THE EFFECTIVENESS OF DIFFERENT EXPLORATION STRATEGIES IN COMPLEX PROBLEM SOLVING ENVIRONMENTS: LOG FILE ANALYSES

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One of the main factors supporting and motivating the use of technology in educational assessment is the opportunity of logging and analysing not only the observed variables but metadata as well (Tóth, Rölke, & Greiff, 2014). Educational data mining can contribute to a deeper and better understanding and explanation of the examined phenomenon. Recent analyses provided both a new theory and data-based evidence for enhancing the global understanding of all different exploration strategies students have applied or could apply in a complex problem solving (CPS; Funke, 2001; Greiff et al., 2013) environment. This study explores (1) the ratio of a good strategy application and high CPS performance; (2) it describes the most effective exploration strategy; and (3) tests the influence of the number of the executed manipulations and the time spent within the exploration phase on the achievement. The sample consisted of 2226 students attending grades 6 to 8 (age 12-15) in Hungarian primary schools (N_6=677, N_7=607, N_8=942). 124 classes from 43 primary schools were involved in the study from different regions, which resulted, a wide range of distribution of students' background variables. A CPS test was administered online via the eDia platform (Molnár, 2015). The assessment took place in real school settings in the schools' ICT labs using the available school infrastructure. The test took approximately 40 minutes to complete. The internal consistence of the MicroDYN problems as a measure of knowledge acquisition after coding the metadata and assigning a new variable to each task and person was very good (α=.91; 10 items). The application of a theoretically good strategy did not always result a high performance. The ratio of good strategy application and high CPS performance was changing by the complexity of the CPS tasks. More than 2/3 of the students using a theoretically good strategy could have solved the less complex problems properly, while this ratio is only 1/5 in the case of CPS tasks having eigendynamic. The most effective strategy was one of the VOTAT (Funke, 2014) strategies, when only one input variable was different from zero and all the other input variables were systematically kept at neutral level. The number of the executed manipulations had no or very low correlation with achievement, however, the number of the theoretically good manipulations influenced students' achievement on a higher level (r=.453 to .667, from the less to the most complex tasks). Time had a similar effect, with generally no or very low correlations, and in the case of a theoretically good strategy, medium correlations (r=.352 to .484). The present analyses using educational data mining techniques contributed to the research findings regarding CPS in educational settings by analysing students' exploration behaviour and the underlying causal relations.