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Addressing key concepts in physical geography through interactive learning activities in an online geo-ICT environment

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The increasing number of geospatial datasets and free online geo-ICT tools offers new opportunities for education in Earth Sciences. Geospatial technology indeed provides an environment through which interactive learning can be introduced in Earth Sciences curricula. However, the effectiveness of such e-learning approaches in terms of learning outcomes has rarely been addressed. Here, we present our experience with the implementation of digital interactive learning activities within an introductory Physical Geography course attended by 90 undergraduate students in Geography, Geology, Biology and Archaeology. Two traditional lectures were replaced by interactive sessions (each 2 h) in a flexible classroom where students had to work both in team and individually in order to explore some key concepts through the integrated use of geospatial data within Google Earth^{TM}. A first interactive lesson dealt with the classification of river systems and aimed to examine the conditions under which rivers tend to meander or to develop a braided pattern. Students were required to collect properties of rivers (river channel pattern, channel slope, climate, discharge, lithology, vegetation, etc). All these data are available on a global scale and have been added as separate map layers in Google Earth^{TM}. Each student collected data for at least two rivers and added this information to a Google Drive Spreadsheet accessible to the entire group. This resulted in a database of more than one hundred rivers spread over various environments worldwide. In a second phase small groups of students discussed the potential relationships between river channel pattern and its controlling factors. Afterwards, the findings of each discussion group were presented to the entire audience. The same set-up was followed in a second interactive session to explore spatial variations in ecosystem properties such as net primary production and soil carbon content. The qualitative evaluation of both interactive sessions showed that the majority of students perceive these as very useful and inspiring. Students were more capable in exploring the spatial linkages between various environmental variables and processes compared to traditional lectures. Furthermore, the format of the sessions offered a forum in which undergraduate students from a variety of disciplines discussed the learning content in mixed groups. The success of interactive learning activities, however, strongly depends on the quality of the educational infrastructure (flexible spaces, wireless connections with sufficient broadband capacity).