

<p>11. Comparative Study of Japan and Germany on the Relationship between Attitudes toward Science and Scientific Knowledge Leader: YOSHIOKA Ryohei, Senior Researcher, Educational Resources Research Center</p>

(1) Purpose and Aim of Study

The purpose of this research was to determine the degree to which knowledge of school science and mathematics subjects, taught from the perspective of providing useful knowledge and literacy, is retained later in life. Surveys were also carried out regarding the awareness of and attitudes toward science. Specifically, university students, their teachers, and parents of students were surveyed using a series of questions to determine the extent of knowledge retained from school classes, as well as general scientific literacy and attitudes toward science. This research was carried out in both Japan and Germany.

(2) Outline of Research Results

- For research on words associated with science, there was no significant variation between the number of associations made by males or females or according to science specialization in all groups. However, there was a significant difference between females and the average values of the group as a whole. The words most associated with science in Japan were “experiment,” “outer space,” “technology,” “school science,” and “nature.” In Germany, “physics,” “biology,” “chemistry,” “research,” and “experiment” were most common.
- Regarding the definition of “science,” approximately 90% of those tested used an appropriate format, but only 30% (Japan) and 50% (Germany) of the responses were correct. Of these, 90% of German respondents employed broader concepts in their definitions, while only 40% of Japanese respondents did so. Another 40% of Japanese respondents used a simpler definition comprised of verbs and adjectives.
- The results of a multiple-choice test regarding perceptions of science revealed that Japanese people perceive less influence on their daily lives from science than Germans do. Both Japanese and Germans identified technology and the media as current major influences on their perceptions,

but Germans named government and religion more frequently than Japanese.

- Regarding feelings towards science and the reasons for those feelings, Germans demonstrated a more positive outlook, giving reasons including that science affirmed their humanity and the world around them, as well as examples of scientific applications of technology. On the other hand, many Japanese held a negative opinion of science, and as their reasons they included scientific laws and formulas, and precise scientific terms.

- Regarding science classes at school, Germans desired longer, more interesting classes than Japanese did.

- The results of analysis of attitudes important for learning science showed that Germans favor more positive attitudes, while negative attitudes tended to score higher among Japanese respondents.

- There was a large difference between Japanese and German perceptions and attitudes regarding science, and Japanese had stronger anti-science tendencies than Germans. This contrasts with the social background in Germany, where the Green Party's anti-nuclear power movement is strong, and reflects Japan's current scientific learning slump.

- There was not a significant difference in scientific knowledge between Japanese and German adults. This is a point of difference from the PISA survey of upper secondary school academic results, and may be due to a difference between knowledge studied at schools and actual knowledge retained.

- When comparing upper secondary school students to adults, in Germany, students and adults had similar results, while in Japan, adults held more favorable attitudes toward science than students. It could be thought that attitudes towards science are not improved through study, but instead are individually derived from one's inherent intuitions and daily life experiences. This reveals a need to ascertain the cause of Japanese students' strikingly negative attitudes toward science.