The Influence of Reasoning Skills on Later School Achievements: Results From the Hungarian Educational Longitudinal Program

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Abstract

Objectives Development of reasoning skills has been one of the main declared aims of education but methods to foster them and instruments to monitor their development have not been broadly used in schools. Their particular function in school learning also needs further studies. The role reasoning skills play in further learning can be studied reliably only by using longitudinal assessments. Data of the Hungarian Educational Longitudinal Program (HELP) allow such an analysis. In this paper, first we outline the structure and methods of HELP and then, examine the relationship of two reasoning skills, inductive reasoning and problem solving with further school achievements. Perspective Prior studies have revealed the structure and development of inductive reasoning (Csapo, 1997) and that it influences achievements in several domains, including those not directly requiring this type of reasoning, such as second language skills (Csapo & Nikolov, 2009). Other studies indicated the importance of problem solving, including its role in the application of knowledge in novel contexts. A problem solving test battery has been devised which can be administered to different age groups (Molnar & Csapo 2007). This instrument administered in the framework of a longitudinal program contributes to a better understanding of the role cognitive skills play in organization and application of knowledge. Data HELP is a multi-cohort long-term program launched in 2003 with representative samples (n~5,000 per cohort) of students in first, fifth and ninth grade at the beginning of data collection. For the two older cohorts data collection was completed after four years. In the case of the younger one data collection has continued resulting in a data set of seven years until now. Instruments included cognitive and affective tests that were administered to the students systematically at the beginning or end of a school year. Data were also collected about students' school achievements and socio-economic backgrounds. Analysis Analysis of data includes multiple regressions with inductive reasoning and problem solving as independent variables and later school achievements as dependent variables. Several regression models were tested in the three cohorts, depending on the available data. The predictive power of inductive reasoning and problem solving was compared to that of reading comprehension and mathematics tests. Results indicated the strongest influence in general in the case of inductive reasoning, while the influence of problem solving is similar to that of mathematical reasoning. Educational and scientific importance As in modern societies the contexts where knowledge mastered at schools are to be applied are changing rapidly, general, complex reasoning skills have been paid more attention. This increased interest is marked by several large-scale projects aiming at studying, assessing and teaching so-called "21st century skills". The PISA 2003 included the assessment of problem solving, while for PISA 2012 a computer-based assessment of problem solving is planned. The type of longitudinal studies

presented in this paper help to identify those cognitive skills that influence later academic achievements more strongly; therefore, they are worth monitoring and developing. These studies also contribute to the improvement of predictive validity of the assessment instruments.