Structural Origin Of Connectivism: Networked Culture As A New Paradigm Of Learning

Kinjal Chakraborty

Student

Department of Education

University of Kalyani

Abstract:
Connectivism, as a theory of learning in the digital age, proposes that learning occurs through the formation of networks that link people, digital tools, and information systems. Originally influenced by connectionist perspectives in neuroscience, connectivism diverges from traditional cognitivist paradigms that model the human brain as a computer. This paper revisits Stephen Downes' articulation of connectivism, contrasting it with neo-cognitivist approaches such as those proposed by Atkinson and Sternberg, which prioritize information processing frameworks. By drawing on synaptic metaphors and integrating concepts from Self-Determination Theory (SDT), this paper argues for a reconceptualization of connectivism that centers non-cognitive, emergent, and environmental interactions as primary in the development of learning networks.

Keywords: Connectivism, Synaptic Learning, Networked Instruction, Self-Determination Theory, Neo-Cognitivism, Stephen Downes, Learning Theory

Introduction

In a digitally saturated world, learning is increasingly mediated by complex networks of interactions—human, technological, and informational. Connectivism, as proposed by George Siemens and Stephen Downes, captures this shift by framing learning not as an individual cognitive activity, but as a distributed process occurring across a network of connections. This view reorients our understanding of learning toward systems thinking, emphasizing relationships over representations, and interactions over internal processes.
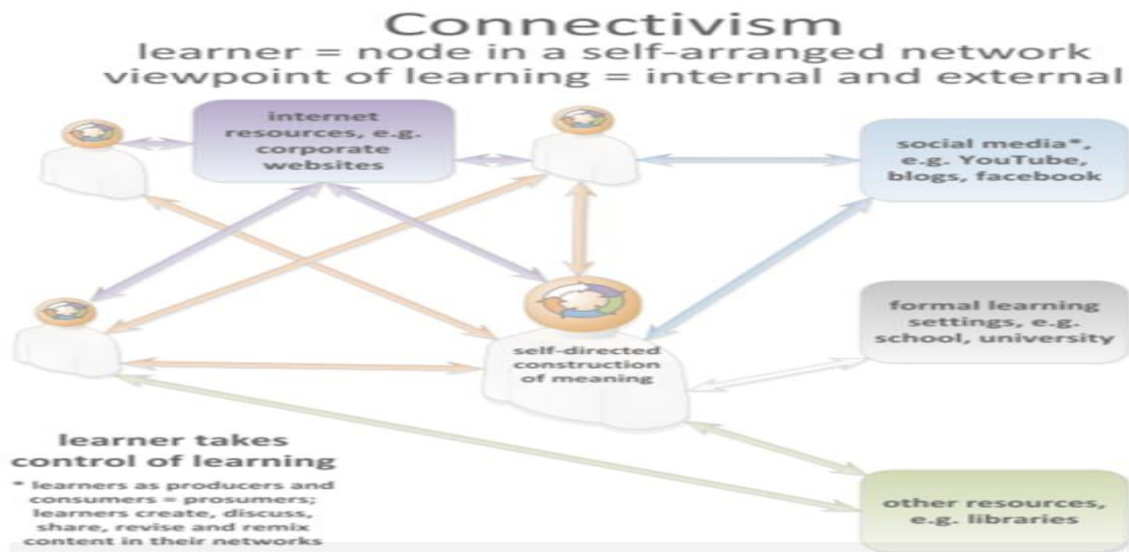
Basic Structure of the Paradigm

From Cognitivism to Connectivism

Neo-cognitivist theories, such as the information processing model of Atkinson and Sternberg, rely heavily on the metaphor of the brain as a computer. In these models, the mind encodes, stores, and retrieves data, mirroring the architecture of digital machines. While useful, this metaphor flattens the complexity of human experience, reducing learning to linear processes of input-output.

Stephen Downes critiques this metaphor by suggesting a shift from computational to *physical* or *synaptic* representations of learning. According to Downes, learning is not merely the processing of information but the formation and modulation of connections—both neural and social. This view aligns with connectionist models in neuroscience, where learning emerges through the strengthening of synaptic pathways and pattern recognition across distributed networks.Downs argued with this notion and said that it is not a computer but also a physical representation, similarly we can say that it is a synaptic representation.

At first the formation of intra neurone connections are important then perceptions and communication are activated as the mediation process or we can say it as the point of interface to interact with the environment.

Inner world

Perception and
Communication

Outer Enviornment
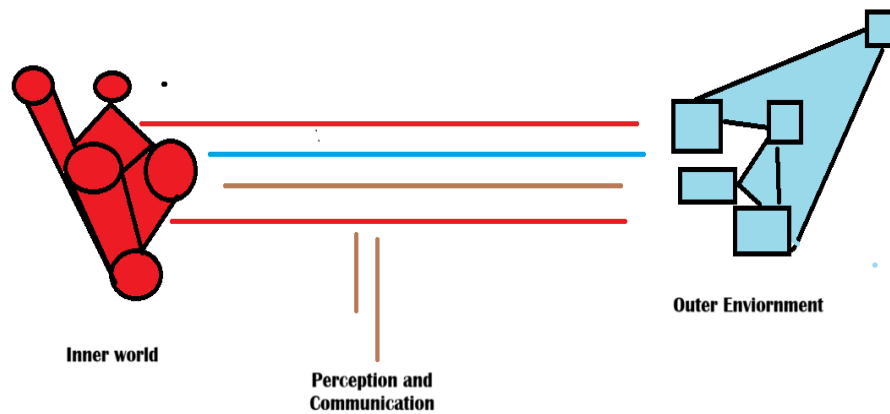
How connectionism transformed as connectivism
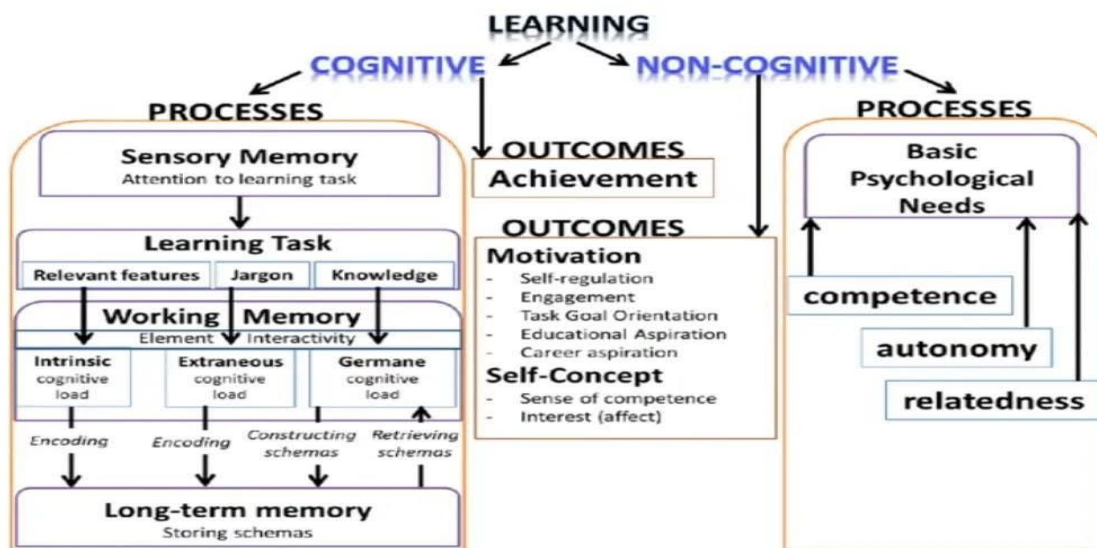
Structural representations of the Perceptions of Connectivism

Synaptic Metaphors and the Interface of Learning

The reconceptualized view of connectivism posits that learning begins not with perception or cognition per se, but with the micro-level formation of synaptic links—*intra-neuronal connections*—which precede awareness and meaning-making. Once a basic structure of connectivity is established, perception and communication operate as mediators—*interfaces*—between the learner and the environment.

This synaptic metaphor enables a new way of understanding learning as an *emergent property* of interaction, not simply a transmission of content. It echoes Vygotskyan socio-cultural theories, which suggest that

cognitive development is socially mediated, but pushes the idea further by suggesting that cognition itself is scaffolded on non-cognitive processes like environmental engagement and affective states.

The Role of the Environment and Non-Cognitive Forces

Unlike cognitivism, connectivism does not privilege internal mental mechanisms. Instead, it views cognition as a function of the network itself, inclusive of tools, communities, and external systems. Learning is "offloaded" into the environment, making the formation of productive connections more critical than memory or recall.

This view opens space for the integration of Self-Determination Theory (SDT), particularly its emphasis on autonomy, competence, and relatedness as psychological needs that foster intrinsic motivation. In a connectivist framework, SDT can be seen as providing the *conditions* under which learners seek out and form meaningful connections. Autonomy drives exploration, competence sustains engagement, and relatedness enables collaborative network formation.

Educational Implications: Network-Based Instruction

Reconceptualizing connectivism in this way has profound implications for pedagogy. Instructional design must move beyond content delivery and toward *network facilitation*. Educators become *connective agents*—not simply transmitters of knowledge but enablers of linkages across people, technologies, and domains.

This entails:

- Designing environments that encourage *self-determined navigation* of information.
- Using digital tools that enhance *connection-making* rather than passive consumption.
- Fostering *communities of inquiry* where learning is decentralized and co-constructed.

By aligning SDT with connectivism, we create a robust framework for *motivated network learning*—a model that embraces complexity, autonomy, and emergent knowledge construction.

Synthetic Pychology: Connectivism, a theory for digital-age learning, emphasizes the formation of knowledge through networked structures connecting people, tools, and information. While rooted in brain-based connectionist ideas, connectivism diverges from traditional cognitivist metaphors like the brain-as-computer model. This paper revisits Stephen Downes' interpretation of connectivism, contrasting it with neo-cognitivist models, and integrates the emerging field of **Synthetic Psychology**—the simulation and construction of cognitive systems—to enhance understanding of networked learning. Alongside, the role of Self-Determination Theory (SDT) is explored as a motivational foundation in the construction and navigation of learning networks. Ultimately, this reconceptualization embraces both natural and artificial cognition as mutually constitutive of a dynamic learning ecology.

Synthetic Psychology and the Evolution of Learning Theories

Synthetic Psychology, as proposed by artificial intelligence and robotics scholars (notably Holland, Minsky, and Brooks), involves the design of systems that simulate or replicate psychological processes. Rather than explaining the mind *as is*, it seeks to *build* systems that behave intelligently.

Integrating Synthetic Psychology into connectivism introduces three new insights:

1. **Cognition as Constructible**: Cognitive systems—biological or artificial—can be constructed from basic interacting units (like neurons or circuits).

2. **Non-Human Learning Agents**: AI systems can learn via networks, experience feedback, and adapt—mirroring human networked learning.
3. **Hybrid Networks**: Learning increasingly takes place in human-machine symbiosis (e.g., Google Search, ChatGPT, recommender systems), suggesting that understanding learning now requires synthetic, not just organic, perspectives.

Conclusion

Connectivism, when reconceptualized through synaptic and non-cognitive lenses, offers a transformative view of learning for the 21st century. By moving beyond computational metaphors and embracing environmental, emotional, and social interactions as foundational, this theory aligns more closely with how humans actually learn in networked environments. Integrating principles of Self-Determination Theory further grounds this approach in human motivation, making it not only theoretically rich but practically actionable for modern education.

- Downes, S. (2007). *What connectivism is*. Half an Hour. http://halfanhour.blogspot.com/2007/02/what-connectivism-is.html

- Siemens, G. (2005). *Connectivism: A learning theory for the digital age*. International Journal of Instructional Technology and Distance Learning, 2(1), 3–10. http://www.itdl.org/Journal/Jan_05/article01.htm

- Siemens, G. (2006). *Knowing knowledge*. Lulu Pres

- Churchland, P. S., & Sejnowski, T. J. (1992). *The computational brain*. MIT Press.

- Rumelhart, D. E., & McClelland, J. L. (1986). *Parallel distributed processing: Explorations in the microstructure of cognition* (Vol. 1). MIT Press.

- Atkinson, R. C., & Shiffrin, R. M. (1968). *Human memory: A proposed system and its control processes*. In K. W. Spence & J. T. Spence (Eds.), *The psychology of learning and motivation* (Vol. 2, pp. 89–195). Academic Press.

- Sternberg, R. J. (2009). *Cognitive psychology* (5th ed.). Wadsworth.

- Deci, E. L., & Ryan, R. M. (2000). *The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior*. Psychological Inquiry, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.

- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

- Engeström, Y. (2001). *Expansive learning at work: Toward an activity theoretical reconceptualization*. Journal of Education and Work, 14(1), 133–156. https://doi.org/10.1080/13639080020028747