucci *et al.*, 2014).

Character formation and civic engagement represent higher-order outcomes of these mechanisms. These processes are inherently relational, emerging through interactions with peers, mentors, and community contexts (Zaff *et al.*, 2010; Flanagan & Levine, 2010). However, while PYD provides strong insights into individual development, it offers limited guidance on how these processes operate within multi-level and digitally mediated systems.

## 2.5 Leadership and Social Processes in Youth Organizations

Leadership development constitutes a critical dimension of youth development, particularly within structured organizations such as scouting. Contemporary leadership theory conceptualizes development as a relational and process-oriented phenomenon that unfolds through experience, feedback, and social interaction (Day *et al.*, 2014; Murphy & Johnson, 2011).

Youth organizations provide unique contexts for leadership development by offering progressive roles, peer-based learning, and opportunities for responsibility. These environments enable participants to develop competencies such as decision-making, communication, and collaboration, while also fostering identity formation and self-efficacy (Kouzes & Posner, 2017; Hannah & Avolio, 2010).

Group-level processes play a central role in this development. Social interaction facilitates learning through observation, imitation, and collaboration, while group identity formation reinforces belonging and commitment (Postmes *et al.*, 2020). Social identity theory suggests that individuals internalize group norms and values through repeated interaction, shaping behavior and motivation.

Collaborative learning further enhances these processes by enabling participants to co-construct knowledge and solve problems collectively. This is particularly relevant in experiential settings, where learning is embedded in shared activities and challenges (Roholt *et al.*, 2014; Ord, 2007).

Despite the importance of these processes, existing research often treats leadership and group dynamics as isolated phenomena. There remains limited understanding of how these mechanisms interact with individual engagement and organizational structures within a broader adaptive system.

## 2.6 Synthesis: Toward an Integrated Multi-Level Framework

The reviewed literature reveals significant advancements across multiple domains, *yet also* highlights persistent fragmentation. Complexity theory provides a systemic lens but lacks micro-level specificity. Learning ecosystem research emphasizes distributed learning but often remains descriptive. Digital transformation introduces new dynamics but is insufficiently integrated into developmental theory. PYD offers robust insights into individual development but underrepresents systemic interactions.

This fragmentation reflects a broader limitation in contemporary educational research, where theoretical insights are not fully translated into integrative models capable of explaining real-world complexity (Fullan, 2021; Biesta, 2022). As a result, there is a critical need for a framework that connects these perspectives into a coherent, mechanism-based, and multi-level explanation of youth development.

Such a framework must account for:

- 1) interactions across individual, group, and organizational levels
- 2) mechanisms that link participation to developmental outcomes
- 3) the role of digital mediation in shaping these processes
- 4) the adaptive and emergent nature of learning systems

The next section addresses this need by identifying specific theoretical gaps and outlining the conceptual approach used to develop an integrative model of adaptive youth development systems in scouting education.

## 3. Identifying the Theoretical Gap

This section critically examines the limitations of existing literature to identify the unresolved theoretical issues that constrain the advancement of knowledge on youth development systems, particularly within the context of scouting education. While prior research has generated substantial insights across domains such as Positive Youth Development, learning ecosystems, and digital transformation, these perspectives remain insufficiently integrated. This fragmentation limits the capacity to explain how developmental mechanisms operate across levels within complex, adaptive, and digitally mediated environments (Jacobson *et al.*, 2019; Sangrà *et al.*, 2019; Peters *et al.*, 2022). Addressing this limitation requires a systematic interrogation of the gaps that emerge at the intersection of these theoretical traditions.

### 3.1 Fragmentation of Theoretical Perspectives

A fundamental limitation in the current body of literature lies in the fragmentation of theoretical approaches to youth development. Research grounded in Positive Youth Development has provided a robust understanding of individual-level outcomes, emphasizing constructs such as competence, confidence, and character as indicators of successful development (Lerner *et al.*, 2015; Damon, 2004). However, these frameworks tend to conceptualize development primarily at the individual level, offering limited insight into how broader systemic interactions shape these outcomes. The relational developmental systems perspective extends this view by acknowledging interactions between individuals and contexts, yet it stops short of fully articulating how these interactions operate within multi-level institutional structures (Overton, 2015; Lerner *et al.*, 2021).

In contrast, complexity and systems theory reconceptualize education as a dynamic and interconnected system characterized by feedback loops, emergence, and adaptation (Jacobson *et al.*, 2019; Koh & Askill-Williams, 2021). While this perspective offers a powerful macro-level lens, it often abstracts away from the concrete mechanisms that drive individual development, thereby limiting its applicability in explaining how specific developmental

outcomes are produced. Similarly, the literature on learning ecosystems emphasizes the distributed and networked nature of learning across contexts, highlighting the role of connectivity and learner agency (Sangrà *et al.*, 2019; Siemens, 2022). However, it provides limited specification of how these ecosystem structures translate into measurable developmental processes.

Digital education research introduces yet another layer of fragmentation. While it offers valuable insights into technological affordances and engagement patterns, it frequently treats digital environments as independent domains rather than as integral components of broader developmental systems (Crompton & Burke, 2023; Bond *et al.*, 2023). As a result, these bodies of literature evolve in parallel rather than in integration, creating conceptual silos that hinder the development of a unified explanatory framework. This fragmentation ultimately constrains the theoretical coherence and predictive capacity of research on youth development.

### **3.2 Lack of Mechanism-Based Explanations**

A second critical gap concerns the limited attention to mechanism-based explanations in the literature. Much of the existing research adopts descriptive or correlational approaches, identifying associations between variables without explicating the underlying causal processes that generate developmental outcomes (Durlak *et al.*, 2010; Larson, 2000). While constructs such as engagement, participation, and leadership are frequently examined, the pathways through which these constructs translate into character formation, identity development, and civic engagement remain insufficiently theorized.

For instance, engagement is widely recognized as a central driver of positive youth outcomes, yet the mechanisms through which engagement produces developmental change are often treated as implicit rather than explicitly modeled (Fredricks *et al.*, 2004; Skinner *et al.*, 2009). Self-determination theory suggests that engagement is shaped by the satisfaction of psychological needs, but this insight is rarely integrated into broader system-level models (Ryan & Deci, 2020). Similarly, reflective learning is acknowledged as a key process in experiential education, yet its role as a mediating mechanism linking experience to development is not consistently articulated across studies.

This limitation is particularly pronounced in nonformal education contexts such as scouting. Existing research often focuses on program effectiveness or participant outcomes without systematically examining how specific program components interact to produce developmental change (Rogers, 2005; Ord, 2007). Leadership development studies similarly emphasize outcomes such as skill acquisition and identity formation while underrepresenting the processes that connect experiential activities to these outcomes (Day *et al.*, 2014; Murphy & Johnson, 2011).

The absence of mechanism-based explanations limits both theoretical advancement and practical application. Without a clear understanding of causal pathways, interventions risk relying on generalized best practices rather than context-sensitive and adaptive strategies. This underscores the need for theoretical models that explicitly identify and integrate the mechanisms linking inputs, processes, and outcomes within youth development systems.

### **3.3 Absence of Multi-Level Integration**

A third major limitation in the literature is the lack of multi-level integration. Youth development processes inherently operate across multiple levels, including individual, group, and organizational contexts. However, most existing studies adopt a single-level perspective, thereby overlooking the interactions and feedback loops that occur across levels (Lerner *et al.*, 2015; Bowers *et al.*, 2015). This reductionist approach limits the ability to capture the complexity of real-world developmental processes.

At the individual level, research tends to focus on psychological constructs such as motivation, engagement, and identity. At the organizational level, studies emphasize program design, leadership, and institutional effectiveness (Eccles & Gootman, 2002; Kouzes & Posner, 2017). However, the meso level—where group dynamics, peer interaction, and social identity formation occur—is often underexplored despite its critical role in shaping developmental experiences (Larson *et al.*, 2006; Kiilakoski & Kivijärvi, 2015).

Social identity theory suggests that group belonging significantly influences behavior, motivation, and identity formation, yet its integration into youth development models remains limited (Postmes *et al.*, 2020). Similarly, collaborative learning processes, which play a central role in experiential education, are rarely linked systematically to both individual and organizational outcomes. This disconnect results in partial explanations that fail to account for how processes at different levels interact to produce developmental outcomes.

Furthermore, the interaction between organizational structures and individual experiences is often treated as static rather than dynamic. Program design, leadership practices, and institutional culture are typically conceptualized as contextual factors rather than as active components that co-evolve with participant behavior. This limits the ability to understand how adaptive systems function over time. Addressing this gap requires a multi-level framework that captures both vertical interactions across levels and horizontal dynamics within each level.

### **3.4 Digital Context Neglect in Youth Development Models**

Despite the growing influence of digital transformation, many youth development models have not fully incorporated the implications of digitally mediated environments. While research on digital learning has expanded rapidly, it often remains disconnected from theories of youth development and character formation (Bond *et al.*, 2023; OECD, 2023). This results in parallel streams of literature that fail to inform each other.

Digital technologies fundamentally alter the conditions under which learning and development occur by enabling new forms of interaction, access, and participation (Castañeda & Selwyn, 2018; Williamson *et al.*, 2020). Hybrid learning systems allow individuals to engage across physical and digital contexts, creating continuous and flexible learning experiences. However, they also introduce new challenges related to attention, motivation, and equity, particularly in relation to digital access and literacy (Van Dijk, 2020; Selwyn, 2016).

More importantly, digital technologies act as mediating structures that connect different levels of the system. They facilitate communication between individuals, support collaboration within groups, and enable coordination at the organizational level. Despite this, existing models often treat technology as an external variable or supplementary tool rather than as an integral component of the developmental system. This conceptualization limits the ability to understand how digital mediation shapes interactions, influences engagement, and contributes to developmental outcomes.

Integrating digital transformation into youth development theory therefore requires a shift from viewing technology as an add-on to recognizing it as a structural and relational component that influences processes across levels.

### **3.5 Synthesis of the Theoretical Gap**

Taken together, the analysis reveals a fundamental and multi-dimensional theoretical gap in the literature. Existing research is characterized by fragmentation across theoretical domains, limited articulation of underlying mechanisms, insufficient integration across levels, and inadequate incorporation of digital transformation into developmental models. These

limitations collectively constrain the ability to develop comprehensive explanations of how youth development processes unfold within contemporary learning environments.

This gap reflects a broader challenge in educational research, where theoretical insights are often not translated into integrative frameworks capable of capturing systemic complexity and real-world dynamics (Fullan, 2021; Biesta, 2022). As a result, current models lack the explanatory depth and practical relevance required to inform adaptive and scalable youth development systems.

Addressing this gap requires a reconceptualization of youth development as a dynamic, multi-level, and mechanism-based system in which individual experiences, group interactions, organizational structures, and digital technologies are interdependent and co-evolving. Such a framework must move beyond static and linear representations to capture the emergent and adaptive nature of developmental processes, while also specifying the mechanisms that link participation to outcomes.

The following section responds to this need by outlining the conceptual approach and analytical strategy used to construct an integrative framework for adaptive youth development systems in scouting education.

## 4. Conceptual Approach and Analytical Strategy

This section outlines the conceptual and analytical foundations used to construct the proposed framework of adaptive youth development systems in scouting education. Building upon the identified theoretical gaps, the study adopts an integrative, mechanism-based, and multi-level approach that synthesizes multiple theoretical traditions into a coherent explanatory model. The objective is to move beyond descriptive and fragmented accounts toward a structured understanding of how developmental processes operate across levels within complex and digitally mediated environments (Jacobson *et al.*, 2019; Sangrà *et al.*, 2019; Peters *et al.*, 2022).

### 4.1 Theory Synthesis Approach

The development of the conceptual framework is grounded in a theory synthesis approach, which enables the integration of complementary theoretical perspectives to generate new insights that are not attainable within a single framework. Theory synthesis is particularly relevant in contexts where existing knowledge is fragmented across domains, as it facilitates the construction of a unified explanatory structure (Sangrà *et al.*, 2019; Peters *et al.*, 2022).

In this study, four primary theoretical domains are integrated. Complexity theory provides a systemic lens that captures the adaptive and emergent nature of educational processes. Learning ecosystem theory contributes a contextual perspective by emphasizing the distributed and interconnected nature of learning across environments. Digital transformation literature introduces the role of technological mediation as a structural component that reshapes interactions. Positive Youth Development offers a developmental foundation, specifying key outcomes and individual-level processes.

The integration of these perspectives is not additive but relational. Each theoretical domain is positioned as an interdependent component of a broader explanatory system. For instance, adaptive processes derived from complexity theory are linked with engagement and reflection mechanisms from PYD, while digital technologies are conceptualized as structural enablers that operate within learning ecosystems (Crompton & Burke, 2023; Bond *et al.*, 2023). This relational synthesis enables the development of a framework that simultaneously explains processes and outcomes across levels.

Importantly, this approach aligns with recent calls for interdisciplinary and integrative models in educational research, which emphasize the need to bridge micro-level psychological

processes with macro-level systemic dynamics (Fullan, 2021; Biesta, 2022). By situating the framework at this intersection, the study enhances both its theoretical coherence and practical relevance.

## 4.2 Conceptual Mapping and Mechanism Identification

A central methodological component of this study is conceptual mapping, which involves systematically identifying key constructs and specifying the relationships between them. Conceptual mapping enables the organization of complex theoretical insights into a structured framework, making it particularly suitable for theory-building research (Sangrà *et al.*, 2019; Peters & Romero, 2019).

Through this process, the study identifies a set of core constructs that are central to adaptive youth development systems, including adaptive capacity, engagement, reflective learning, social interaction, group identity, organizational structure, and digital mediation. These constructs are selected based on their theoretical relevance and their recurrence across the synthesized literature.

A structured tabulation is required to eliminate ambiguity in construct definition and level of analysis, particularly given the multi-theoretical integration underpinning the framework. The table below consolidates constructs, mechanisms, and their theoretical grounding into a single analytical reference point.

**Table 1.** Core Constructs, Levels, and Mechanisms in Adaptive Youth Development Systems

Level	Construct	Mechanism Function	Theoretical Foundation
Micro	Motivation	Initiates participation through intrinsic drivers	Self-Determination Theory (Ryan & Deci, 2020)
Micro	Engagement	Sustains behavioral, emotional, cognitive involvement	Engagement Theory (Fredricks <i>et al.</i> , 2004)
Micro	Reflective Learning	Transforms experience into meaning and identity	Experiential Learning (Durlak <i>et al.</i> , 2010)
Meso	Social Interaction	Enables exchange, feedback, and relational learning	Social Learning Theory (Larson <i>et al.</i> , 2006)
Meso	Group Identity	Internalizes shared norms and belonging	Social Identity Theory (Postmes <i>et al.</i> , 2020)
Meso	Collaborative Learning	Facilitates co-construction of knowledge	Collaborative Learning Theory (Roholt <i>et al.</i> , 2014)
Macro	Program Design	Structures developmental opportunities	Youth Program Design (Eccles & Gootman, 2002)
Macro	Leadership Systems	Aligns and coordinates multi-level processes	Leadership Development (Day <i>et al.</i> , 2014)
Macro	Institutional Culture	Shapes norms, values, and participation climate	Organizational Theory (Schein, 2010)
Cross-Level	Digital Mediation	Connects and reshapes interactions across levels	Digital Transformation (Williamson <i>et al.</i> , 2020)

*Source: Developed by the authors*

Table 1 consolidates the conceptual architecture by explicitly linking each construct to its corresponding mechanism and theoretical foundation, thereby reducing definitional ambiguity and preventing conceptual overlap across levels. By organizing constructs according to micro, meso, and macro domains while isolating digital mediation as a cross-level mechanism, Table 1 strengthens the analytical clarity of the framework and supports its translation into empirical operationalization.

However, conceptual mapping alone is insufficient without the identification of underlying mechanisms. Mechanism identification focuses on the causal processes that explain how

and why relationships between constructs occur (Durlak *et al.*, 2010; Larson, 2000). In this study, mechanisms are conceptualized as dynamic processes that translate participation and interaction into developmental outcomes.

Engagement, for instance, is positioned as a mechanism that converts experiential participation into cognitive, emotional, and behavioral investment. Reflective learning functions as a mechanism that transforms experience into meaning and identity formation. Social interaction operates as a mechanism that facilitates knowledge exchange, collaboration, and the internalization of group norms. At the organizational level, program design and leadership structures act as enabling mechanisms that shape the conditions under which these processes occur.

By explicitly identifying these mechanisms, the framework moves beyond correlational explanations and provides a causal logic that links inputs, processes, and outcomes. This is essential for both theoretical advancement and practical application, as it allows for the design of interventions that target specific developmental pathways.

### **4.3 Multi-Level Analytical Framework**

The conceptual framework adopts a multi-level analytical structure to capture the inherent complexity of youth development processes. Three levels of analysis are specified: micro, meso, and macro, each representing distinct but interconnected domains of influence.

At the micro level, the focus is on individual processes, including motivation, engagement, and reflection. These processes are central to Positive Youth Development and represent the primary drivers of individual growth (Lerner *et al.*, 2015; Ryan & Deci, 2020). At the meso level, the framework examines group dynamics, including peer interaction, social identity formation, and collaborative learning. These processes mediate individual experiences and play a critical role in shaping developmental trajectories (Larson *et al.*, 2006; Postmes *et al.*, 2020). At the macro level, the focus shifts to organizational structures, program design, and institutional practices, which provide the broader context within which development occurs (Eccles & Gootman, 2002; Day *et al.*, 2014).

The relationship between these levels is conceptualized as dynamic and reciprocal. Processes at one level both influence and are influenced by processes at other levels, creating feedback loops that drive system adaptation. For example, individual engagement contributes to group dynamics, while group interactions shape organizational practices. In turn, organizational structures influence both individual and group-level processes by enabling or constraining participation and interaction.

This multi-level perspective is consistent with contemporary theories of complex systems and multilevel analysis, which emphasize the importance of capturing cross-level interactions in understanding social phenomena (Kozlowski & Klein, 2000; Aguinis *et al.*, 2020). By incorporating these interactions, the framework provides a more comprehensive explanation of how developmental processes unfold within adaptive systems.

### **4.4 Logic of Model Development**

The development of the conceptual model follows a structured and iterative logic that integrates theoretical insights with analytical rigor. The process begins with the identification of key constructs derived from the literature, followed by the specification of relationships based on both theoretical reasoning and empirical evidence. These relationships are then organized into a multi-level structure that reflects the interactions between individual, group, and organizational processes.

A critical aspect of this logic is the positioning of digital mediation as a cross-level enabler. Rather than being treated as an external variable, digital technologies are conceptualized as integral components that facilitate and reshape interactions across the system (Williamson

*et al.*, 2020; Castañeda & Selwyn, 2018). This conceptualization reflects the reality of contemporary learning environments, where digital and physical experiences are deeply intertwined.

The model development process also incorporates the principle of alignment across levels. Effective youth development systems are characterized by coherence between individual engagement, group dynamics, and organizational structures. Misalignment across these levels can lead to inefficiencies and reduced developmental outcomes, while alignment enhances system adaptability and effectiveness.

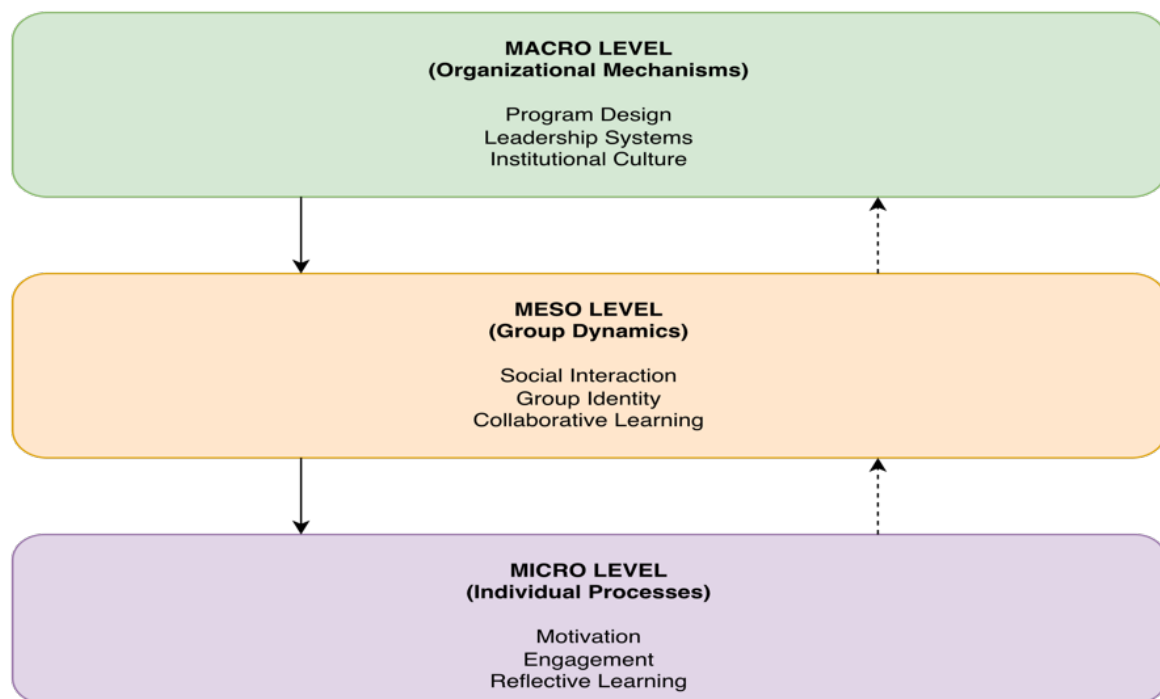
Finally, the framework is refined through iterative alignment between theoretical coherence and practical applicability. This ensures that the model is not only conceptually robust but also relevant for real-world implementation. By grounding the framework in both theory and practice, the study contributes to bridging the gap between abstract conceptualization and applied youth development strategies.

The conceptual approach presented in this section provides the analytical foundation for the development of an integrative model of adaptive youth development systems. By combining theory synthesis, mechanism identification, and multi-level analysis, the study establishes a structured pathway for translating fragmented theoretical insights into a coherent explanatory framework. The next section builds on this foundation by elaborating the core constructs, mechanisms, and relationships that constitute the proposed conceptual model.

## 5. Results: Conceptual Development

This section presents the core outcome of the study, namely the development of an integrative conceptual framework that reconceptualizes scouting education as an adaptive youth development system. Building on the theoretical synthesis and identified gaps, the framework articulates how developmental outcomes emerge through mechanism-based interactions across multiple levels. Rather than treating development as a linear progression, the model positions it as an emergent process shaped by dynamic relationships between individual engagement, social interaction, organizational structures, and digital mediation (Jacobson *et al.*, 2019; Lerner *et al.*, 2015; Davis & Sumara, 2022).

A multi-level conceptual architecture is necessary to clarify how youth development processes are structurally organized across interacting domains. The figure below formalizes the theoretical positioning of micro, meso, and macro mechanisms within an adaptive system, highlighting their vertical interdependencies rather than treating them as isolated analytical layers.



**Figure 1.** Multi-Level Mechanism Architecture of Adaptive Youth Development Systems  
*Source: Author's conceptualization*

The framework articulated in Figure 1 clarifies how youth development is structured across three analytically distinct yet interdependent levels. Rather than depicting a linear hierarchy, Figure 1 emphasizes reciprocal relationships in which organizational structures shape group dynamics, group processes mediate individual development, and individual experiences feed back into higher-level adaptation. This multi-level configuration is essential for understanding how developmental outcomes emerge through aligned mechanisms rather than isolated variables.

## 5.1 Core Constructs Definition

The conceptual model is structured around four interrelated core constructs: adaptive system capacity, learning ecosystem integration, youth development outcomes, and digital mediation. Each construct represents a distinct yet interconnected dimension of the system, contributing to the emergence of developmental processes.

Adaptive system capacity refers to the ability of the scouting education system to respond dynamically to internal variations and external pressures through continuous feedback, learning, and adjustment. This construct extends complexity theory by operationalizing adaptation as a system-level capability rather than an abstract property (Koh & Askell-Williams, 2021; Burns & Köster, 2021). It captures how the system evolves over time through interactions among actors and structures.

Learning ecosystem integration reflects the degree to which diverse learning contexts (formal, nonformal, and informal) are interconnected and aligned to support developmental processes. This construct emphasizes continuity and coherence across learning experiences, allowing individuals to transfer knowledge and skills across contexts (Sangrà *et al.*, 2019; Siemens, 2022). Within this ecosystem, scouting operates as a critical node that bridges experiential learning with broader developmental pathways.

Youth development outcomes are conceptualized based on the Positive Youth Development framework, encompassing competence, confidence, character, connection, and caring. These outcomes are not treated as static end-states but as emergent properties resulting from sustained interaction between individuals and their environments (Bowers *et al.*, 2015;

Lerner *et al.*, 2021). This reconceptualization shifts the focus from outcome measurement to process generation.

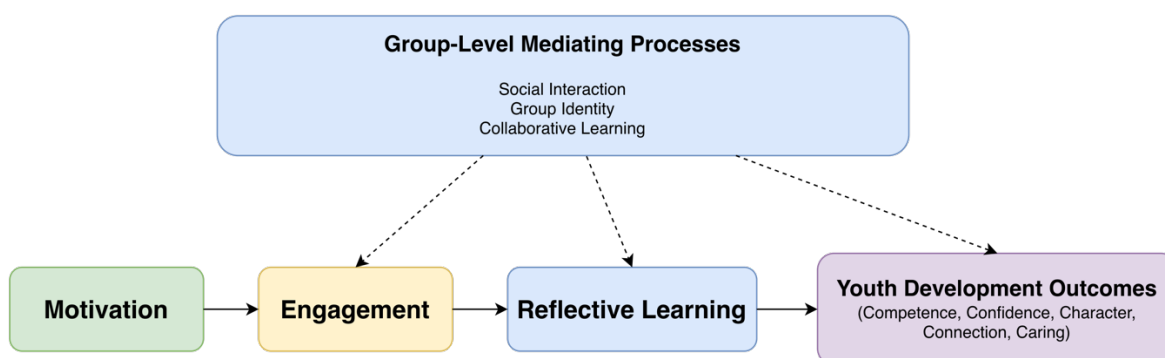
Digital mediation is positioned as a cross-cutting construct that reshapes interactions across all levels of the system. It refers to the role of digital technologies in facilitating communication, enabling participation, and structuring learning processes (Castañeda & Selwyn, 2018; Williamson *et al.*, 2020). Unlike traditional perspectives that treat technology as an external tool, this model conceptualizes digital mediation as an intrinsic component that co-determines system dynamics.

Together, these constructs form the structural backbone of the adaptive youth development system, providing the basis for identifying the mechanisms through which development occurs.

## 5.2 Micro-Level Mechanisms: Individual Development Processes

At the micro level, the framework focuses on the internal processes through which individuals engage with and derive meaning from their experiences. Three primary mechanisms are identified: motivation, engagement, and reflective learning.

A mechanism-focused representation is required to explicate how developmental outcomes are generated through sequential and interacting processes. The following figure translates the theoretical logic into a causal pathway, clarifying how individual-level mechanisms are activated and subsequently mediated by group-level dynamics to produce youth development outcomes.



**Figure 2.** Mechanism Flow of Youth Development in Scouting Systems  
*Source: Developed by the authors*

As illustrated in Figure 2, youth development is generated through a sequential activation of individual-level mechanisms, where motivation initiates engagement, engagement sustains participation, and reflective learning transforms experience into developmental outcomes. The structure also integrates group-level processes as mediating forces that shape the strength and direction of these relationships. Figure 2 therefore makes explicit the causal logic of the framework, demonstrating how developmental outcomes emerge from interconnected mechanisms rather than direct linear effects.

Motivation, particularly intrinsic motivation, serves as the initial driver of participation in scouting activities. Drawing on self-determination theory, motivation is strengthened when individuals experience autonomy, competence, and relatedness within their environment (Ryan & Deci, 2020). These psychological conditions create the foundation for sustained engagement and developmental progression.

Engagement functions as a central mechanism that translates participation into developmental outcomes. It encompasses behavioral involvement, emotional investment, and cognitive effort (Fredricks *et al.*, 2004; Skinner *et al.*, 2009). In this model, engagement is not treated as a static variable but as a dynamic process that fluctuates based on

contextual conditions and social interactions. High-quality engagement enables deeper learning, stronger identity formation, and greater internalization of values.

Reflective learning represents the mechanism through which experiences are transformed into personal meaning and growth. Through reflection, individuals interpret their actions, evaluate outcomes, and integrate insights into their identity and behavior. This process aligns with experiential learning theory and is critical for the development of character and self-awareness (Durlak *et al.*, 2010; Nucci *et al.*, 2014).

These mechanisms operate in sequence and interaction, forming a developmental pathway in which motivation initiates engagement, engagement sustains participation, and reflection consolidates learning into long-term developmental outcomes. Importantly, these processes are shaped by influences from higher levels, highlighting the embedded nature of individual development within the broader system.

### **5.3 Meso-Level Mechanisms: Group Dynamics and Social Processes**

At the meso level, the framework emphasizes the role of group-based processes in mediating and amplifying individual development. Three key mechanisms are identified: social interaction, group identity formation, and collaborative learning.

Social interaction provides the primary context through which individuals engage with peers, exchange knowledge, and develop interpersonal skills. Through repeated interaction, individuals learn to navigate social relationships, negotiate meaning, and build trust (Larson *et al.*, 2006; Kiilakoski & Kivijärvi, 2015). These interactions enhance engagement and provide opportunities for experiential learning that extend beyond individual cognition.

Group identity formation represents a deeper level of social integration, where individuals develop a sense of belonging and shared purpose. Drawing on social identity theory, this process involves the internalization of group norms and values, which influence behavior and motivation (Postmes *et al.*, 2020). In scouting contexts, rituals, shared experiences, and collective goals reinforce this identity, strengthening commitment and participation.

Collaborative learning functions as a mechanism that enables individuals to co-construct knowledge and develop problem-solving skills through shared activities. This process is particularly salient in experiential environments, where learning is embedded in teamwork and collective challenges (Roholt *et al.*, 2014; Ord, 2007). Collaborative learning enhances both cognitive and social development, linking individual engagement with group-level outcomes.

These meso-level mechanisms serve as a bridge between individual processes and organizational structures. They mediate the translation of personal experiences into socially embedded learning and reinforce the alignment between individual and collective development.

### **5.4 Macro-Level Mechanisms: Organizational Structures and Institutional Dynamics**

At the macro level, the framework focuses on organizational mechanisms that shape the conditions under which development occurs. Three primary mechanisms are identified: program design, leadership systems, and institutional culture.

Program design determines the structure and content of learning experiences, influencing the opportunities available for engagement and interaction. Effective program design aligns activities with developmental objectives, ensuring that experiences are meaningful, challenging, and contextually relevant (Eccles & Gootman, 2002; Rogers, 2005). It also provides the structural framework within which micro and meso-level mechanisms operate.

Leadership systems function as enabling mechanisms that guide, support, and coordinate developmental processes. Leaders act as facilitators of learning, role models, and connectors between levels, shaping both individual experiences and group dynamics (Day *et al.*, 2014; Kouzes & Posner, 2017). Leadership effectiveness is therefore critical for maintaining alignment across the system.

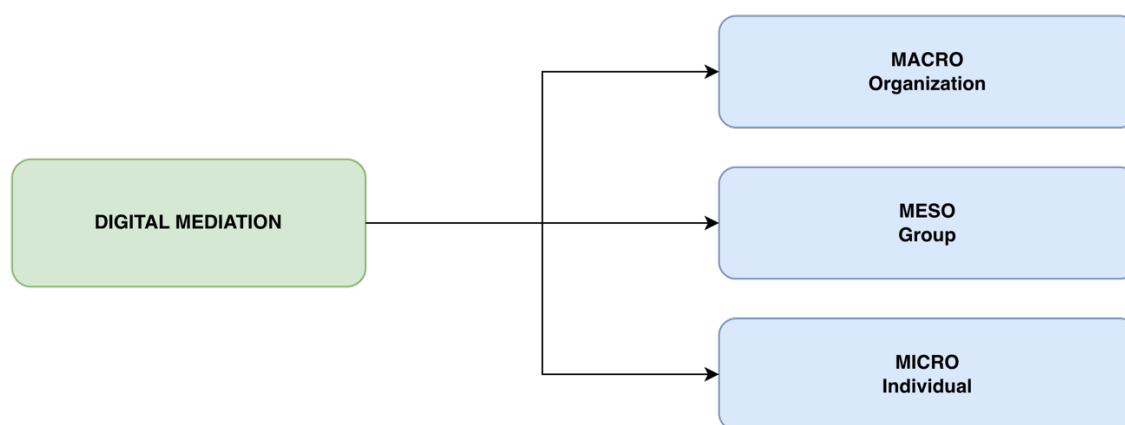
Institutional culture represents the shared norms, values, and practices that define the organizational environment. It influences how participants perceive and engage with the program, shaping motivation, behavior, and identity formation. A supportive and adaptive culture enhances the effectiveness of developmental mechanisms by fostering trust, participation, and innovation.

These macro-level mechanisms provide the structural and cultural foundation that enables adaptive processes across the system. They do not operate independently but interact dynamically with micro and meso-level processes, contributing to the emergence of developmental outcomes.

### 5.5 Digital Mediation as a Cross-Level Enabler

Digital mediation is conceptualized as a cross-level enabler that connects and transforms processes across micro, meso, and macro levels. At the individual level, digital tools support personalized learning and continuous engagement by providing access to resources, feedback, and self-directed learning opportunities (Bond *et al.*, 2023; Kahu & Nelson, 2020).

A parsimonious representation is required to isolate the structural role of digital mediation without reproducing the full system architecture. The figure below abstracts from detailed mechanisms and instead foregrounds how digital mediation connects levels within the system.



**Figure 3.** Digital Mediation as a Cross-Level Structural Connector  
*Source: Developed by the authors*

Figure 3 isolates the structural role of digital mediation by abstracting from detailed mechanisms and focusing on its cross-level function. Rather than operating as an additional variable, digital mediation connects organizational, group, and individual domains through enabling and reshaping interaction patterns. This simplified structure clarifies that the primary contribution of digitalization lies in reconfiguring how processes across levels are linked, thereby strengthening system integration and adaptive capacity.

At the group level, digital platforms facilitate communication and collaboration, enabling interaction beyond physical boundaries. These platforms support both synchronous and asynchronous engagement, enhancing the flexibility and inclusivity of group processes (Hrastinski, 2008; Garrison *et al.*, 2000).

At the organizational level, digital technologies enable coordination, data-driven decision-making, and program adaptation. They provide tools for monitoring participation, evaluating outcomes, and refining program design, thereby enhancing system responsiveness (Zawacki-Richter *et al.*, 2019; OECD, 2023).

Importantly, digital mediation does not simply enhance existing processes but fundamentally reshapes the structure of interactions within the system. It introduces new forms of connectivity, alters temporal and spatial boundaries, and enables more fluid and adaptive learning environments. This reinforces the conceptualization of scouting education as a hybrid system that integrates physical and digital experiences.

## 5.6 Boundary Conditions and Contextual Moderators

The effectiveness of the proposed mechanisms is influenced by contextual factors that act as boundary conditions within the system. Cultural context shapes values, norms, and expectations, influencing how developmental processes are experienced and interpreted (Benson *et al.*, 2006; Flanagan & Levine, 2010). Variations in cultural settings may lead to differences in engagement, identity formation, and leadership development.

Digital infrastructure and access represent another critical boundary condition. Differences in technological availability and digital literacy affect the extent to which digital mediation enhances or constrains development (Van Dijk, 2020; Selwyn, 2016). In contexts with limited infrastructure, the benefits of digital integration may not be fully realized.

Leadership capacity also plays a moderating role. The ability of leaders to design, implement, and adapt programs influences the effectiveness of mechanisms across levels (Hannah & Avolio, 2010; Murphy & Johnson, 2011). Strong leadership enhances alignment and coherence, while weak leadership may lead to fragmentation.

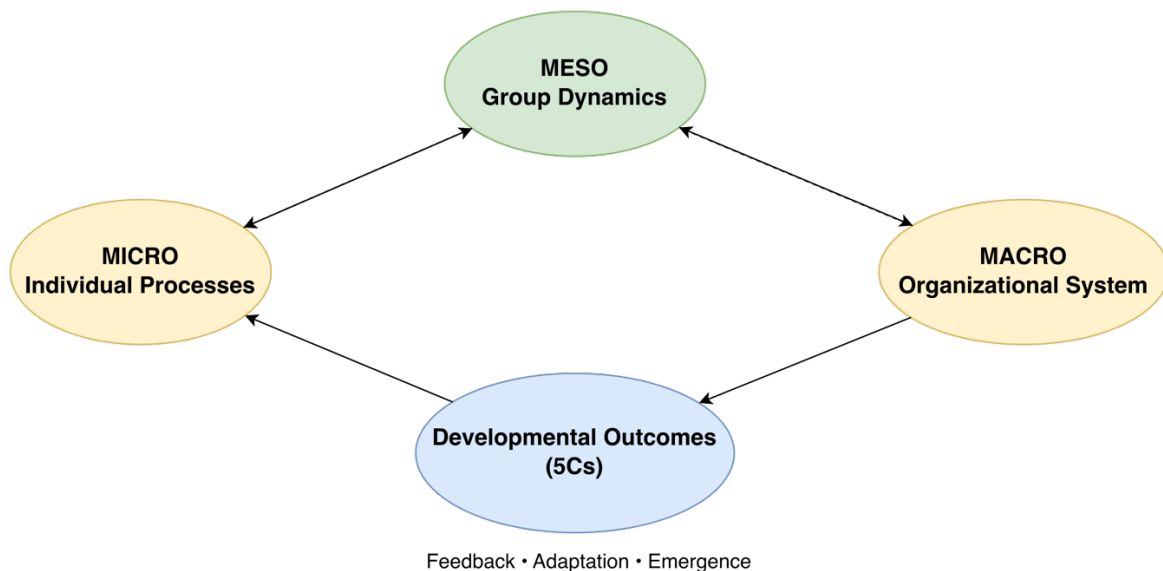
These boundary conditions highlight that the proposed framework is not universally deterministic but context-sensitive. They reinforce the importance of adaptability in designing and implementing youth development systems.

The conceptual framework developed in this section advances the literature by articulating youth development as an emergent, mechanism-based, and multi-level process. By integrating constructs from complexity theory, learning ecosystems, digital transformation, and Positive Youth Development, the model provides a comprehensive explanation of how developmental outcomes are generated in contemporary contexts. The next section formalizes this framework into a conceptual model and develops testable propositions that guide future empirical research.

## 6. Conceptual Model and Propositions

This section formalizes the conceptual framework into an explicit model and develops a set of theoretically grounded propositions. The model captures youth development in scouting education as a multi-level, mechanism based system in which outcomes emerge from the interaction of processes across individual, group, and organizational domains. Digital mediation is incorporated as a cross level enabler that restructures interactions and enhances system adaptability. The model is not linear but recursive, reflecting the characteristics of complex adaptive systems where processes evolve through continuous feedback and interaction (Jacobson *et al.*, 2019; Davis & Sumara, 2022).

A system-level representation must explicitly capture the recursive and adaptive nature of development processes, avoiding any linear interpretation of causality. The figure below models the system as a closed feedback structure in which interactions across levels continuously generate adaptation and emergent outcomes.



**Figure 4.** Adaptive Feedback Loop in Multi-Level Youth Development Systems  
*Source: Developed by the authors*

Figure 4 emphasizes the recursive nature of the proposed framework by modeling youth development as a closed-loop adaptive system. Developmental outcomes are not treated as terminal points but as inputs that feed back into individual processes, thereby sustaining continuous learning and system evolution. This circular structure reinforces the argument that adaptation emerges from ongoing interactions across levels, rather than from linear cause–effect relationships, and highlights the centrality of feedback in maintaining system responsiveness.

## 6.1 Conceptual Model Structure

The conceptual model is organized around three analytically distinct but interdependent levels. At the micro level, individual processes such as motivation, engagement, and reflective learning drive developmental change. At the meso level, group dynamics including social interaction, identity formation, and collaborative learning mediate and amplify individual experiences. At the macro level, organizational mechanisms such as program design, leadership systems, and institutional culture shape the structural conditions under which development occurs.

The relationships between these levels are reciprocal rather than unidirectional. Individual engagement contributes to the formation of group dynamics, while group processes influence organizational adaptation. Organizational structures, in turn, enable or constrain both individual and group level processes by shaping access, opportunities, and interaction patterns. This recursive interaction reflects multilevel theory, which posits that phenomena at higher levels both influence and are influenced by processes at lower levels (Kozlowski & Klein, 2000; Aguinis *et al.*, 2020).

Digital mediation operates across all levels as a structural mechanism that enhances connectivity, flexibility, and responsiveness. It facilitates communication between individuals, supports collaboration within groups, and enables coordination at the organizational level. By altering the temporal and spatial boundaries of interaction, digital mediation strengthens the integration of processes across levels and contributes to the adaptive capacity of the system (Williamson *et al.*, 2020; Bond *et al.*, 2023).

The model therefore conceptualizes scouting education as an integrated system in which developmental outcomes emerge from the alignment and interaction of mechanisms across levels rather than from isolated factors.

## 6.2 Proposition Development

Based on the conceptual model, a set of propositions is developed to articulate the causal relationships between constructs. These propositions provide a foundation for future empirical testing and serve to clarify the theoretical logic underlying the framework.

**Proposition 1** states that individual level engagement positively influences youth development outcomes through the activation of reflective learning processes. Engagement increases the depth of participation and cognitive involvement, while reflection enables the transformation of experience into meaningful learning and identity development (Fredricks *et al.*, 2004; Ryan & Deci, 2020).

**Proposition 2** states that social interaction at the group level mediates the relationship between individual engagement and identity formation. Interaction provides the social context in which experiences are interpreted, allowing individuals to internalize shared meanings and values that contribute to identity construction (Larson *et al.*, 2006; Postmes *et al.*, 2020).

**Proposition 3** states that group level identity and collaborative learning processes strengthen the translation of experiential participation into competence and character development. Shared activities and collective problem solving reinforce learning through mutual support and co construction of knowledge (Roholt *et al.*, 2014; Ord, 2007).

**Proposition 4** states that organizational level program design positively influences the effectiveness of individual and group level mechanisms by structuring opportunities for engagement and interaction. Well-designed programs create environments that are conducive to participation, reflection, and collaboration (Eccles & Gootman, 2002; Rogers, 2005).

**Proposition 5** states that leadership systems enhance the alignment between micro, meso, and macro level processes, thereby strengthening overall system coherence. Effective leadership facilitates coordination, provides guidance, and ensures that developmental processes are integrated across levels (Day *et al.*, 2014; Kouzes & Posner, 2017).

**Proposition 6** states that digital mediation positively moderates the relationships between individual, group, and organizational mechanisms by increasing connectivity, accessibility, and responsiveness. Digital technologies enable continuous interaction and extend learning opportunities beyond physical boundaries (Bond *et al.*, 2023; Crompton & Burke, 2023).

**Proposition 7** states that alignment between micro, meso, and macro level mechanisms leads to higher adaptive system capacity. When processes across levels are coherent and mutually reinforcing, the system becomes more responsive to change and more effective in producing developmental outcomes (Koh & Askeff Williams, 2021; Jacobson *et al.*, 2019).

**Proposition 8** states that contextual factors such as cultural norms, digital infrastructure, and leadership quality moderate the strength and direction of relationships within the system. Variations in context influence how mechanisms operate and determine the effectiveness of the overall framework (Selwyn, 2016; Flanagan & Levine, 2010).

A structured presentation of propositions is necessary to translate the conceptual model into a testable analytical framework. The table below organizes each proposition by its causal logic, underlying mechanism, and expected effect, ensuring clarity for empirical operationalization.

**Table 2.** Propositions and Mechanism-Based Relationships in Adaptive Youth Development Systems

Proposition & Relationship	Underlying Mechanism	Expected Effect
P1 Engagement → Youth Development Outcomes	Reflective learning transforms experience	Positive effect on 5Cs development

<b>Proposition &amp; Relationship</b>	<b>Underlying Mechanism</b>	<b>Expected Effect</b>
<b>P2</b> Engagement → Identity Formation (via interaction)	Social interaction mediates meaning construction	Strengthened identity and belonging
<b>P3</b> Group Processes → Development Outcomes	Collaborative learning reinforces experience	Enhanced competence and character
<b>P4</b> Program Design → Micro & Meso Processes	Structured opportunities enable engagement	Increased effectiveness of participation
<b>P5</b> Leadership Systems → Cross-Level Alignment	Coordination and facilitation across levels	Greater system coherence
<b>P6</b> Digital Mediation × Multi-Level Processes	Connectivity and feedback amplification	Strengthened cross-level relationships
<b>P7</b> Cross-Level Alignment → Adaptive Capacity	Reinforcing feedback loops	Higher system adaptability
<b>P8</b> Contextual Factors → System Relationships	Moderation by culture, infrastructure, leadership	Variable strength/direction of effects

Source: Developed by the authors

Table 2 translates the conceptual model into a coherent set of testable propositions by explicitly linking relationships to their underlying mechanisms and expected outcomes. This structured representation enables clearer hypothesis development and supports the application of multi-level analytical methods. By organizing propositions in this manner, Table 2 strengthens the model's empirical tractability while preserving its mechanism-based logic.

### 6.3 Implications for Empirical Testing

The conceptual model provides a structured basis for empirical validation. Each proposition represents a testable relationship that can be examined using quantitative, qualitative, or mixed method approaches. At the individual level, engagement and developmental outcomes can be operationalized using validated scales from Positive Youth Development research (Geldhof *et al.*, 2013). Reflective learning can be measured through self report instruments and qualitative assessments of meaning making processes.

At the group level, social interaction and collaborative learning can be examined using social network analysis and observational methods that capture interaction patterns. Identity formation can be assessed through measures of group belonging and value internalization. At the organizational level, program design and leadership effectiveness can be evaluated using institutional indicators and participant perceptions.

The multi-level structure of the model suggests the use of hierarchical modeling techniques to capture cross level interactions. Methods such as multilevel modeling or partial least squares structural equation modeling are particularly suitable for testing the relationships proposed in this framework (Aguinis *et al.*, 2020). Digital mediation can be operationalized through indicators of technology use, access, and integration within programs.

Importantly, the model also lends itself to mixed method designs that combine quantitative measurement with qualitative insights. Such approaches are particularly valuable for capturing the complexity of developmental processes and validating the mechanisms identified in the conceptual framework.

The conceptual model and propositions developed in this section translate the theoretical framework into a structured and testable form. By articulating relationships across multiple levels and specifying the mechanisms that connect them, the model bridges the gap between theoretical abstraction and empirical investigation. It provides a comprehensive foundation for future research aimed at understanding and enhancing adaptive youth development systems in scouting education. The following section discusses the broader theoretical contributions, practical implications, and future research directions arising from this model.

## 7. Discussion

This section interprets the proposed conceptual framework in relation to existing literature and elaborates its theoretical contributions, practical implications, and broader relevance. By positioning scouting education as an adaptive, multi level, and digitally mediated youth development system, the model extends current theoretical boundaries and offers a more comprehensive explanation of how developmental processes unfold in contemporary contexts.

### 7.1 Theoretical Contributions

The primary theoretical contribution of this study lies in its integration of previously fragmented perspectives into a coherent and mechanism based framework. Prior research has examined youth development, learning ecosystems, and digital transformation largely in isolation, resulting in partial explanations of developmental processes. The present model addresses this limitation by linking these domains through a unified multi-level structure that captures their interdependencies (Sangrà *et al.*, 2019; Peters *et al.*, 2022).

The framework contributes to complexity theory in education by operationalizing key concepts such as adaptation, emergence, and feedback within a concrete developmental context. Rather than treating these concepts as abstract principles, the model specifies how they manifest through interactions between engagement, social processes, and organizational structures. This provides a clearer explanation of how complex systems generate developmental outcomes and responds to calls for more applied and mechanism oriented approaches in complexity based educational research (Davis & Sumara, 2022; Koh & Askeff Williams, 2021).

In addition, the study advances the literature by explicitly incorporating digital mediation as a structural component of the system. Existing research often treats digital technologies as external tools or contextual variables, limiting their explanatory role. By conceptualizing digital mediation as a cross level enabler that shapes interactions across individual, group, and organizational domains, the model provides a more realistic representation of contemporary learning environments (Castañeda & Selwyn, 2018; Williamson *et al.*, 2020).

The integration of these elements results in a framework that not only explains developmental outcomes but also clarifies the processes through which they are produced. This shifts the focus from static relationships to dynamic mechanisms, enhancing the explanatory power and theoretical coherence of youth development research.

### 7.2 Extension of Positive Youth Development Theory

The proposed framework extends Positive Youth Development theory by situating individual developmental processes within a broader multi-level system. While PYD provides a strong foundation for understanding individual outcomes, it offers limited guidance on how these outcomes are shaped by interactions across levels. The present model addresses this limitation by linking micro level mechanisms such as engagement and reflection with meso level social processes and macro level organizational structures (Lerner *et al.*, 2015; Overton, 2015).

This extension aligns with relational developmental systems theory, which emphasizes the co construction of development through interactions between individuals and contexts. However, the current model advances this perspective by explicitly incorporating organizational and digital dimensions, thereby expanding the scope of PYD to reflect contemporary learning environments (Lerner *et al.*, 2021).

Furthermore, the framework deepens the understanding of engagement as a central mechanism in youth development. Rather than treating engagement as an outcome or

isolated variable, the model positions it as a dynamic process that interacts with social and organizational factors. This perspective highlights the importance of designing environments that sustain high quality engagement over time.

The inclusion of digital mediation further extends PYD by acknowledging the role of technology in shaping developmental processes. Digital environments influence how youth interact, learn, and form identities, making them integral to modern youth development. By incorporating these elements, the model enhances the relevance of PYD in the digital era and provides a more comprehensive account of developmental dynamics.

### **7.3 Implications for Scouting Practice**

The conceptual framework offers several implications for the design and implementation of scouting programs. First, it emphasizes the importance of alignment across levels. Effective youth development requires coherence between individual engagement, group dynamics, and organizational structures. Programs that focus on only one level without considering their interaction are likely to produce limited outcomes.

Second, the model highlights engagement and experiential learning as central drivers of development. Scouting programs should prioritize activities that foster active participation, reflection, and collaboration. This involves designing experiences that are meaningful, contextually relevant, and capable of sustaining motivation over time (Fredricks *et al.*, 2004; Durlak *et al.*, 2010).

Third, leadership emerges as a critical factor in enabling adaptive processes. Leaders play a key role in facilitating interaction, guiding reflection, and maintaining alignment across levels. Investment in leadership development is therefore essential for enhancing program effectiveness and sustainability (Day *et al.*, 2014; Kouzes & Posner, 2017).

Fourth, the integration of digital technologies presents both opportunities and challenges. Digital tools can enhance communication, expand access, and support continuous engagement. However, their use must be carefully balanced with experiential and social learning to preserve the core values of scouting. Programs that integrate digital and physical experiences effectively are more likely to achieve adaptive and sustainable outcomes.

### **7.4 Policy Implications**

The findings of this study have important implications for policy development in nonformal education. Policymakers should recognize youth organizations as critical components of broader learning ecosystems and provide support for their development and integration. This includes investment in infrastructure, training, and program innovation to enhance their capacity to contribute to youth development (Coombs & Ahmed, 1974; Kiilakoski & Kivijärvi, 2015).

The model also underscores the need for policies that support digital integration in youth programs. This involves not only improving access to technology but also developing digital competencies among participants and facilitators. Policies should encourage the use of technology as a means of enhancing engagement and learning rather than as an end in itself (Selwyn, 2016; OECD, 2023).

In addition, the multi-level nature of the framework suggests that policy interventions should be coordinated across different levels of the system. Efforts to improve youth development outcomes should consider the interaction between individual, group, and organizational factors rather than focusing on isolated components.

## 7.5 Societal Relevance and Contribution to Global Development

The proposed framework has significant societal relevance, particularly in addressing challenges related to youth engagement, character development, and social cohesion. By conceptualizing scouting as an adaptive system, the model highlights its potential to respond to changing societal conditions and contribute to the development of responsible and engaged citizens (Zaff *et al.*, 2010; Flanagan & Levine, 2010).

The framework aligns with global development priorities, particularly in the areas of education, institutional development, and collaboration. By emphasizing the role of nonformal education in supporting holistic development, the model contributes to the advancement of inclusive and equitable learning opportunities. It also highlights the importance of youth participation in building strong and resilient communities.

The integration of digital technologies further enhances the relevance of the model by addressing contemporary challenges related to access, participation, and innovation. By facilitating connectivity and collaboration, digital tools can expand the reach and impact of youth development programs, supporting broader societal goals.

## 7.6 Future Research Directions

The conceptual framework opens several avenues for future research. Empirical studies are needed to test the proposed propositions and validate the relationships between constructs. This includes the development of measurement instruments and the application of multi-level analytical techniques to capture interactions across levels (Geldhof *et al.*, 2013; Aguinis *et al.*, 2020).

Future research can also explore the role of contextual factors in shaping the effectiveness of adaptive youth development systems. Comparative studies across different cultural and organizational settings would provide insights into how the model operates under varying conditions.

In addition, further investigation is needed into the role of digital technologies in youth development. This includes examining how different forms of digital engagement influence learning, identity formation, and social interaction, as well as identifying best practices for integrating technology into nonformal education.

Longitudinal research would also be valuable in understanding how developmental processes evolve over time and how early experiences influence long term outcomes. Such studies would enhance the predictive power of the model and contribute to its refinement.

The discussion demonstrates that the proposed framework provides a comprehensive and integrative perspective on youth development in scouting education. By linking mechanisms across multiple levels and incorporating digital mediation as a core component, the model advances both theoretical understanding and practical application. It offers a foundation for future research and policy development aimed at creating adaptive and effective youth development systems in an increasingly complex and digital world.

## 8. Conclusion

This study develops an integrative conceptual framework that reconceptualizes scouting education as an adaptive youth development system operating across multiple levels. By synthesizing perspectives from complexity theory, learning ecosystems, digital transformation, and Positive Youth Development, the study advances a mechanism based model that explains how developmental outcomes emerge through the interaction of individual, group, and organizational processes.

The findings highlight that youth development is not a linear progression driven by isolated factors but an emergent process shaped by dynamic and recursive interactions. At the micro level, motivation, engagement, and reflective learning function as core mechanisms that drive individual development. At the meso level, social interaction, group identity, and collaborative learning mediate and amplify these processes. At the macro level, program design, leadership systems, and institutional culture provide the structural conditions that enable or constrain development. Digital mediation operates across these levels as a cross level enabler that enhances connectivity, flexibility, and system responsiveness.

The theoretical contribution of this study lies in addressing the fragmentation of existing literature by integrating previously disconnected domains into a coherent and multi-level framework. The model extends Positive Youth Development theory by embedding it within a systemic and adaptive perspective, while also advancing complexity based approaches by specifying concrete mechanisms of development. In addition, the study positions digital mediation as an intrinsic component of youth development systems, thereby enhancing the relevance of existing theories in contemporary learning environments.

From a practical perspective, the framework provides guidance for designing youth development programs that are adaptive, aligned, and responsive to changing conditions. It underscores the importance of coherence across levels, the centrality of engagement and experiential learning, and the strategic integration of digital technologies. These insights are particularly relevant for large scale youth organizations that must navigate increasing complexity while maintaining developmental effectiveness.

The study also establishes a foundation for future empirical research. The proposed constructs and propositions offer a basis for testing the relationships within the model using multi-level and mixed method approaches. Future research may further explore contextual variations, longitudinal dynamics, and the evolving role of digital technologies in shaping youth development systems.

Overall, this study contributes to advancing a more comprehensive understanding of youth development as an adaptive and interconnected process. By providing a structured and mechanism based framework, it offers both theoretical clarity and practical direction for strengthening youth development systems in an increasingly complex and digital world.

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