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Computational Thinking in the Curriculum of China

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Task 0. What are the main features of the school system?

- "633" system, senior high school program lasts three years.
- Policy on the Implementation of Deepening the Reform of the Examination Enrollment System of 2014

3+【3 Selected out of 6】

- **"3" represents the three core subjects: Chinese, Mathematics and Foreign Languages, while “3 selected out of 6" are the three subjects chosen by students from the six optional subjects.**
- **The examinee's total score consists of two parts: three subjects (compulsory subjects) of Chinese, Mathematics and Foreign Language, and three subjects (optional subjects) of high school academic proficiency test.**

3+【3 Selected out of 6】

- **Three selected subjects are chosen by candidates according to their interests, specialties and the requirements of the target universities.**
- **Six optional subjects: politics, history, geography, physics, chemistry and biology in general senior high school academic proficiency examinations.**
- **The assessment standards are categorized into levels matching different scores .**
- **The two examinations are held separately.**

Purpose

- The the new college entrance examination reform aims at categorized examination, comprehensive evaluation, multiple admission and transparent procedures, away from high-stake once-for-all test, offering more choices, to promote holistic and personalized development of students, and to facilitate the implementation of quality education.

Curriculum Reform in High School

Aligned with the new college entrance examination, the high school will reform the curriculum reform in following ways:

- 1. Teaching and evaluation based on curriculum standards and key competency;
- 2. Combination of selected subjects: teaching for different learning levels, implementation of optional class system, credit system and tutorial system;
- 3. Subject selection: career planning.

Task 1. What are the reform issues of Informatics curriculum?

- ICT Curriculum
- The current curriculum standard of ICT for senior high school of 2017

The new curriculum standard

- Aim at fostering effective technology users, innovative technology designers and rational technology reflector.
- Include three components - compulsory, optional compulsory and optional - to meet the diverse needs of students.
- Emphasize the learning-centered approach, enhance ICT competency in the process of problem solving, stimulate students' awareness of openness, cooperation and consultation, and encourage the use of Computational Thinking to form solutions to problems.
- Establish an evaluation system based on key subject-based competencies.

Key Competencies in Subjects

- **The curriculum standard describes in detail the four key competencies: information consciousness, Computational Thinking , digital learning and innovation, and information society responsibility.**
- **Computational Thinking refers to defining problems by means of computers, using reasonable algorithms to produce solution to problems, and transferring to other problems related to them.**

Challenges to be Addressed

1. ICT-related courses are yet to be prioritized and teaching content are yet to be updated.
2. The teaching facilities and equipments need to be renewed.
3. Shortage of IT teacher resources and inter-regional gap of teaching resources.
4. Discrepancies in students' basic knowledge of ICT.
5. Repetition of content between junior and senior high school curriculum concerning ICT.
6. Lack of innovation in pedagogy.

Task 2. Is Computational Thinking specified? If yes, how?

- Computational thinking, as one of the four key competencies in ICT-related subjects of senior high school, has been paid increasing attention in China.
- The concept is relatively broad and the structure is being developed.

- **In recent years, the research on the development of Computational Thinking in the ICT curriculum of primary and secondary schools has just began.**
- **Most of the existing research is based on the algorithmic and programming courses, and few combines computational thinking with the basic knowledge of high school ICT.**

- Computational thinking is aligned with the goal of "artificial intelligence + education".
- Base on the new curriculum standard, the computational thinking is being structured into ICT curriculum, and the teaching method is being explored.

Task 3. What are the teaching materials used to teach computational thinking?

- Five sets of experimental textbooks approved by the National Committee for Teaching Materials for Primary and Secondary Schools in 2004.
- These textbooks are being revised as a result of the new curriculum standard issued in 2017.
- In general, the five sets of textbooks focus on instrumental aspects of ICT.

Example

Based on App Inventor to develop Computational Thinking in high school ICT school-based curriculum design

1. Design of Course Objectives:

To guide the students to think and solve problems actively through the teaching methods of problem-driven teaching, project-based learning and creative problem solving, develop computational thinking, master the method of computational thinking, enhance the ability of computational thinking, and develop advanced innovative thinking.

2. Framework Design of Course Content

- The curriculum for developing computational thinking in high school is comprised of three parts: the basics, the application and the game development.
- It also includes two auxiliary parts: introduction of App Inventor and App Inventor toolbox. Each part contains several projects.

Task 4. What are the challenges for reform?

- 1. What are the structure and elements of Computational Thinking in ICT curriculum of senior high school, and how are they presented in the curriculum module?
- 2. How to design senior high school ICT textbooks dominated by computational thinking.

Educational Big Data Research in China

Educational big data research in China focuses on teachers rather than students.

- President Jinping Xi attaches great importance to big data research.
- President Jinping Xi's elaboration on Big Data provide national educational reform with an entirely new mindset. Its leading role on curriculum teaching reform can be discussed from multi-aspects: mastering the Big Data, mastering the initiative of the reform; Internet plus education driving the development of curriculum teaching reform; applying the Big Data to improve the development of school curriculum system.

Thanks！