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the Rainfall Concept Test for teachers and students as our survey tools and collected data from 58,572 fourth-grade students of the same area and 383 fourth-grade teachers. The teachers and students belong to the same school. The study analyzes the teachers', their students' misconceptions and the cognition of the rainfall phenomenon, the correlation between their test scores, and the consistency and differences between their conceptual understandings. The main results of the study are detailed in the following points: (1) In the correlation analysis, there is a significant positive correlation between the teachers' and their students' scores; (2) Both teacher and student have misconceptions of the rainfall phenomenon; (3) Consistency exists in the understanding between teachers and their students, they can both use "evaporate" to explain the rainfall phenomenon, but are easy to overlook or fail to realize the role of "gravity" in the process of rainfall phenomenon; and (4) In terms of difference, although teachers can use "the condensation of water" to explain the rainfall, students cannot use it very well. The study indicates that teachers' understanding on content knowledge could be a factor to influence the students' conceptual understanding to a certain extent. Teachers need to pay more attention to their own understanding of content knowledge as well as students' misconceptions in classroom teaching in order to help students achieve a deep understanding of scientific concepts.

[26O1I-3] A Study on Method of Trend Researches using R (A0551)

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ABSTRACT Current researches adopt basic statistical tools to analyze research trends. On account of the tools' limitations, human researchers have to collect data by reading all the articles. Consequently, this methodology can limit the amount of data, and the researchers could not analyze massive materials. In order to overcome this limitation, this research aims to develop a useful methodology using R, which is well-known programming language in other industries. The best feature of methodology in this study is that computer program carries out the whole process to analyze huge amount of data. This program not only collects the data about journals, but also constructs the keyword database of them. After that, it determines inter keyword relationships. To help people understand these relations, it represents them in network map. Also, this map is designed with three-dimensional CG in order to improve readability of the map. Since all the process is done by computers, there could be a chance to have a problem like inaccuracy. However, modifying and elaborating the program by conducting pilot test can take care of this problem.

[26O1I-4] A Comparative Study of Science Teachers' Beliefs on Lessons between Japan and England (A0300)

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ABSTRACT Learning contents of science are delivered to students through the control process at different levels. For

instance, it is inevitable that 'Implemented Curriculum' defined by IEA have gaps between 'Intended Curriculum' and 'Attained Curriculum'. Because there are certain cultures of schools, teacher's beliefs and other factors that affect science lessons actually. According to some literatures, for example, Ryder, J., & Banner, I. (2013) analyzed the effect to secondary science teachers by reforming National Curriculum, and Hanley, P., Ratcliffe, M., & Osborne, J. (2007) also examined science teachers' experiences of teaching 'ideas-about-science' in Twenty First Century Science. On the other hand, in Japan, there are a few researches relating to science curriculum policy. Generally, Course of Study and National Curriculum affect science teachers in the classroom practice (e.g. Bosch, M., & Gascón, J., 2006). Therefore, science teachers also affect science curriculum because they have own beliefs of science lessons. The objective is to assess the factor in forming (lower secondary) science teachers' beliefs on lessons. To achieve this aim, we conducted a survey toward science teachers in Japan and England, and also examined science teachers' perspective, the way of designing lessons and teaching science. First of all, we made the questionnaire, and conducted a pilot survey toward science teacher training course students at Hiroshima University (Japan) and University of Leeds (England). After modifying the questionnaire on the basis of pilot survey results, we completed the questionnaire. Next we conducted a final survey toward 84 science teachers at lower secondary schools in Hiroshima and 24 science teachers at comprehensive schools in Leeds. Number of valid responses was 79 people and 24 people respectively. The data from the questionnaires were summarized in tabular form and statistical tests applied as appropriate. We performed cross-tabulations between science teachers' beliefs on lessons (e.g. science teachers' perspective, the way of designing lessons and teaching science) and personal attribute (e.g. gender, teaching experience, specialist teaching subject), respectively. Results by Fisher's exact test indicated that significant differences were not recognized in all combinations ($p > .05$, n.s.). Therefore, we could interpret that science teachers' beliefs on lessons don't depend on personal attribute in each country. Next, we performed cross-tabulations with regard to science teachers' beliefs between Japan and England. Results by Fisher's exact test indicated that significant differences appeared in all items, though differ in degree (science teachers' perspective: $p < .05$, the way of designing lessons: $p < .001$, the way of teaching science: $p < .01$). Therefore, we could interpret that science teachers' beliefs on lessons depend on the difference of country. We can conclude that the factor in forming (lower secondary) science teachers' beliefs on lessons depends on not personal attribute but the cultural context of each country. In other words, science teachers' beliefs on lesson are characterized by teacher's culture in own country.

<1J> Informal Settings

Chair: Nelson C. C Chen (National Kaohsiung Normal University)

[26O1J-1] An Empirical Edutainment to Enhance the Motivation of Science Learning: A Case Study of Multi-functional Bamboo Gun at Science Bazaar (A0606)

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