

## THE ROLE OF INDUCTIVE REASONING IN EARLY LITERACY AND NUMERACY AT THE BEGINNING OF PRIMARY SCHOOL

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Inductive reasoning has been considered as an important factor in many domains of human cognition and knowledge acquisition (Csapó, 1998; Feeney & Heit, 2007; Klauer & Pbye, 2008; Molnár et al., 2013). Thus, it is essential to understand its relation to other skills and to foster it in a wide-range of educational settings. The aim of this study is to explore the role of inductive reasoning in early literacy and numeracy at the beginning of primary school. 4,832 first grade students participated in the study from 164 Hungarian primary schools (mean age=7.3 years, SD= .94). The inductive reasoning test consisted of 26 figurative items divided into two subtests: 13 series and 13 analogies tasks (Cronbach's alpha=.89; M=42.9% SD=23.8%). Early literacy was assessed with 40 tasks aiming to measure the syllable and phonemic level of phonological awareness (Cronbach's alpha =.90; M=54.6% SD=21.3%). The early numeracy test also consisted of 40 items and it comprised four subtests: basic counting, number word sequence, numeral recognition, and magnitudes and numerals (Cronbach's alpha=.90; M=62.1% SD=19.0%). All tests were computer-based and administered in schools' ICT rooms via the eDia platform (Molnár & Csapó, 2013). Students had to use the click on and the drag and drop functions to solve the tasks. In order to provide an opportunity for practising mouse use skills, students also completed an ICT familiarity test (Cronbach's alpha=.85; M=93.9% SD=9.0%). The ceiling effect indicates that students had no difficulties handling the mouse during the testing. We found significant correlations between all test achievements:  $r(4039)=ind\_literacy=.51$   $r(4067)=ind\_math=.55$   $r(4390)=literacy\_math=.66$  ( $p<.01$  in all cases). When controlled for inductive reasoning on the relationship between early literacy and numeracy, data still show a moderate partial correlation  $r(4036)=literacy\_math=.53$  ( $p<.01$ ). Multiple regressions were carried out in order to examine if figural series and analogies predicted early literacy and numeracy. Using the enter method, we found that both series and analogies significantly predicted early literacy scores,  $\beta=.26$ ,  $t(4040)=14.8$ ;  $\beta=.30$   $t(4040)=16.9$ ,  $p<.01$ , respectively. They explained a significant proportion of variance in numeracy achievements,  $R^2$  series=12.1,  $R^2$  analogies=14.2,  $F(2, 4038)=717.85$ ,  $p<.01$ . The results were similar for early numeracy, too:  $\beta=.33$ ,  $t(4068)=19.0$ ;  $\beta=.28$   $t(4068)=16.3$ ,  $p<.01$  respectively;  $R^2$  series=16.7,  $R^2$  analogies=13.9,  $F(2, 4066)=898.03$ ,  $p<.01$ . Our findings revealed that inductive reasoning plays a significant role in early literacy and numeracy. However, a large proportion of variance remained unexplained and the partial correlation analyses also indicated that we have to consider other factors as well. General intelligence or social background are possible variables but further research is necessary to clarify these assumptions.