

# English Abstracts

# The Education of Science and Story: Practice of Narrative Knowing in Learning Scientific Cosmology

KAWAURA Sachiko

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This paper explores possible ways to use “story” in the education of science, specifically in an undergraduate cosmology course for non-science majors that covers time spanning from the beginning of the universe to present time. With respect to J. S. Bruner’s “narrative knowing,” which emphasizes schematic understanding of specifics, this paper identifies the significance in learning the history of the universe, solar system, and life as a coherent story by: 1) integrating knowledge that was previously divided among fields and generating meanings in scientific discoveries, 2) establishing perspectives that respect “relativity” and deepening the understanding of interrelatedness among existences, and 3) expanding cognitive contexts and developing a meta context that generates more options in the interpretation of surrounding realities.

This paper suggests that focal points in the education of science for non-science majors include: 1) understanding of “paradigms” and the system of paradigm shifts, 2) rediscovering their own ethics and value systems through understanding details of scientific findings, and 3) establishing perspectives that enable individuals to place their understanding of scientific findings in meaningful contexts. The feedback from students reflects the fact that the practice of narrative knowing in the education of science encourages them to reestablish connections among “worldview,” “knowledge,” and “self,” thereby clarifying their own ethics and values

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Associate Professor, Department of Psychology and Human Relations,  
School of Humanities, Nanzan University

# Natural Science Education in the General Education Curriculum at Chukyo University

YAMAMOTO Shigeyoshi\*  
MUGURUMA Chizuru\*\*  
KUWAMURA Tetsuo\*\*\*

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This paper discusses natural science education in the General Education Course (GEC) curriculum at Chukyo University, a 4-year private institution located in the central part of Japan. The School of International Liberal Studies is responsible for the GEC's operation and management. Nine faculty members form the Natural Science Group (NSG) that teach lecture-based subjects such as physics, chemistry, biology, earth and planetary sciences, mathematics, and statistics as well as conduct seminar-style computer processing courses. Although the university has a School of Information Science and Technology and a School of Health and Sports Sciences, nine of the 11 schools belong to the field of human and social sciences. Hence, a majority of students have insufficient background knowledge on the natural science.

The first two chapters describe the NSG's approaches to coping with the above situation, and provide an overall view of critical issues for natural science education at private universities. In the next chapter, as an example, problems that arise in chemistry classes are clarified and solutions are suggested. In the last chapter, the necessity for natural science education is discussed from the viewpoints (based on the results of a questionnaire survey) of students with human and social sciences majors.

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\*Professor, School of International Liberal Studies, Chukyo University

\*\*Associate Professor, School of International Liberal Studies, Chukyo University

\*\*\*Professor, School of International Liberal Studies, Chukyo University

# Attempt to Improve Science Education: Proposal for In-class Experiments to Help Students Understand Scientific Concepts without Prior Knowledge

MIURA Yuichi

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It is very important for students to understand natural laws based on evidence, and to learn scientific procedures to solve problems. Science education is becoming increasingly more important for everybody to conserve energy and to safely use the precious natural resources.

However, serious communication problems between students and professors prevent effective science education. For example, some students have no understanding of physical concepts, so they cannot understand relationships between “the equation of motion” and “real motion.” It is difficult for professors to understand why students cannot accept well-known scientific words or concepts because they had no problem understanding the concepts when they were students.

To improve science education, several simple and clear in-class experiments to help students understand scientific concepts are described in this paper. It is also useful for students that the physical investigation on the recent accidents, to understand natural laws easily.

A procedure to assess the efficiency of science education is also discussed in this paper

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Associate professor, Graduate School of Science, Nagoya University

# Science Education for All College Students

SUZUKI Hisao

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In the United States, more than 100,000 students have currently attended integrated science courses that were held in more than 200 universities. The popularity of these courses is closely related to the courses' aims, which is to educate all students in the sciences. Furthermore, these courses are effective for science and engineering students as well as students majoring in social and cultural subjects.

The integrated approach is not merely a shorter version of each field of natural science, but is essential because the education of all students in science is the goal. Moreover, this approach does not require any high school science background. Therefore, these courses can easily handle students with vastly different backgrounds. This paper discusses the aims of integrated science courses and reports on integrated science courses that were started at Hokkaido University in April 2009.

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Professor, Graduate School of Science, Hokkaido University

# Viewpoints of Basic Science Study Reform in Some Recent University Practices

KAWAKATSU Hiroshi

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The number of young people who want to work with technology is decreasing. We cannot effectively show young people future perspectives on science and technology society.

We now face a turning point in modern civilization. The Earth cannot keep infinite productivity. The mass production and mass consumption society of the 20th century will be changed into a sustainable development society for the 21th century.

People who are aware of need for sustainability have begun basic science study reforms. Their points are summarized as following.

- (1) Science and technology experts should be progressed with his basic professional ability, as science and technology in the 21th century demands the creativity of experts with basic new science knowledge.
- (2) Science and technology experts should try to improve at communicating with ordinary citizens. Many new science and technology ideas and demands will be enhanced through dialogue with ordinary citizens.
- (3) It is a human right in democratic societies for ordinary citizens to study basic science.

These points are discussed with regard to practices at the Meijo University as well as foreign universities.

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Professor, Comprehensive Scientific Education Center, Meijo University

# A Study of the CASTL Program in the United States: Implications from Comparative Analyses of Three Professors' SoTL Projects

KIRA Naoshi

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The scholarship of teaching and learning (SoTL) is an attempt to improve teaching and learning processes through scholarly inquiry into classroom practice by professors. SoTL has become an important movement in higher education in the United States since the late 1990s. Focusing on the Carnegie Academy for the Scholarship of Teaching and Learning (CASTL), established in 1998 to promote the movement, this paper comparatively examines the SoTL projects of three professors in chemistry, history, and political science, who participated in the CASTL's Scholars Program. It aimed at discovering similarities and differences in the contents and methods of the projects based on the diversity of their fields, as well as in their views of the features and effects of the program that were based on their experiences in participating in an interdisciplinary community of professors.

This study found that despite the differences in their fields reflected in the diversity of their SoTL projects and disciplinary styles, the three professors recognized tremendous value in the Scholars Program, especially in terms of its provision of space and access to interdisciplinary colleagues for discussing educational problems, as well as its supply of valuable lectures and seminars, especially regarding education research methods, which led to some borrowing of methodologies.

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Professor, Professional Program of School Education, Japan Professional School of Education

# Accreditation of Academic Degree through Assessment of Prior Learning in French Higher Education

NATSUME Tatsuya

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The purpose of this paper is to analyze the background and the effects of accreditation of academic degree through assessment of prior learning (APL, *Validation des acquis d'expérience*) in French higher education. APL aims at increasing the opportunity to obtain qualifications, especially for workers who do not have opportunity for higher education. The findings are as follows;

1. APL, which was set up and introduced by law in 2002, allows adults to get academic degrees on the basis of a universities committees' examination of their knowledge and skills gained through their life experiences. They need not follow formal education.
  2. There are arguments among researchers on meaning and effects of APL. Some regard APL as an innovative practice for higher education, but others believe it causes chaos in the tradition of higher education.
  3. APL may be regarded as one of the challenges in implementation of lifelong learning policies by the French government. It causes challenges for higher education institutes to coordinated innovative tentatives and traditional values of higher education. It became necessary for higher education institutes to review the meaning of education, the contents and evaluation of students' competencies and the traditional values of academic degrees.
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Professor, Center for the Studies of Higher Education, Nagoya University



# An Investigation of the Children's University: A New University Outreach Idea in Europe

SAITOH Yoshiko

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This paper examines the principal strength of the Children's University, a new university outreach idea, and discusses why it has been so widely accepted in Europe.

Outreach activities are now required of universities and academics to move from a one-way transmission of knowledge to a two-way exchange of ideas and opinions regarding science. On the other hand, the newly developed Children's University, where children are given serial lectures on campus from academics, follows the old type outreach idea, which is denied within the recent trend. In despite of its negative position, the Children's University only took a few years to spread widely across Europe, received an EU prize, and has been publicly granted to establish an organized network.

The following points are derived from site visit investigations: 1) the main purpose is to allow children to see and experience university culture, 2) several "gimmicks" are designed, 3) lecture titles have a specific style with the question "why?" in them, 4) organizers are not active researchers, 5) organizers cooperate with the mass media, and 6) exposure to mass media and awarding of prizes has sped the propagation of the program. These points are found highly suggestive in terms of future university outreach programmes in Japan.

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Assistant Professor, Center for the Studies of Higher Education,  
Nagoya University

# What Japanese Higher Education Can Learn from the Bologna Process?

TACHI Akira

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This paper defines the Bologna Process as serial and multilayered organized acts of many kinds of actors to create a cross-border European Higher Education Area (EHEA) by 2010. This was agreed to at the Bologna Declaration of 1999, and progressed with periodic meetings between ministers of the signatory countries that were responsible for higher education.

The paper examines features of the process from three angles – its aims, its actors, and its situation – adding reviews of preceding academic articles and policy documents concerning the Bologna Process in Japan and the U.S., and tries to draw its implication to Japanese higher education.

The most notable points are the recognition of the significance of qualification frameworks for reform and the spontaneity of multilayered contributors in the process. The process suggests that Japanese higher education should be reconstructed, creating a functional framework of degrees, and the constituents of higher education institutions should act spontaneously under the smart steering of the government.

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Professor, Graduate School of Higher Education Administration, J. F. Oberlin University

# The Tasks of Ed.D. Program in Research University: the Case of “Educational Leadership and Management” at Nagoya University

MATSUSHITA Haruhiko

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In 2006, the first Ed.D. program in Japan was launched at the Graduate School of Education and Human Development at Nagoya University. The purpose of this paper is to present the current issues surrounding doctorate programs and to explore the future tasks and possibilities of Ed.D. programs in research universities.

Since the 1990s, graduate programs in Japan have been quantitatively expanding as a result of the government policy of prioritizing graduate schools. In 2003, professional graduate schools were introduced to train professionals with advanced specialized skills. Although higher education reforms seem to have met the various demands of people and society, they have also invited several serious issues such as unemployed graduates with doctoral degrees, and the failure to satisfy student quotas. Facing these issues, higher education policies are expected to shift from the quantitative expansion of graduate programs to their qualitative differentiations.

Based on the current situation, Ed.D. programs are anticipated to satisfy the needs of further research on educational policies and to cultivate new types of human resources with advanced and sophisticated research minds that can be used as educational leaders in every sector of society.

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Professor, Graduate School of Education and Human Development,  
Nagoya University

# Introduction to University-wide Courses in Graduate Education

KOBAYASHI Shinichi

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This paper describes university-wide courses in graduate education. The paper examines policy debates about graduate education reform in Japan and investigates changes in graduate education in both the United Kingdom and the United States to understand why university-wide courses in graduate education have been developed. The paper then introduces examples of university-wide enterprises in the reform of graduate education at the University of Tsukuba and Kyushu University, which have both developed innovative systems of university-wide courses in graduate education.

In the case of University of Tsukuba, university-wide courses have developed as a result of a bottom-up and voluntary reform in graduate education. Therefore, the attempt could be sustainable; however, it would take a long time to make these courses more systematic due to restricted resources.

Finally, the paper points out that university-wide courses in graduate education have inherent significance because students have increasingly more diverse backgrounds.

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Professor, Graduate School of Business Sciences, University of Tsukuba

# Professional Degree Programs in China

CHEN Xi

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Postgraduate education for professional degrees was established in China during the 1990s. With the expansion of graduate schools, the number of students who want to get professional degrees is also increasing. Now, they shared about 30% in all graduate students, and most of them are on-job students. This situation has led to many crucial changes to postgraduate education in China. However, it is now very difficult for graduate students who have an academic degree to find jobs, and at the same time, the professional human resource of urgent shortage is so necessary for the society. And if we compare professional degree programs in U.S.A, as there is more needs for professional human resource, we will find most of the degrees in graduate school are professional degrees.

This paper presents the conditions of postgraduate education of professional degrees in China, and discusses the main issues in its system, in order to clarify the expansion mechanism of graduate school in the future.

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Lecturer, Institute of Higher Education, East China Normal University;

Research Fellow, Graduate School of Education and Human Development, Nagoya University

# In What Classes Critical Thinking is Taught?

KUBOTA Yuka

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The purpose of this paper is to show whether undergraduate students' critical thinking skills can be fostered by what class and curriculum by examining the literature of critical thinking.

First, this paper shows that critical thinking education in the United States started with teaching logic in philosophy classes and has been developed in a variety of academic disciplines. This transition was influenced by McPeck's view that thinking is always about some particular object or subject. Logic and guidelines for teaching critical thinking have also been introduced in a variety of academic disciplines.

This paper examines the effectiveness of approaches for fostering critical thinking, including a general approach, an infusion approach, and a mixed approach. By using two case examples, this paper shows that not only individual efforts but also institutional efforts are indispensable in developing students' critical thinking skills fully.

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Research Fellow, Center for the Studies of Higher Education, Nagoya University