

# From Mechanization to Ecologization: A Study of Teaching Organization and Management Models Driven by Self-Organization Theory in Chinese Universities

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**Abstract:** In the contemporary era, university education, developed post-Industrial Revolution, displays excessive mechanization. This is evident in the lack of personalized learning, unidirectional teaching processes, and treating students as 'products', focusing on standardized testing and assessments. As society shifts from an industrial to a knowledge-based economy, university education faces significant changes, with challenges posed by advancements in information technology, globalization trends, and evolving government education policies. This paper introduces the theory of self-organizing synergism and explores the problems of organization and management in teaching, employing new perspectives and methods tailored to the characteristics of Chinese universities. The study proposes a self-organized model of learning and management, demonstrating the ecological, dynamic, and adaptive nature of this model in the context of digital media arts education. The aim of this study is to offer fresh ideas and insights for facilitating the ecological transformation of educational concepts and models.

## 1. Introduction

Although the university education management paradigm developed and established after the industrial revolution has undergone several major changes in the new era, it still inevitably has some limitations and drawbacks in this new period of rapid development and information explosion. The main ones include:

### (1) Lack of personalization and flexibility

The mechanized education model usually adopts a "one-size-fits-all" teaching method, in which all students learn the same courses in the same time, ignoring the individual differences and special needs of students. Teaching content and methods are rigid, making it difficult to adapt to the changing needs of society and the diverse learning styles of students.

### (2) Passivity of students

Many universities adopt the teacher-led teaching mode, and students often play the role of passive receivers in the learning process, lacking the opportunity for active exploration and practice. This model inhibits the development of students' creative and critical thinking. The traditional mechanized education model emphasizes the one-way transmission of knowledge from teachers to students, ignoring the importance of teacher-student interaction and cooperative learning among students, which largely restricts the development of students' social skills and teamwork abilities.

### (3) Over-emphasis on test-taking

The traditional education model is too rigid and

mechanical, focusing on teaching and inculcating knowledge in a step-by-step manner, and placing too much emphasis on standardized tests and scores, leading to the widespread phenomenon of "teaching to the test". As a result, students neglect the importance of in-depth understanding and practical application of knowledge, and study only for the sake of exams.

### (4) Neglecting all-round development

In order to meet the demand for skilled professionals in industrial society, university education has begun to emphasize specialized education. However, over-specialized education may neglect students' all-round development and limit their vision and innovation. It focuses too much on the inculcation of knowledge and the training of skills, neglecting the cultivation of non-intellectual factors such as emotion, morality and aesthetics. This education model is difficult to train students to become talents with comprehensive quality and innovation ability.

### (5) Feedback homogenization

In the educational evaluation link continuous and formative evaluation, the traditional educational evaluation tends to focus on the final results of students, and less on the learning process and progress of students. This type of evaluation may ignore the individual differences and growth of students, as well as their efforts and progress in the learning process. Monolithic information, in traditional university education, the teacher is usually the sole evaluator and feedback from students and peers is usually ignored. This may lead to monolithic and one-sided feedback that does not provide a

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comprehensive assessment and feedback on student learning.

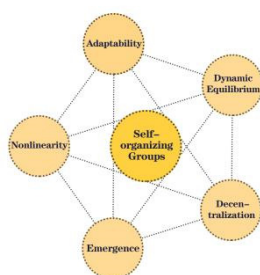
These drawbacks constrain the university education system's ability to meet diversified and individualized needs and affect the ability of educational institutions to adapt to the rapid changes in new knowledge and technology, while the traditional education management style limits the cultivation of innovation and independent thinking skills in the learning process. These problems have become more and more significant in the era of knowledge economy, therefore, the existing university education management paradigm must be optimized and improved to adapt to this new era of rapid change.

## 2. Construction of New Organizational Management Models through Self-Organization

### 2.1. Concepts and Principles of Self-Organization Theory

Self-Organization Theory emerged in the 1970s alongside modern systems theory and dissipative structures theory. It is a scientific methodology focused on exploring the evolutionary and generative mechanisms of "complex systems." [1]

Self-Organization refers to the spontaneous organization and coordination within a system, achieved through internal interactions and adaptive adjustments, without the need for external central control or guidance. Originating from the natural sciences, self-organization theory describes how a system transitions from a state of disorder to order. [2] This transformation is not dependent on external guidance or centralized control but is driven by internal interactions and feedback mechanisms. (Figure1)



**Figure1** Five Characteristics of Self-organizing Groups

In the absence of centralized control, the self-organizing process typically adheres to the following principles:

1) **Decentralization:** Self-organization theory encourages educators to move away from traditional "didactic" teaching methods towards more dynamic, interactive, and student-centered approaches. Methods such as "flipped classrooms," "project-based learning," or "problem-based learning" can facilitate students' self-organization of knowledge, enhancing their understanding and application skills.

2) **Adaptive Interaction:** In self-organizing systems, interactions among components (which can be cells, individuals, departments, or companies) are local, meaning each part interacts only with its immediate or

directly related counterparts.

3) **Nonlinearity:** Local interactions often involve both positive and negative feedback. Positive feedback reinforces and amplifies certain behaviors or patterns, while negative feedback inhibits and reduces them. These feedback mechanisms lead to non-linear behavior in the system, where small changes can have significant effects.

4) **Dynamic Equilibrium:** Self-organizing systems often achieve a state of dynamic equilibrium, meaning that despite continuous interaction and change among the system's components, the overall properties of the system (such as its overall pattern or behavior) remain relatively stable.

5) **Emergence:** In the process of self-organization, new global properties that cannot be predicted from individual components often emerge. This phenomenon is known as emergence.

### 2.2. "Ecological" Educational Concepts and Organizational Management Models

Self-organization in educational organization and management is a relatively novel concept, influenced and inspired by a variety of educational philosophies and organizational management models throughout history.

1) **From Efficiency to Student-Centric: Democratic Management**

The early management models, centered around efficiency and centralization, had their limitations, particularly in fostering students' autonomy and creativity. With the promotion of student-centered and personalized teaching, educational organizations have begun to place greater emphasis on student participation and autonomy. This shift has laid the groundwork for self-organized management, as this model emphasizes the involvement of all members of the educational organization (including students and teachers) in decision-making, promoting a democratic management style.

2) **Organizational Learning: Team Collaboration and Knowledge Sharing**

Influenced by theories of organizational and community learning, self-organization is not just a method of educational management but also a mode of learning. Here, team collaboration and knowledge sharing become particularly crucial. This theoretical perspective encourages autonomy and collaboration within the organization, thereby better addressing problems and adapting to changes.

3) **Data-Driven: From Reactive to Proactive Management**

In the era of big data and artificial intelligence, modern educational organizations have access to more data-driven decision-making tools. These tools enable self-organized management to shift from a reactive to a more proactive stance, using data analysis to predict and address issues, rather than merely reacting to them after the fact.

4) **Integrative and Complex:** Traditional linear or singular perspectives often fall short when addressing the various complex issues faced by educational organizations. Systems thinking offers a comprehensive and holistic perspective, emphasizing the interplay and

interdependence of various factors and environments, both within and outside the organization. [3] This mode of thinking is highly suitable for self-organized management models, as it fosters an understanding of educational organizations as complex systems.

Guided by systems thinking, self-organized management focuses not just on individual tasks or problems, but contemplates how to better operate and optimize the educational organization from a broader and more multifaceted perspective. This includes understanding organizational culture, motivational mechanisms, the distribution of educational resources, and the dynamic relationships among students, teachers, administrators, and other stakeholders.

An integrative and complex understanding emphasizes adaptability and flexibility, enabling educational organizations to respond more swiftly and effectively to the ever-changing educational landscape and demands. Systems thinking also underscores feedback loops and continuous improvement, meaning that self-organization is not a static goal but a dynamic, continuously evolving process.

These four aspects collectively form the theoretical foundation and practical pathway for self-organization in educational organization and management, reflecting the integration and evolution of various modern educational philosophies and organizational management models.

Self-organized teaching organization and management is a highly integrative and complex system, involving various activities and roles within the educational organization, as well as interactions with the external environment (such as society, culture, technology, etc.). This aligns closely with the concept of Systems Thinking, which views educational organizations as open, dynamic systems.

The theoretical developments at each stage provide a rich theoretical foundation and insights for the new self-organized model of teaching organization and management. From student-centered educational models to organizational learning, and then to data-driven decision-making, these diverse theories and models collectively facilitate the application and development of self-organized management in educational organizations, making it more adaptable to the variable and complex educational environment of modern society.

### **2.3. New Management Models through Self-Organization**

Based on the characteristics of self-organization theory, the self-organized management model exhibits the following features:

1) Decentralization, establishing distributed and multi-centric control mechanisms. In a self-organized state, authority is diminished, and decentralization occurs, allowing everyone the potential to become a CEO.[4 ]

2) Strong self-motivation. In self-organization, there is a high level of empowerment, ensuring that everyone is automatically responsible and actively seeks synergy.

3) Networked structural forms. It moves away from the traditional matrix or linear structures to a value-based

network structure. In this non-linear, networked structure, any variable or element can potentially bring about disruptive innovation.

4) Powerful individual self-transformation and learning capabilities. Self-organization does not equate to a lack of organization; rather, it suggests that the order of the organization is not pre-designed but spontaneously formed. Through co-creation, sharing, and co-governance, it transitions from disorder to order, thereby creating higher value.

Self-organization theory can provide a unique theoretical perspective in the field of education, aiding in understanding and addressing complex issues. Here are some specific examples:

a) Classroom Management: The classroom is a typical complex system where teachers need to manage a large number of students while addressing various educational needs and behavioral issues.[5][6] Self-organization theory can help teachers understand and utilize the interactions among students, for instance, by promoting cooperative learning and guiding students to form a positive and orderly learning atmosphere.

b) Learning Difficulties: Learning difficulties often involve many interconnected factors, including cognitive, emotional, social, and familial aspects. Self-organization theory can help us understand how these factors interact and form complex behavioral patterns. Based on this understanding, we can design more effective teaching strategies and support systems to help students overcome learning difficulties.

c) Curriculum Design: Curriculum design must consider many complex factors, including students' prior knowledge, motivation, learning styles, and assessment criteria. Self-organization theory can help us understand how the curriculum operates as a whole, enabling the design of more effective and flexible curriculum structures.

d) Assessment Feedback: Traditional educational models overly emphasize student evaluation and test scores, mainly focusing on memorization and test-taking skills. This approach may lead students to overly focus on scores and superficial learning, lacking comprehensive development. In contrast, self-organized learning emphasizes exploration and discovery in the learning process, not just the learning outcomes. This means that assessment focuses on students' thinking, understanding, and application abilities, not just their capacity to memorize and repeat knowledge. It focuses on students' comprehensive abilities and overall development, evaluating their thinking skills, creativity, collaboration, and problem-solving abilities.

### **2.4. Providing a New Framework for Changes in the Structure and Function of Educational Systems**

Self-organization theory offers a unique perspective in understanding the changes in the structure and function of educational systems. Here are the basic principles for using self-organization theory to provide a framework for these changes:

1) Systemic Perspective: In self-organization theory,

the educational system is viewed as a whole composed of many interconnected parts (including teachers, students, curriculum, policies, environment, etc.). Any change within the system can potentially impact the entire structure and function of the system.

2) Interaction and Feedback: The various parts of the system interact to form and maintain the structure of the system. These interactions may include positive feedback (reinforcing existing trends) and negative feedback (stabilizing the system, offsetting changes). Strategies for educational change need to consider these feedback mechanisms to avoid unintentionally reinforcing undesired behaviors or disrupting important stability.

3) Adaptability and Evolution: Parts of the system (such as teachers and students) can adjust their behavior based on feedback. This adaptive process can lead to the evolution of the system. Therefore, educational change may require an iterative process, allowing educators to experiment with new methods, learn, and adjust.

4) Emergence: In the system, some structures and functions emerge from local interactions, and these emergent phenomena may be difficult to predict and control. For instance, a new teaching method might work well in one class but not in another. This requires a humble and respectful attitude towards educational change, rather than attempting to control and foresee everything.

5) Boundary Conditions: The behavior of the system is influenced by boundary conditions, such as resources, rules, culture, etc. These boundary conditions may limit or guide the change of the system. Therefore, educational change may need to focus on and influence these boundary conditions, for example, through policy reforms or cultural development.[7]

Overall, self-organization theory provides a comprehensive, dynamic, and complex perspective for understanding and guiding the change in educational systems. In practice, this requires a greater focus on the process rather than the outcome, more emphasis on exploration rather than certainty, and a preference for inspiring and guiding rather than controlling and commanding.

### 3. Conclusion

Self-organization theory has brought about positive transformations in the organization and management of education in Chinese universities, steering educational concepts towards a more ecological direction. This theory emphasizes the importance of internal interactions and adaptability within the system, advocating for schools and educational institutions to adopt more flexible, decentralized, and autonomous management models to cope with the rapid changes in educational environments and demands. It underscores the active participation of students and teachers, the value of cooperative learning, and the crucial role of educational leaders in facilitating and supporting this process, thereby promoting autonomy and personalization in learning.

At the level of educational leadership, self-organization theory advocates for the decentralization and co-construction of leadership, emphasizing collaboration

and coordination between educational leaders, teachers, students, and parents. It encourages leaders to create positive learning environments, foster autonomy and creativity within the school, and cultivate learning communities and self-organizing teams to collectively achieve the school's goals.

In terms of educational organizational structure, self-organization theory advocates for schools and educational institutions to implement more flexible and decentralized organizational frameworks and management models. It supports autonomy and adaptability within the school, motivating teachers and students to demonstrate initiative and creativity in the learning process. Additionally, the theory emphasizes the establishment of learning communities and communities of practice to promote collaboration, interaction, and knowledge sharing within the school.

In summary, self-organization theory provides a new theoretical and practical framework for educational organization and management. It emphasizes the active participation of students and teachers, autonomy and cooperative learning, as well as the adaptability and innovative capacity within the organization. This theory challenges the traditional mechanistic education model, driving profound changes and continuous optimization in the education system.

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