

On the Education of Talented Children for the Creativity Development by Using CAS¹

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We are considering the discovery and the promotion of the talent from the viewpoint of education of talented children. The education that develops the talent is from “Individual needs for all children.” Computer Algebra System (CAS) can be used as a new possibility in the education that develops the talent. We will need to take advantage of the research results from cognitive science. In order to fully utilize CASs in education, teaching methods that are based on cognitive science will be needed, and these are clearly different from those used in paper and pencil teaching.

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1. INTRODUCTION

Creativity is a process and a result of inventing new value. Originality is development of the creativity. The creativity and the originality are connected (M. Takahashi, 2002). Can teachers teach children how to acquire the creativity?

There is “development and education (talent discovery and promotion) of the creativity” in one of the area of investigations of creativity. It is an important theme how to develop the creativity in the area of investigations of creativity. Creativity is important for all learners.

However, it is difficult for all learners to fill it by a uniform method. We consider the

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discovery and the promotion of the talent from the viewpoint of education of talented children.

2. EDUCATION OF TALENTED CHILDREN

In Japan, special education for talented children is doing in a small number of private schools and prep schools. However, many Japanese understand that finding child's merit and developing the child's ability are necessary. This education method is called "Education that develops the talent." The education that develops the talent does not target only the upbringing of the elite. To discover all child's various talents, and to extend it, we are aiming at it.

The education that develops the talent is from "Individual needs for all children." Recently, the importance of "Education that makes the best use of individuality" is emphasized. The purpose of the education that develops the talent is equal to the purpose of "Education that makes the best use of individuality." Children's talents are various.

In various occupations, the needed ability is different. There are a lot of abilities besides the intelligence test and the school test. There is a following classification concerning the kinds of human's intelligence by Gardner (1999).

- Language intelligence
- Mathematical intelligence
- Musical intelligence
- Sports intelligence
- Spatial awareness intelligence
- Communications intelligence
- Self-managing intelligence
- Environmental identification intelligence

These intelligences are combined and are acting. Being able to measure by the entrance exam scholastic attainments is only language intelligence and mathematical intelligence. "Useful knowledge in the future" is not an ability concerning the current learning. It is an ability to be able to think independently in the future. This is "Zest for Living" in the course of study of Japan.

The Attached Kindergarten, Akashi Elementary School, and Akashi Junior High School of the Faculty of Human Development of Kobe University are doing "consistent career education for 12 years." An educational purpose of these schools is that children acquire "Zest for Living."

3. APPROACHES OF KINDERGARTEN AND SCHOOLS OF THE FACULTY OF HUMAN DEVELOPMENT OF KOBE UNIVERSITY

Kindergarten, Akashi Elem. Sch. & Akashi Junior High Sch. Attached to the Faculty of Human Development of Kobe University (2007) construct the consecutive curriculum from the Kindergarten to the Junior High School, and were done the practices “Child image at which the school aimed” was set, and the research for it was promoted. The Akashi Elementary School and Akashi Junior High School of the Faculty of Human Development of Kobe University makes the best use of the comprehensive learning, and is supporting the child’s learning for the above 8 areas. The purpose of learning is to understand “Intellect and human nature that creates the society.”

4. NEW POSSIBILITY TO USE CAS IN EDUCATION THAT DEVELOPS THE TALENT

Computer Algebra System (CAS) can be used as a new possibility in the education that develops the talent. “Universal method of solving all problems” that can be applied to the problem of all types that the Cartesian proposed is as follows (Cartesian, 1946).

- The first stage: Interpret all problems as mathematical problems.
- The second stage: Interpret the problems of mathematics as problems of the algebra.
- The third stage: Interpret the problems of all algebra as solving the one equation.

We modernize this idea, and to execute it for students learning and using CAS. Here, we propose the following methods as new “Universal method of solving all problems.”

- The first stage: Interpret all problems as the problems of computer mathematics.
- The second stage: Interpret the problems of all computer mathematics as the problems of the computer algebra.
- The third stage: Interpret the problems of all the computer algebra as the one algebraic simultaneous equations system.

The tool to enable this method is CAS (T. Takahashi, 2005). We need to take advantage of the research results from cognitive science. Powerful tools like CAS can become effective tools by finding effective ways to use them. In order to fully utilize CAS in education, teaching methods that are based on cognitive science will be needed. These are clearly different from those used in paper and pencil teaching. We are groping how to practice them at attached schools of Kobe University for this new education

method.

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