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Study on Characteristics and Constituent Elements of Learning Plan from the Perspective of Deep Learning

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Abstract: *The in-depth learning from the perspective of learning science, which emerged in the 1970s, focuses on the social character and key ability of learners in the era of knowledge economy to adapt to and lead the development of modern society and become people who are beneficial to themselves and society. As a technical tool or spiritual value carrier of classroom teaching, learning plan attaches importance to "situational" complex learning research, pays attention to the questioning of cognitive subject "human value", shifts from attaching importance to the capacity of classroom knowledge to enhancing the depth of classroom knowledge, and aims to pursue an effective learning process of understanding and innovative learning of knowledge with important concepts as the core, and cultivate students' knowledge, ability and emotion necessary for in-depth learning. The study plan from the perspective of deep learning has the characteristics of knowledge questioning, problem thinking, hierarchical thinking and hierarchical gradient. It is composed of learning objectives, knowledge structure, problem design, scenario creation, reflection and evaluation, and forms a deep learning logical thinking framework with problem orientation as the guide and ideological development as the purpose throughout the process.*

Keywords: *deep learning; study plan; connotation; features; structural elements*

1. Introduction

Learning science, which arose in the 1970s, is an interdisciplinary field that forms a new understanding of the nature and laws of learning. It is the forefront of learning research. It can be said that it is a clear spring of learning research in different types and levels of education, and it is the basic learning principle that learners should follow. The era of knowledge economy has put forward new requirements for talent specifications. Learning needs deeper and deeper learning. It can use complex concepts to create new concepts, new theories, and new products. It is an effective learning process for understanding and innovative learning of knowledge with important concepts as the core in the school field, and constantly forms the social character and key ability to adapt to and guide the development of modern society, Become a person who is beneficial to both oneself and society. In short, by recognizing the essence of the learning plan, we will find that it is still necessary to have the learning plan in the era of information intelligence. The concept of the content of the learning plan is not outdated. All kinds of education and teaching at all levels need the learning plan, which is a combination of theory and practice. The key is how to make the learning plan, as a medium or carrier, become a bridge to effectively link the complex between teaching and learning. This paper mainly discusses the essence, characteristics and elements of the learning plan from the perspective of deep learning, with the learning plan as the starting point, and the internal relationship between the concept of deep learning and the learning plan as the starting point, in order to find the basis for the scientific and reasonable aggregation of the learning plan, promote the occurrence of the analysis, synthesis, innovation, high-level and deep learning process of students of different types of education, and improve the comprehensive quality of students.

2. Ontology understanding: the essence of learning plan from the perspective of deep learning

Deep learning is an important concept in the field of contemporary learning science. Compared with shallow learning, it focuses on the process, state and results of students' transition from shallow learning to deep learning. Deep learning is not a complete learning form. This article is more inclined to Professor Li Jiahou's point of view. Deep learning means that learners can critically learn new

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knowledge and ideas, integrate new knowledge and ideas into existing cognitive structures, connect among many ideas and transfer existing knowledge into new situations on the basis of understanding learning [1]. Deep learning does not deliberately pursue the depth and difficulty of the learning content itself, but focuses on learners' deep understanding, synthesis and creation of core knowledge points such as concepts, rules or principles, aiming at the collaborative construction of knowledge meaning and the development of high-level thinking. Therefore, deep learning is not a complete learning form. It covers three levels or dimensions of learning mode, learning process and learning results. It is a spiral level complex that integrates pedagogy, psychology and epistemology and interacts with each other. It is a dynamic system or system.

Tracing back to the source, we can see that the learning plan originates from the students' learning needs. The learning plan is an organic unity of the collaborative construction of students' knowledge structure, cognitive structure and learning science structure around the three-dimensional dimensions of learning methods, learning processes and learning results. Taking a comprehensive view of the existing studies, there is no unified definition of the study plan, the concept of the study plan is abstract and universal, and there is a lack of attention to the ontological meaning of the study plan. Especially under the paradigm of contemporary learning science research, the learning plan should return to the true state of knowledge learning to meet the learning demands of the era of knowledge economy[2]. Zhang Chengju believes that "learning plan versus teaching plan is a plan designed by teachers according to teaching tasks, students' knowledge base and ability level, learning law and students' psychology under the guidance of quality education thought, or a learning plan designed by students with the help of teachers to cultivate innovative thinking and develop learning ability throughout the learning process [3]." Guan Shiwei, Zang Shumei's Theoretical Research on the Design of Learning Plans pointed out that "the learning plan should include two parts: one is the plan for students' learning, which is biased towards the design of learning content; the other is the plan for teachers' teaching, which focuses on how teachers guide learning, and the classroom teaching design around the 'problem discussion' in the learning plan or the key and difficult points or error-prone points of teaching materials, which aims to improve the problem-solving ability and the development of innovative thinking [4]".

To sum up, there is no unified view in the academic circles at present. The learning plan deviates from the original development concept, tends to be a teaching plan or exercise plan, evolves into a tool for teachers' rational thinking, and becomes a skateboard to help teachers' teaching process to be sequenced or solidified, obscures the essential requirements of knowledge learning, and loses the core meaning of the learning plan, which seems to be a generalization. Pei Dina pointed out that "teaching is an organism that integrates teaching and learning, and is a two-way dynamic relationship [5]." In essence, there is no highest standard for defining the concept of learning plan. The key is to seize the pulse of learning plan, find the deep hole of learning plan, deeply understand the connotation, characteristics, structure and pattern of learning plan, explain the ontological meaning or core idea of learning plan from the perspective of knowledge theory, teaching theory and psychology, and return to the original idea or trace the beginning and end, consolidate its core essence and materialize it into concrete solutions or concepts that can be operated. To sum up, with the basic education curriculum reform as the background, the learning plan is a learning plan of teacher-student interaction "teaching integration" under the new curriculum reform, which is designed by teachers collectively or individually and participated by students according to the class hours or the content of teaching materials, and aims to guide students to independently, cooperate and explore. Or the learning plan is a learning plan that is guided by problem-oriented and aims at thinking development and aims to help students construct knowledge meaning. Specifically, it is a learning guidance text that integrates knowledge, problems, situations, training and reflection. It is a structured deep learning of overall cognition, and an effective learning or deep learning process that optimizes learning content and learning process.

3. Internal representation: the core feature of learning plan from the perspective of deep learning

Tracing back to the source, we can see that the learning plan originates from students' learning needs. The learning plan is student-centered, student-centered, and student-oriented. From the perspective of the connotation of the learning plan, the learning plan is a learning plan for teachers to help students construct the meaning of knowledge from the perspective of students' deep learning, through the integration of knowledge structure and cognitive structure, guided by problem-oriented, and aimed at thinking development. It is suitable for different educational fields, and is an ideal situation for students to learn. The study plan has the core characteristics of subjectivity, dominance, problematicity, inquiry and hierarchy.

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3.1 Subjectivity

The subjective characteristics of the study plan are mainly reflected in the whole process of the study plan design, from the main body, purpose, content and link of the study plan design. From the perspective of learning plan design, subjectivity mainly refers to teachers abandoning previous outdated ideas, breaking the rigid situation that learning plan only serves teachers, returning to students' learning perspective, and serving students' in-depth learning; From the perspective of the purpose of learning plan design, learning plan is a self-study plan for students, which aims to promote students' in-depth learning, improve problem-solving ability, cultivate innovative literacy, develop high-level thinking, and lay the foundation for lifelong learning; From the content of learning plan design, learning plan design is the core link of classroom teaching, while problem representation is the core or key of learning plan design. Problem design carries the mastery of knowledge and skills, process methods and experience of emotional values. The problem solving process is more the exchange and dialogue of life soul between students, teachers and students, and the experience of students' life existence; From the aspect of learning plan design, we should carefully study students, understand the learning situation, observe students' learning status, pay attention to students' previous knowledge and experience, use students' existing knowledge and experience as a fixed point for new knowledge learning, assimilate or adapt to new knowledge, expand or generate knowledge meaning, and construct knowledge structure.

3.2 Dominance

Directivity mainly refers to the role and position of the teacher's guide, organizer and facilitator in the learning plan. It is a challenge to the absolute authority of teachers in traditional teaching, an improvement of teachers' speech, and a repositioning of teachers' functions. It is mainly reflected in how to effectively integrate the link and correspondence between knowledge structure and students' cognitive structure, how to set suspense or situations through problem design to trigger students' cognitive conflicts, challenge students' thinking, and promote the development of students' high-level thinking in solving difficult and complex real problems. Specifically, from the role of facilitator and guide, the learning plan is the two-way communication and interaction between students, teachers and students and the text, and the soul dialogue between lives. Students' in-depth learning needs the guidance and guidance of teachers. Timely and appropriate guidance is like flowing water and nectar infiltrating the heart, which is a true portrayal of the teacher-oriented function; from the perspective of the content design of the learning plan, the selection, combination and presentation of the knowledge content are all guided. The guided knowledge structure can stimulate students' thirst for knowledge, interest and motivation, build a fixed point for learning new knowledge, provide strategic guidance for students' learning, promote students' deep learning, master advanced cognitive skills, and improve their cognitive level.

3.3 Problematic

The core or essence of the study plan refers to the design of the problem. Whether the problem design is scientific or not is related to the implementation effect of the study plan. The essence of problem guidance is to move from simple knowledge mastery to multiple intelligence generation, from discrete knowledge to systematic learning thinking or overall cognition, to achieve the unity of basic knowledge, skills and problem-solving ability, to seek the balance between the development of knowledge system and innovation ability, and to explore the reconciliation and unity between the construction of subject knowledge system and students' learning experience. Knowledge is connected, and it is usually a huge whole. As the core knowledge point of learning plan design, it must be lumped into problems. Through the continuous solution of many problems in a problem system, it can learn the perspective, steps and priorities of problem solving, clarify the relationship, focus on the key points, and promote wisdom. Therefore, in the design of learning plan, it is necessary to clarify the attribute of the problem, organize the problem according to the learning objectives, knowledge content, students' personality and thinking level, follow the law of consistency between the knowledge structure and students' cognitive structure, conform to the progressive law of thinking level from low to high, and highlight the cultivation of the ability to solve the problem of distance transfer, We should gradually change from problem-free space to simple problem to complex problem, to metaproblem and finally to challenge the logical structure of the problem.

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3.4 Exploratory

Inquiry is mainly aimed at solving problems in the transfer training. Inquiring needs to be vigilant about the study plan exercises or exercise sheets to avoid the study plan becoming a copy of exercise books and self-study guidance. The inquiry learning plan is a problem chemistry plan. It is to change the back result test of the learning plan into a forward-looking independent learning guide. Through the continuous solution of many problems in a problem system, it can learn the perspective, steps and priorities of problem solving, clarify the relationship, focus on the key points, and promote wisdom. The problem is the representation or externalization of thinking. Because of the logic, structure and systematicness of the problem itself, the problem is conceived or expanded according to the problem system, and the thinking can often shrink freely. At the same time, the depth and breadth of thinking depend on the problem chain constructed in the students' minds, the vision and breadth of thinking depend on the problem domain sketched in the students' minds, and the logical hierarchical relationship between knowledge or concepts also depends on the problem network generated by students. Therefore, the inquiry of learning plan is to turn the exercise into the problem, avoid the repetition and accumulation of shallow knowledge, more "why" questions and less "what" questions, form the problem chain according to the knowledge logic and students' cognitive structure, guide students to explore the core ideas and methods behind the deep knowledge, understand the theorems, rules and methods followed in the process of knowledge generation, form models or general rules, and realize variant learning.

3.5 Hierarchy

Hierarchy mainly refers to the hierarchical development of students' thinking level in problem-based learning. The level of thinking is embodied as the difficulty of the problem, and the abstraction is the generalization of the core knowledge points, following the rules of the level of cognitive objectives. Its performance is the increasing complexity; increasing diversity; the overall situation precedes the local skills; the increasing difficulty of meaningful tasks; Practice in various situations to emphasize extensive application; before implementing the sub-task, focus on the conceptualization of the overall task. Specifically, problem difficulty refers to the distance between the comprehensive effect of the width, depth, angle and precision of the problem and the actual cognitive level of students. If the gap between the difficulty of the problem and the cognitive level is large, the difficulty of the problem is large, and vice versa. As the inherent characteristics of the problem, width, depth, angle and precision are the attributes of the problem itself, while the difficulty of the problem is the reflection of the students' learning situation. For teachers, the difficulty of the problem is easy to grasp, but what is more difficult to grasp is the difficulty of students' thinking. The difficulty of thinking directly reflects how big the gap between students' current level of thinking activity and their current level of thinking is. In a word, proper thinking can stimulate students' cognitive conflict, make students feel the cognitive difficulty, but it will not exceed the cognitive threshold of their adjacent development zone. Finally, it will arouse students' enthusiasm and motivation to participate in learning through "advance organizer", cultivate learners' problem awareness, improve problem-solving ability, and cultivate thinking quality. Therefore, it is necessary to put forward questions that are helpful for students to think about their desire, valuable, difficult, and intellectually challenged; Form a problem or problem chain from the outside to the inside and from the shallow to the deep; The allocation of time and energy should be determined according to the difficulty of the problem; Improve the degree of attention to problem solving and conclusion.

4. External structure: the constituent elements of learning plan from the perspective of deep learning

On the basis of clarifying the essence and internal representation of the study plan, from the perspective of practical application, the study plan is composed of five parts: learning objectives, knowledge structure, problem design, situation creation and evaluation and reflection. Among them, the learning goal is the foundation, the knowledge structure is the key, the problem design is the core, the situation creation is the guarantee, the evaluation and reflection is the purpose, and the various elements are interconnected and mutually affected, which together point to the development of high-level thinking.

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4.1 Learning objectives

Learning objectives generally include three-dimensional objectives of knowledge, ability and emotional experience. The cognitive learning goal is the basis or core of the three-dimensional goal. The cognitive goal has the function of controlling the process goal and value goal, and is the main line of the three-dimensional learning goal formulation. The cognitive goal points to the learning result and the problem points to the goal. The learning goal has the attribute of problem-solving. Problem-based learning can promote the development of students' thinking and effectively turn the goal into effective teaching and learning behavior. Clear learning objectives and the relationship between them can ensure the continuity of teaching; grasping the problem-solving attribute of the goal helps to find the right thinking thread. Therefore, the formulation of learning objectives should not only focus on the integration of three-dimensional objectives, but also pay attention to the dimensions of knowledge and cognitive process, and formulate appropriate learning objectives. On the basis of determining the core knowledge points, each knowledge point is classified by Bloom's cognitive goal. At the same time, the same goal can be achieved step by step through several sub-issues, and different goals can also be achieved through the integration of a core issue. The process of achieving a certain target dimension will inevitably be accompanied by the emergence of other target dimensions [6].

4.2 knowledge structure

The knowledge structure is to effectively integrate the learned content and express it in a graphical structured form, which aims to help students quickly graft the original knowledge structure to clearly and accurately understand the context of the next learned knowledge, facilitate students to process and process information, and deepen students' understanding and memory of the learned knowledge. Therefore, the knowledge structure should be consistent with the cognitive structure, and should be presented in a non-linear and reticular structure, which is convenient for learners to construct the corresponding knowledge concept network on the basis of existing knowledge and experience, and facilitate digestion and transfer. Furthermore, knowledge should be problemized, embedded in flexible problems, and given certain problem-solving attributes. Through learning from real and complex problem situations, knowledge should be deepened in the field of meaning, expanded in the scope of knowledge application, and formed a knowledge system. Finally, carry out multi-angle cognition around the same knowledge point, broaden the knowledge learning path, stimulate students' divergent thinking, promote students to realize concept interaction around the same topic, deepen the scope or scope of knowledge application in this field, develop creative thinking, and form expert thinking in a certain field.

4.3 Problem design

Problem design is the main line of study plan design, and problem chemistry practice runs through the design of study plan. In knowledge learning, knowledge is mainly organized around problems, not arranged and organized according to the logical relationship of knowledge itself. In knowledge teaching, abstract and dynamic knowledge content is often condensed into a series of problems. Knowledge problematization should not only emphasize cognitive processing, but also ignore the systematic processing of its own subject knowledge, so as to avoid the fragmentation of knowledge while the knowledge points are detailed and specific, and to promote students to master knowledge and develop ability in the systematic problem solving [7]. Therefore, as a carrier of condensed knowledge, ability, emotion and other comprehensive qualities, problems should not only follow their own design rules, but also follow the complex rules of structured and systematic problems to realize the logical relationship between multi-dimensional problems "based on discipline problems, guided by teachers' problems, and centered on students' problems". Specifically, the design of the problem system should match the internal relationship between the new and old knowledge, pay attention to different problem types according to the knowledge dimension and the cognitive process dimension, pay attention to the definition of the attribute of the problem goal, optimize the learning content and learning process by serializing the problem learning, and make the problem chemistry learning become an intelligent generation field for knowledge acquisition, goal achievement, and experience acquisition.

4.4 Scenario creation

Deep learning occurs in a complex social and technological environment. The realization of deep learning needs to be rooted in the information interaction of the complex learning environment. The

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abstract information transmission separated from the problem vein is easy to produce inert knowledge. The problem situation is the field of problem rule abstraction. The goal of problem situation creation is to provide a learning field for students' cognitive activities of overall construction, and realize the overall construction of the subject knowledge system by constructing the problem chemistry learning of block knowledge with procedural value and optimized structure. In particular, the "view of knowledge" under the new curriculum reform emphasizes the empirical basis, construction process and collaborative nature of knowledge, and the empirical basis of knowledge indicates that the establishment of a certain concept must be based on specific experience, that is, experience, or its meaning is empty [8]. Through the creation of problem situations, students' knowledge and experience base will be structured, students' potential learning ability will be awakened, students' thinking paths and methods will be expanded, and deep learning will be realized. Therefore, the creation of problem situations should conform to students' actual life, stimulate students' interest in learning, facilitate students' independent inquiry, trigger students' problem generation, and aim to build knowledge background, learning strategies and path support for problem solving for knowledge construction and cognitive development.

4.5 Reflective evaluation

Reflective evaluation mainly refers to the development of students' metacognition, which is the essential content of the development of high-level thinking. Metacognition is a reflection on knowledge mastery and a reduction of knowledge generation and development. It requires learners to be able to critically check the logic of arguments and arguments, learn to use existing knowledge or experience to evaluate new ideas, actively connect ideas and conclusions, and require learners to reflect on their understanding and learning process, and develop awareness of metacognition through problem discovery, analysis and solution process The breadth and skill level of metacognition. Evaluation is feedback, open evaluation method, diversified evaluation content, and scientific evaluation process, which help to urge students to self-reflect, correctly attribute, scientifically set learning goals, actively adjust learning strategies, and achieve learning motivation from both sides. Therefore, reflection, as the core representation of metacognition, does not occur out of thin air, but is based on the evaluation and feedback generated by cognitive conflict, problem situation and transfer training in the problem-solving process [9]. Evaluation and reflection can promote students to adjust their learning state, change their learning methods, move forward towards the original learning results, construct the knowledge meaning system, and improve their thinking level.

5. Conclusions

As a technical tool or spiritual value carrier of classroom teaching, the learning plan attaches importance to the "situational" complex learning research, pays attention to the questioning of the cognitive subject "human value", and changes from emphasizing the capacity of classroom knowledge to improving the depth of classroom knowledge, aiming at pursuing the effective learning process of understanding and innovative learning of knowledge with important concepts as the core, and cultivating the knowledge, ability and emotion necessary for students' in-depth learning. In the period of high-quality development, in-depth learning is the inevitable path of quality generation, and the key is how we promote the development of in-depth learning, that is, how to systematically integrate the connotation into the specific teaching design and implementation, especially with the help of big data and information tools in the intelligent era, to make the learning plan into a dynamic, three-dimensional and visual teaching plan. Therefore, the inquiry study plan is never out of date. Informatized teaching is not a negation or rejection of the traditional study plan design, but should complement each other and complement each other. High-quality study plans are often technical tools or spiritual value carriers for access to in-depth learning.

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