THE EFFICACY OF A COMPUTER-BASED COGNITIVE TRAINING PROGRAM TO ENHANCE 4TH AND 5TH GRADE STUDENTS' INDUCTIVE REASONING

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The increasing need of assessing and developing thinking skills in daily school context is a strong issue and expectation in the 21st century (Adey et al., 2007). Enhancing and supporting this development becomes a main goal for educational systems (Bottino et al., 2007). Inductive reasoning is considered as one of the basic thinking processes (Klauer & Phye, 2008), strongly connected to higher-order thinking skills (Schubert et al., 2012; Molnár et al., 2013). The objective of the present study is to test the efficacy of a computer-based cognitive training program and to enhance fourth (N=57) and fifth (N=61) grade students' (age 9–11) inductive reasoning by means of technology. The training is based on Klauer's theory of inductive reasoning (Klauer, 1989) and consists of 120 online problems which can be solved through inductive reasoning. The tools for the training exercises were embedded in Mathematics contexts and selected to correspond with the age of the targeted cohort. Both the experimental and the control groups were made up of 118 Palestinian students. The effectiveness of the training was measured with a computer-based test of inductive reasoning comprising 60 multiple-choice items in four subtests: figural series, figural analogies, number series and number analogies (Cronbach's alpha=.81). The interval between the pretest and the posttest was 6 weeks, the period in which the training was performed. Both the test and the training program were devised within and delivered by the eDia platform (Molnár & Csapó, 2013) using the schools' infrastructure. No significant differences were found between the performance of the experimental and the control group prior to the experiment (M_{cont}=25.26, SD_{cont}=11,23; M_{exp}=27.03, SD_{exp}=9.71, t=1.3, p=.19). On the posttest, the experimental group significantly outperformed the control group by more than one standard deviation (M_{cont}=25.59, SD_{cont}=11.17; M_{exp}=44.63, SD_{exp}=11,49, t=12.91, p<.001). The effect size of the training program was d=1.65 (p<.01; d_{Grade4}=1.44; d_{Grade5}=1.90). Using Cohen's (1988) convention for describing the magnitude of effect size, it is clearly a large effect not only in the Palestinian context but internationally as well. No gender differences were detected on the pre- (t_{cont}=1.03, p=.30; t_{exp}=.42, p=.67) or the posttest (t_{cont}=.74, p=.46; t_{exp}=.71, p=.48). The findings of the training program suggest that inductive reasoning skills can be significantly and effectively developed between the ages of 9 and 11 by means of technology in Palestinian educational context. The effectiveness of the computer-based program proved to be unrelated to gender; i.e. it had a similar effect on boys and girls. An inductive reasoning training program has been adapted to Arabic style and language as part of the program package which can be effectively applied to measure the development of elementary students' inductive reasoning even independently of the rest of the training program.