

# **Construction of a Semantically Integrated e-Learning System Based on Topic Maps for Multidisciplinary Learning**

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Technologies on environment and energy are at high level in Japan. Weight of the technology in the Japanese industry for next generation will be high in these areas. Education on environmental issues in elementary and secondary education ranges from environmental conservation, natural conservation, resource, natural disaster, climate change, to the sustainable development. Topics of these issues are multi-disciplinary.

These topics are only partially introduced in the standard textbooks of science and sociology. In addition, they are not sufficiently linked in the textbooks with the traditional domain of knowledge, such as physics. Thus it is not easy for pupils and students to associate environmental issues with the knowledge of science and sociology taught in the classrooms.

To provide a learning environment where the topics of global issues are related with basic sciences and daily life, we construct a trans-field learning portal, which is driven by Topic Maps (a technology standard for organizing and making information better findable) at <http://tm.u-gakugei.ac.jp:8080/epw/>. This interlinks online resources suitable for learning in various domains, such as physics, chemistry, biology, earth science, environment, sustainability, industry, history of science, and so on, based on a multi-dimensional topic map. It also provides a number of learning management functions.

In the topic map, a knowledge domain is modeled by a hierarchy of topics interlinked by a special type of association "supertype-subtype". These topics are further associated with the topics of the other domains, by defining appropriate association types. This makes easier to explore global issues for the user studying a course of traditional study of science. In the same way, a user studying global issues

in this system can also easily access the base knowledge.