Analysis on Ideological and Political Teaching Curriculum Design and Information Transfer Based on Complex Adaptive System Theory

Caihong Zhang*

Xi'an Physical Education University, Xi'an, 710068, China

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Abstract

In the field of technology, based on scholar's research results of instructional system design complexity, this paper discussed the development of instructional system design thought. It also analyzed the basic framework of ideological and political teaching curriculum design based on complex adaptive system.

Keywords: system, complexity, instructional design

1 Introduction

With the development of modern science and technology, informatization and networkization have become the trend of Chinese development. At the same time, with the development of Chinese higher education from elite to mass, the increased enrollment and building of colleges and universities, and running a school of multi-campus, teachers of ideological and political lessons have the reality of "mobile-mode of teaching" in teaching practices. The extracurricular contact time between political and ideological lesson teachers and students is lesser. Then students' consolidation and review of knowledge are total by themselves. However, such kind of way will cause lack of deep understanding on ideological and political lessons. In addition, students have strong material gaining attitude on learning, which causes students are to learn for examination. Therefore, as for how to utilize after class time in high efficiency has become another key point of teaching methods in ideological and political course of colleges and universities. Fro example, to strengthen the coaching of students to ideological and political course; to deepen students' understanding on knowledge of ideological and political course; to develop student's ability of logical thinking and to enhance the instruction effect of ideological and political course. With the help of researches of scholars in educational technology field on the complexity of instructional system design, this paper established ideological and political teaching curriculum design based on complex adaptive system.

2 Complex Adaptive System Theory

Complex adaptive system (CAS) theory put forward by Holland in 1994. CAS refers to the complex dynamical system of subjects improving their own behaviors through study in the process of evolution and development, and they are inter-coordinated, mutual adapted and inter active [1].

Its basic idea is that system is made up of subjects that have their own finality and initiative. Adaptive subject has connected micro and macro world together. In microcosmic aspect, subject can constantly learning in the interacttion with environment and other subjects, and changing their own structure and behavioral pattern according to their learned experience, so as to better survival in objecttive environment, that is the subjective adaptive. In macrocosmic aspect, in interaction between subject and environment, the whole system shows complex evolutionary process. The initiative and adaptation expressed among subject, environment and other subjects are the basic agents of system development and evolution. The evolutions of whole system are all derived on this basis, including the generation, differentiation and appearance of diversity of new hierarchies, and the appearance of larger subjects that generated by new polymerization. This is the core idea of CAS theory-"adaptation creates complexity" [2].

3 Teaching System and Its Design

A. TEACHING SYSTEM AND ITS COMPLEXITY

According to the basic idea of system theory, we regard various educations and teaching organizational form that with the purpose of achieving certain education and teaching objectives and realizing certain education and teaching function as education system or teaching system. Teaching system is the subsystem of education system, which contains four basic elements: teacher, students, textbook and teaching media. It is the premise of system operation and forms the spatial structure of system. The mutual effect, interdependence and interaction among sys-

* *Corresponding author's* e-mail: zchongrainbow@163.com

tem elements have constituted the complex operational process between system input and output. American famous educational technical expert, B. H, Banathy thought that teaching system is the hierarchical system complexus. Teaching system is generally divided into four hierarchical systems, which are respectively system in institutional level, management level, teaching level and learning level from high to low [3].
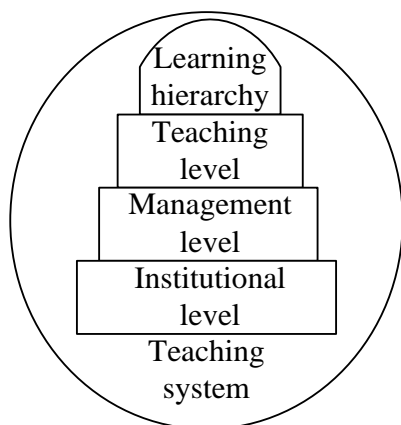

FIGURE.1 hierarchical structure of teaching system

Therefore, seeing from hierarchical structure and function, teaching system has the property and status of "complex".

B. INSTRUCTIONAL SYSTEM DESIGN AND THE COMPLEXITY OF ITS PROCEDURE SCHEMA

Instructional system design (ISD, which is also called teaching design), seeing from the history of the formation of its subject, is a subject that developed with the development of technology based on the integration of multiple theories. As for the definition of the concept of teaching design, different scholars have different opinions. Professor He Kekang [3] thought that teaching design mainly use system approach to convert the principle of learning theory and teaching theory into teaching objectives, teaching content, teaching method and strategy and teaching evaluation, so as to conduct specific planning and creation on the "process" or "procedure" of teaching and learning system. However, the fundamental objective of creating teaching and learning system is to promote students' learning. ISD has the following characteristics: the research object of ISD is learning and teaching system of different hierarchies, which includes the content, condition, resource, method and activity that promote students' learning; ISD refers to research and explore the essential contact among various elements, and element and whole using system method. It also comprehensively consider and coordinate their relations, which organically integrate elements so as to finish the function of teaching system; ISD aims to apply basic theories like learning theory and teaching

theory to solve the practical problems of teaching, thus to form the teaching and learning system that has experienced verification and can realize intended functions.

The procedure schema of ISD is a set of programmed steps. The general procedure schema of ISD contains four basic elements: learner, objective, strategy and evaluation (Wu Meina, 1994). Currently, procedure schema of ISD has hundreds of types, of which the ISD schema with operability already has hundreds of types. It development is generally experienced four generations of evolutionary process (ISD1, ISD2, ISD3, ISD4). From the perspective of science of system, its evolutionary process also expresses as "linear cycle–flow chart–cycle in phase and linear out of phase–dynamic interaction network" [4]. We can induce the previous three phases of ISD procedure schema as linear teaching design. However, procedure schema of teaching design at the fourth generation is non-linear teaching design schema that based on the thought of complex adaptive system. There exist apparent differences between the two. We can compare the characteristics between them (as shown in Table 1[5]).

TABLE 1 Comparison of the main characteristics between linear ISD and nonlinear ISD

linear ISD	nonlinear ISD
linear, closed, static system	nonlinear, open, dynamic system
Teaching event presents linear causal relationship.	Teaching event presents interactive causal relationship.
Whole is the simple sum of each part.	Whole is not the simple sum of each part.
It can predict the change of learner's cognition and skill.	It can not conduct long-term prediction (butterfly effect). a tiny disturbance may produce unpredictable consequence. Integrate the unpredictable teaching event into the dynamic relation so as to increase its flexibility.
By decomposing the whole into the independent part to conduct analysis, and to simplify the complex teaching system	Part-whole-part…, constant cyclic and timely analysis, especially stress to use anthropological studies to understand the overall characteristics of complex teaching system.
Provide the predesigned teaching objectives and teaching sequence, until teaching is finished. There are seldom other alternative learning paths	Teaching objective is diversified and hierarchical with multiple alternatives of learning paths.
Factors like mistake and disturbance are corrected through negative feedback, which is an important means for maintaining the equilibrium state of teaching system.	Factors like mistake and disturbance are queries, explored and introspected in each level through positive feedback, which promote the constant evolution and development of teaching system and learners.

4 Development of ISD Thought

In long term of exploration, educational technology workers have confirmed the system theory thought as the guiding thought of ISD, considered teaching as system for study and defined system approach as the core method of teaching design. With the development of system theory and the constant deepening of cognition of teaching system, system thought and method used by ISD have successively experienced three phases: definitive linear system, definitive nonlinear system and indefinitive nonlinear sys-

tem. Currently it is developing in the direction of complex adaptive system [6].

The above three system thoughts have possessed the characteristics of some complex thoughts, but it cannot fundamentally solve the problems like the complexity of system, initiative adaptation of system elements and learning ability. Until the put forward of complex adaptive system (CAS), can these problems obtained better reply. CAS thinks that all subjects are in a common political and economic environment, but each part conducts adaptive learning and evolution concurrently and independently according to its surrounding partial microenvironment. Chen Liezun, et al tried to apply CAS thought for carrying out teaching design research and practice based on CAS theory, and also put forward the basic key points of ideological and political teaching curriculum design based on CAS thought [7], as shown in Table 2:

TABLE 2   Key points of ideological and political teaching curriculum design based on CAS

thought framework	complex theory and CAS thought
external relationship	It focuses on the social distant imagination. The designation is come forth with the purpose of conscious pursuing and adapting the uncertainty of future society. Its main aim is to culture future social citizens.
knowledge opinion	Knowledge is not only the reflection of objective and dynamic world. It also implicates the passion, faith, conscience and responsibility of human intelligence, which includes explicit knowledge and implicit knowledge. Among knowledge of different types and different subjects, they realize the mutual conversion, sharing, using and creation of knowledge though SECI* process.
Design focus	The creation strengthening of resource, rule, knowledge conversion (teaching platform) and mechanism, and the launch of activity. It attaches importance to practical teaching, extracurricular scientific activity and social practical activity
adaptivity	Subject automatically adapt to environment of indefinitive changes. It has strong environmental adaptability and forms mutual symbiosis with environment. It mainly relies on internal monitoring, automatic regulation and internal incentive.
internal relationship	System design experts provide design resource and conduct common design, interaction and collaborative operation with teachers. It will be much better if teaches are also system design experts. Cyclic, multi-causal relationship, nonlinear relationship and the coexistence of positive and negative feedback require to reform of system itself. The coexistence of self organization with other organization, and the harmonious coexistence of competition and cooperation.
procedure evolution	Teachers and students create together. Subject behavior or system behavior is unknown and cannot be totally predicted or controlled. All students design together and determine the orientation and process of teaching or spontaneously emerged. Keep open attitude to change, and guide by dynamic opinion of environment coordination evolution. Plan interacts with action.
Results assessment	individualized, polybasic, procedural and developed evaluation mode

Teaching system is considered as hierarchical complexus, instead of just staying in decomposing teaching system into teacher, student, teaching content and teaching media. This cognition has reached consensus in field of teaching design. Seeing from China's practical situation, there exist two design orientations: the ISD that defines teaching level as basic level and ISD that considers learning level as basic level. In China's teaching system of class teaching, teaching design with teaching level as basic level occupies leading role. However, in family education, social education, web education and school teaching that centered on student activities, teaching design with learning level as basic level has become the mainstream. At the same time, in other teaching forms, we can also consider institution level and management level as basic level for conducting teaching design.

According to the key points of ideological and political teaching curriculum design of CAS, this paper established the basic framework of ideological and political teaching design based on CAS, as shown in Figure 2.
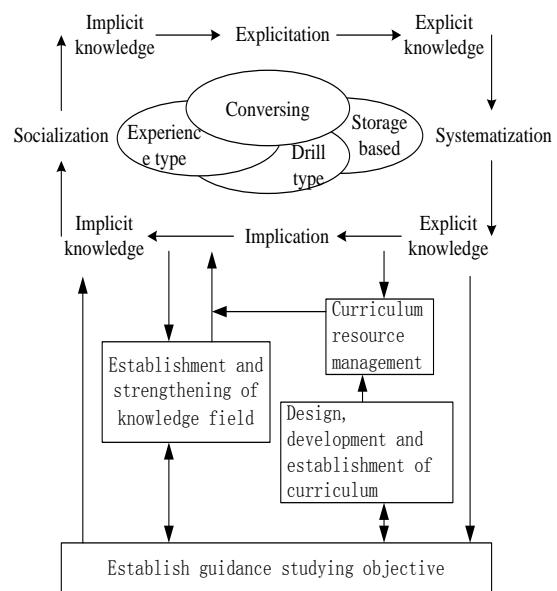

FIGURE. 2 basic framework of ideological and political teaching design based on CAS

Basic framework of ideological and political teaching design based on CAS has the following characteristics:
(1) Stimulate and intensify students' subject adaptation, which makes the inter coordination of demand between system objective and individual development;
(2) Respect the generative of teaching activity, advocate creative learning and culture student's innovation consciousness and ability;
(3) Competition and cooperation are harmoniously coexisted;
(4) Attach importance to the inter conversion and spiral upward of implicit knowledge and explicit knowledge.

5 Conclusion

Seeing from the development of ISD thought, the ideological and political teaching curriculum design based on CAS thought will certainly become the mainstream of ISD. Regard teaching system as hierarchical and stereo complexus, and ISD that respectively with teaching level as basic level and with learning level as basic level are the mainstream in the field of teaching design practice. It is believed that it can play tremendous effect in the future teaching practice, so as to improve the education quality of ideological and political curriculum. In addition, it also provides well reference for other subject educations.

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Authors

Caihong Zhang, born in 1978, Hebei Province of China

Current position, grades: associate professor.
University studies: PHD degree was earned in major of sports humanities and sociology, Beijing Sport University in 2011.
Scientific interest: ideological and political education, sport law.

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