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Research on the Integration Path of Heuristic Inquiry-Based Teaching and Curriculum Ideology and Politics Based on the DOK Model

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Abstract: Aiming at the problems existing in heuristic inquiry-based teaching of university specialized courses—namely, students' cognition remaining at a superficial level, the formalistic integration of ideological and political education, and the disconnection between value guidance and the cultivation of higher-order thinking—this paper introduces Webb's Depth of Knowledge (DOK) model. Relying on its four-level cognitive hierarchy, the teaching process of "preview-induced thinking—intensive in-class explanation and reasoning—interactive seminar and critical deliberation—expansion and sublimation" is aligned with the four levels, and a layered and embedded integration path is constructed. Following the cognitive gradient, ideological and political materials are matched with inquiry tasks, so that curriculum ideology and politics is promoted from superficial preaching to immersive internalization. This provides implementable ideas for carrying out deep-learning teaching reform in specialized courses and for solving the "two skins" dilemma of curriculum ideology and politics.

Keywords: DOK Model; Heuristic Inquiry-based Teaching; Curriculum Ideology and Politics; Deep Learning; Cognitive Progression.

1. Introduction

Fostering virtue through education is the fundamental mission of higher education, and curriculum ideology and politics is an important means of implementing all-round education and achieving the unity of value shaping and knowledge imparting in specialized classrooms. Previous studies have pointed out that combining heuristic teaching with curriculum ideology and politics—through the selection of materials and the guidance of questions—enables values to enter students' cognition naturally alongside knowledge explanation, achieving a subtle and imperceptible educational effect[1]. With the advancement of classroom teaching reform, heuristic inquiry-based teaching, by virtue of its organizational mode of question-driven learning, independent study, critical thinking and generation, and transfer and application, has gradually transformed the traditional one-way indoctrination classroom and promoted the transition of learning toward deep learning[1]. This model emphasizes students' subjectivity and relies on chained questions to guide students to actively discover, analyze and solve problems, which meets the practical needs of cultivating high-level talents. However, in the implementation of specialized courses, its educational value has not been fully released, and two prominent problems exist.

On the one hand, many inquiry activities are confined to lower-order cognitive levels: classroom interaction mostly stays at question-and-answer sessions on knowledge points and retelling of basic cases, lacking evidence sorting, multi-scheme comparison and judgment in complex situations. Consequently, students find it difficult to form stable critical thinking, and deep learning is liable to become a mere formality[1]. On the other hand, the embedding of curriculum ideology and politics is not constrained by cognitive levels and is somewhat arbitrary in arrangement: grand value issues are directly raised at the memorization stage, exceeding students' current cognitive foundation; while the higher-order stages suitable for critical argumentation lack the follow-up and sublimation of the value mainline. This ultimately results in the "two skins" phenomenon, in which specialized teaching, thinking training and ideological guidance are separated from one another[1].

The Depth of Knowledge (DOK) model proposed by Webb does not take the difficulty of knowledge points as the criterion of division; rather, it takes the complexity of cognitive processing required to complete tasks as the yardstick, and divides learning activities into four progressively advancing levels[2]. This framework has been used in specific courses to classify the levels of teaching content, design classroom activities and group tasks, and to examine the development of students' higher-order thinking[3,4]. Embedding the DOK model into the whole process of heuristic inquiry teaching can establish a relatively stable correspondence among teaching stages, cognitive levels and ideological-political objectives; the depth and presentation form of ideological and political content can then be arranged according to the rhythm of students' cognitive development, thereby alleviating the problems of subjective and superficial implantation of ideological and political elements. On the basis of clarifying the internal relationship among the three, this paper constructs a gradient education path corresponding to the four-level cognitive hierarchy and specifies the supporting implementation principles, providing a reference for the teaching reform of similar specialized courses.

2. Definition of Core Concepts and the Internal Alignment Mechanism

2.1. Hierarchical Connotation of the DOK Model

The core of the DOK model is to distinguish the depth of

thinking processing required by learning tasks. Its four levels support one another and rise step by step, forming a continuous chain of cognitive development[2].

DOK1, Recall and Reproduction: this is basic lower-order cognition, mainly involving the recognition, extraction and retelling of specialized definitions, basic formulas and theoretical conclusions. The task information is relatively direct and requires no complex reasoning; it constitutes the foundation for subsequent deep learning[2].

DOK2, Skills and Concepts: this is intermediate cognition, focusing on understanding conceptual connotations, clarifying theoretical logic and mastering standardized operational procedures. Students are able to classify and explain information and accomplish normative application in familiar situations, realizing the transition from memorization to understanding[2,3].

DOK3, Strategic Thinking: this is higher-order cognition, requiring students to carry out multi-dimensional analysis, causal discrimination, scheme comparison, weighing of advantages and disadvantages, and argumentation on the basis of existing evidence. Tasks at this level generally have no unique standard answer, and the emphasis is on exercising independent judgment and logical argumentation abilities[2].

DOK4, Extended Thinking: this is the highest-level cognition, emphasizing the integration of knowledge across chapters and fields, solving complex problems in unfamiliar and unstructured real situations, optimizing schemes and transferring knowledge creatively, with outstanding innovation awareness and practical implementation ability [2,4].

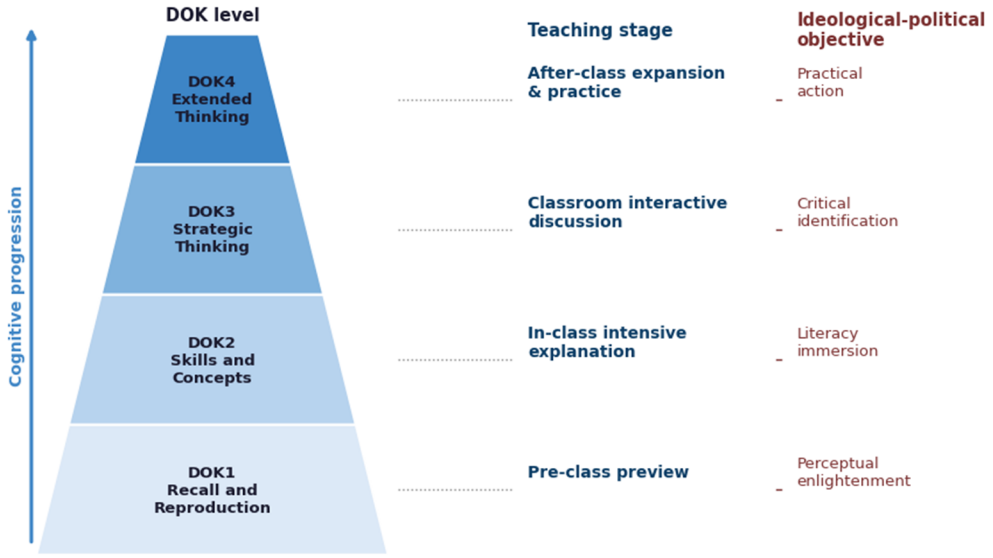

Figure 1. Alignment among the four DOK levels, the teaching stages and the ideological-political objectives

2.2. Internal Logic of Integrating the Three

First, the development rhythms are consistent. Heuristic inquiry teaching follows the learning path of "basic cognition—understanding and application—critical inquiry—innovation and transfer"; the DOK model follows the cognitive processing law from the shallow to the deep; and the educational process of curriculum ideology and politics also advances step by step along "cognitive perception—literacy immersion—value identification—conscious practice". The three are matched in their progression rhythms and can advance synchronously and upgrade collaboratively[1].

Second, they are functionally complementary. Heuristic inquiry reconstructs the teacher-student relationship in the classroom and builds an activity carrier for students' independent inquiry; the DOK model provides the criteria for cognitive stratification, making inquiry depth and task difficulty designable and observable[3]; curriculum ideology and politics undertakes the function of value guidance, making up for the shortcoming of specialized teaching that emphasizes ability training while neglecting literacy cultivation. The three jointly support the implementation of the three-dimensional objectives of "knowledge—ability—literacy" [1].

Third, the educational process is convenient to observe and adjust. With the four-level cognitive framework of DOK, teachers can refine the design of inquiry tasks, ideological and political materials, and learning outputs before, during and after class, thus improving the virtualization and evaluative difficulty of curriculum ideology and politics to a certain extent. Research on deep learning also shows that value internalization requires the support of corresponding cognitive conditions and teaching mechanisms, rather than being a mere superposition of content [5].

3. Implementation Path for Integrating Heuristic Inquiry Teaching and Curriculum Ideology and Politics under the Guidance of DOK Levels

Relying on the four stages of "pre-class preview—in-class intensive explanation—classroom discussion—after-class expansion", which correspond in turn to DOK1 through DOK4, a gradient and embedded education path is formed.

3.1. Pre-class Preview (DOK1, Recall and Reproduction): Basic Cognitive Preparation and Initial Value Perception

This stage focuses on lower-order cognitive input, and its core objective is to sort out basic concepts, build a theoretical framework and clarify the key and difficult points of learning, so as to prepare for in-depth inquiry in class [2].

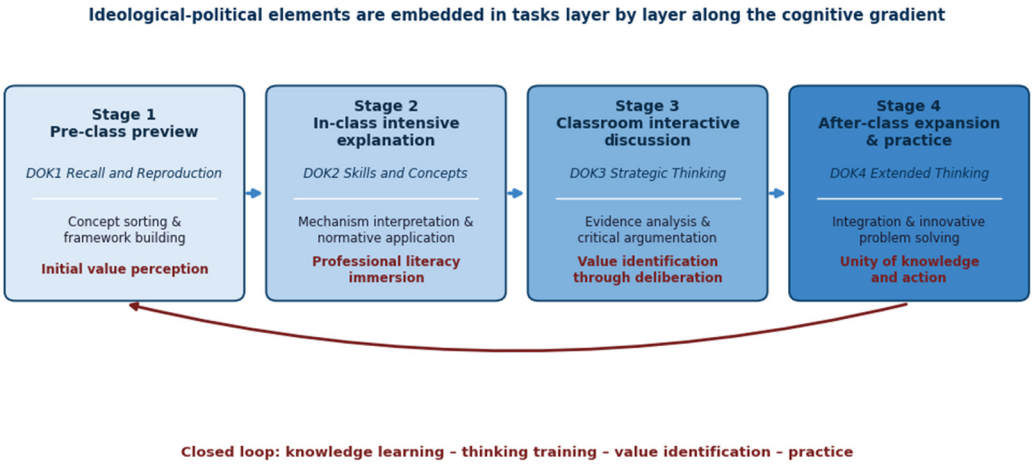

Figure 2. The layered and embedded integration path of heuristic inquiry-based teaching and curriculum ideology and politics under the guidance of the DOK levels

According to the cognitive characteristics of DOK1, the ideological-political arrangement is mainly perceptual preparation, and no complex critical-thinking tasks are set. When issuing preview tasks, teachers, in addition to textbook study and concept sorting, provide lightweight materials such as the development history of the discipline, stories of scientific researchers' scholarship, and industry development plans [1]. While sorting out basic knowledge, students initially understand the social value of the profession, build a simple professional identity, and develop a learning attitude of respecting laws and being rigorous and truthful.

3.2. In-class Heuristic Intensive Explanation (DOK2, Skills and Concepts): Internalization of Principles and Immersion of Professional Literacy

In-class intensive explanation corresponds to DOK2, and the teaching focus shifts from memorization to the interpretation of theoretical mechanisms, methodological procedures and applicable boundaries, guiding students to clarify the internal logic of knowledge and master application methods in conventional scenarios[3]. At this stage, ideological-political education adopts an embedded mode of integration, staying close to the connotation of the knowledge points themselves, without setting up separate ideological-political teaching sessions. When explaining industry norms, technical standards and analysis criteria, teachers simultaneously infiltrate bottom-line awareness, rule awareness and contract spirit; when sorting out theoretical iteration and technological evolution, they convey the quality of down-to-earth research and the pursuit of excellence; and when introducing job responsibilities and potential risks, they guide students to establish a sense of job responsibility[1]. While understanding knowledge and learning how to apply it, students gradually form the corresponding professional values.

3.3. Classroom Interactive Discussion (DOK3, Strategic Thinking): Multi-dimensional Critical Judgment and Internalization of Value Identification

Classroom discussion is the core link of higher-order thinking training and deep ideological-political guidance, corresponding to DOK3[2]. Teachers set comprehensive and situational open topics in conjunction with professional frontiers, real industry controversies and practical problems; these topics have no fixed conclusions and require students to sort out evidence, conduct comparative analysis and argue their viewpoints on the basis of theories, cases and norms[3]. In the process of group cooperation, classroom reports and viewpoint confrontation, elements such as scientific ethics, social responsibility and industry mission are embedded in the discussion of the topics. Students independently form value judgments through rational weighing and mutual questioning, transforming external guidance into their own relatively stable cognition; this process relies on classroom interaction mechanisms and the support of learning communities, rather than one-way indoctrination[5]. Team communication also trains academic qualities such as listening and rational expression.

3.4. After-class Expansion and Sublimation (DOK4, Extended Thinking): Cross-domain Transfer Practice and the Unity of Knowledge and Action

After-class expansion corresponds to DOK4, and the tasks are comprehensive and practical, guiding students to break through the limitations of a single chapter, integrate knowledge across multiple modules, and carry out investigations, scheme design and optimization for real and complex problems[4]. At this stage, ideological-political guidance focuses on promoting identification toward practice, encouraging students to determine inquiry directions in combination with the real needs of industrial transformation and high-quality industry development, and to integrate their personal professional learning and innovation attempts with industry development and social needs[1]. With practical inquiry tasks, a complete closed loop of "knowledge learning—thinking training—value identification—practical action" is formed.

4. Implementation Principles and Key Points of Teaching Support for Integration

4.1. Principle of Level Adaptation and Step-by-step Progression

The depth of ideological-political guidance should match the DOK cognitive levels: DOK1 focuses on perceptual enlightenment, DOK2 on literacy immersion, DOK3 on critical identification, and DOK4 on practical action[4]. On the one hand, we should avoid talking empty talk about grand propositions at the lower-order cognitive stage, which would increase students' burden of understanding; on the other hand, we should prevent higher-order inquiry from discussing only technical schemes while lacking the examination of the value dimension.

4.2. Principle of Integrated Symbiosis and Embedded Fusion

The main line of the classroom should always be the inquiry learning of specialized content, and the ideological-political elements should be embedded in the tasks, without slogan-style preaching detached from specialized content[1]. Value discussions unfold naturally on the basis of professional problems, fundamentally reducing the "two skins" phenomenon.

4.3. Principle of Higher-order Empowerment and Thinking First

The reform should focus on the two higher-order levels of DOK3 and DOK4, striving to cultivate students' abilities in evidence-based reasoning, critical thinking and transfer innovation[4]. Value guidance relies on critical thinking and innovative practice, helping students to use specialized knowledge more prudently and more responsibly from the perspective of literacy.

4.4. Principle of Student Subjectivity and Moderate Guidance

Students' subjectivity in heuristic inquiry should be maintained; the DOK framework is used to control the gradient of tasks, rather than to constrain the thinking space with fixed standards[3]. Teachers mainly undertake the roles of task design, process guidance and value calibration; they should tolerate reasonable and diverse opinions and only make moderate corrections when cognition deviates significantly.

The implementation of the model also requires two supporting measures. First, case, literature and situational material resources adapted to the four cognitive levels should be continuously developed. Second, the process-based evaluation methods should be adjusted: in addition to knowledge assessment, dimensions such as the quality of critical thinking, value judgment and practical responsibility should be added, so as to establish a comprehensive evaluation method that takes cognition, ability and literacy into account [4].

5. Conclusion

Heuristic inquiry-based teaching is an important path for promoting the classroom toward deep learning; the DOK model provides an operable cognitive tool for layered teaching design; and curriculum ideology and politics is the key instrument for fulfilling the fundamental mission of fostering virtue through education. The three are logically self-consistent and can empower one another synergistically. Following the idea of the four-level cognitive progression of the DOK model, ideological-political elements are embedded into teaching stages in layers, forming an educational chain of "superficial perception—middle-level immersion—deep-level identification—high-level practice", which helps alleviate such problems in specialized courses as superficial cognition, fragmented ideological-political content and stiff integration, and realizes the concentric advancement of knowledge imparting, higher-order thinking training and value shaping. This path respects the law of students' cognitive development, takes both specialized competence and literacy cultivation into account, and can provide a reference for the deep-learning construction and quality improvement of curriculum ideology and politics in similar specialized courses. In future work, evaluation scales can be developed around this model, and controlled teaching experiments can be carried out to continuously verify its educational effectiveness.

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