

## Developing materials for GIS practice in higher education and their application in a class of GIS exercises

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We developed and published online GIS practical materials for higher education. They were constructed using free GIS software packages such as QGIS. Part of the materials was used in a class of GIS exercises at the Department of Earth and Planetary Environmental Science, the University of Tokyo. The class was held for three days, and students learned basic GIS operations such as coordinate transformation and raster data analysis using the provided online materials. At the end of each day, we conducted a questionnaire survey to understand satisfactory levels of students as well as usability and difficulty of the materials. Many students answered that the difficulty of the exercises was average or relatively high, and the satisfactory level was also average or relatively high. The usability and understandability of the materials significantly varied among the students.

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