

# PSYCHOLOGIA / PSYCHOLOGY

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## DYNAMIC ASSESSMENT OF LEARNING POTENTIAL IN STANDARD AND TALENTED CHILDREN\*

### 1. Introduction

The concept of learning potential attracts the attention of experts in cognitive psychology<sup>1</sup>, educational psychology<sup>2</sup>, as well as cognitive education<sup>3</sup>. Learning potential, known also as cognitive modifiability<sup>4</sup>, the ability to learn, latent learning capacity<sup>5</sup> or testing the limits<sup>6</sup>, can be understood as an indicator of what a child is able to do or learn, if the conditions are adjusted.

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<sup>1</sup> R.J. Sternberg, E. L. Grigorenko, *Dynamic testing: The nature and measurement of learning potential*, New York 2002; K.H. Wiedl, *Dynamic testing: A comprehensive model and current fields of application*, "Journal of Cognitive Education and Psychology" 2003, nr 3(2), s. 93–119.

<sup>2</sup> W.C.M. Resing, *Dynamic testing and individualized instruction: Helpful in cognitive education?*, "Journal of Cognitive Education and Psychology" 2013, nr 12(1), s. 81–95.

<sup>3</sup> I. Kovalčíková, *Kognitívna stimulácia individuálnych edukačných potrieb žiaka zo sociálne znevýhodňujúceho prostredia*, Prešov 2010.

<sup>4</sup> R. Feuerstein, Y. Rand, M.B. Hoffman, R. Miller, *Instrumental enrichment: An intervention program for cognitive modifiability*, Baltimore 1980.

<sup>5</sup> I. Kovalčíková, *Dynamic testing and assessment of latent learning capacities*, "Sosyal Bilimler Araştırmaları Dergisi" 2009, nr 1, s. 47–53.

<sup>6</sup> J.S. Carlson, K.H. Wiedl, *Toward a differential testing approach: Testing-the-limits employing the Raven matrices*, "Intelligence" 1979, nr 3(4), s. 323–344.

Budoff<sup>7</sup> refers to learning potential as the ability to improve cognitive performance as a result of training. Similarly, Taylor<sup>8</sup> defines learning potential as the underlying fundamental aptitude or capacity to acquire and master novel intellectual or cognitively demanding skills. This aptitude is demonstrated through improvements in performance as response to cognitive mediation, teaching, feedback, or repeated exposure to the stimulus material. Several studies agree on learning potential predicting cognitive functioning, especially problem solving skills<sup>9</sup>, the acquisition of working skills<sup>10</sup>, better results in cognitive rehabilitation<sup>11</sup>, rehabilitation readiness<sup>12</sup>, etc.

Learning potential assessment can be understood as an assessment method aimed at basic cognitive abilities and potential. A dynamic test is used to measure learning potential. In comparison to traditional tests of cognitive abilities, dynamic tests provide immediate feedback, prompts and training, which enables children to show progress when solving cognitive tasks. Dynamic testing is based on the assumption that human abilities develop in activities, where individuals are led and supported by other people with the use of available cultural means.

The structure of a dynamic test is rather specific; it consists of pre-test, training phase and post-test, and uses the graduated prompts technique. Dynamic testing represents the assessment method, within which the training phase is incorporated into the testing process. Aiming to assess cognitive (learning) potential of a child, the dynamic test takes into consideration what the child can learn during a short period of time. The AnimaLogica test, described below, is an example of such a test with the typical dynamic structure.

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<sup>7</sup> M. Budoff, *The validity of learning potential assessment*, w: *Dynamic assessment: An interactional approach to evaluating learning potential*, red. C.S. Lidz, New York 1987, s. 53–81.

<sup>8</sup> T.R. Taylor, *Beyond competence: Measuring potential in a cross-cultural situation fairly. Potential in psychometrics*, Sandton 1992.

<sup>9</sup> K.H. Wiedl, *Cognitive modifiability as a measure of readiness for rehabilitation*, "Psychiatric Services" 1999, nr 50(11), s. 1411–1413; K.H. Wiedl, H.H. Schottke, D. Calero-Garcia, *Dynamic assessment of cognitive rehabilitation potential in schizophrenic persons and in elderly persons with and without dementia*, "European Journal of Psychological Assessment" 2001, nr 17(2), s. 112–117.

<sup>10</sup> M.J. Sergi, R.S. Kern, J. Mintz, M.F. Green, *Learning potential and the prediction of work skill acquisition in schizophrenia*, "Schizophrenia Bulletin" 2005, nr 31(1), s. 67–72.

<sup>11</sup> K.H. Wiedl, J. Wienobst, *Interindividual differences in cognitive remediation research with schizophrenic patients: Indicators of rehabilitation potential?*, "International Journal of Rehabilitation Research" 1999, nr 22(1), s. 55–59.

<sup>12</sup> J.M. Fiszdon, J.F. McClough, S.M. Silverstein, M.D. Bell, J.R. Jaramillo, T.E. Smith, *Learning potential as a predictor of readiness for psychosocial rehabilitation in schizophrenia*, "Psychiatry Research" 2006, nr 143(2–3), s. 159–166.

## 2. AnimaLogica

The AnimaLogica computerized test was developed by Dutch experts in dynamic testing, Stevenson and Resing<sup>13</sup>. It is based upon the Learning Potential of Inductive Reasoning test (LIR)<sup>14</sup>. Since 2012, several studies have been conducted utilizing AnimaLogica. Resing, Stevenson, and Bosma<sup>15</sup> evaluated the use of dynamic testing based on graduated prompts techniques training in a clinical educational setting. The aim of the study was to find out 1) if children would perform better in analogical reasoning after the dynamic training procedure; 2) if children's solving strategies would improve as a consequence of training phase; 3) what was the relationship between static IQ scores, teacher assessment, scholastic achievement and dynamic test measures. Training using graduated prompts technique led to the statistically significant progress in figural analogical reasoning. They found that children changed their solving strategies towards a more sophisticated level; the authors noticed the shift from non-analogical towards semi-analogical and analogical solving strategies. The results also revealed that dynamic test measures (especially post-test score and the number of prompts in the training phase appeared to be relevant) had moderate correlations with teacher's assessment (teacher's learning potential estimation) ( $r = .48$ ,  $p < .01$ .); similarly, dynamic test measures considerably correlated with school performance ( $r = .46$ ,  $p < .01$ ). Moreover, intelligence test scores did not predict school success as well as the dynamic measures.

In 2013, Stevenson, Hickendorff, Resing, Heiser, and de Boeck<sup>16</sup> explored the differences in children's ability to profit from training in analogical reasoning, where the training condition comprised either graduated prompts or mere feedback. The findings showed that the training with graduated prompts (using the AnimaLogica dynamic test) significantly improved the level of analogy solving in comparison to the training with mere right/wrong feedback. Notably, individual differences were stark in children's ability to profit from training in analogical reasoning. Children with lower scores in the pre-test phase improved in analogical reasoning more than children with a higher initial score. At the same time, the authors studied the relationship between the post-test level of analogy solving and the age, working memory, school performance as well as the initial ability to solve

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<sup>13</sup> C.E. Stevenson, *Puzzling with potential. Dynamic testing of analogical reasoning in children*, Amsterdam 2012.

<sup>14</sup> W.C.M. Resing, *Intelligentie en leerpotentieel. Een onderzoek naar het leerpotentieel van jonge leerlingen uit het basis- en speciaal onderwijs*, Lisse 1990.

<sup>15</sup> W.C.M. Resing, C.E. Stevenson, T. Bosma, *Dynamic testing: Measuring inductive reasoning in children with developmental disabilities and mild cognitive impairments*, "Journal of Cognitive Education and Psychology" 2012, nr 11(2), s. 159–178.

<sup>16</sup> C.E. Stevenson, M. Hickendorff, W.C.M. Resing, W. Heiser, P. de Boeck, *Explanatory item response modeling of children's change on a dynamic test of analogical reasoning*, "Intelligence" 2013, nr 41(3), s. 157–168.

analogies. The researchers also found that age and both verbal and visuo-spatial working memory appeared to have positive relationship with test performance; proving to be significant predictors of analogy solving:  $\beta = .92$ ,  $SE = .12$ ,  $p < .001$ ;  $\beta = .36$ ,  $SE = .12$ ,  $p < .004$ ; and  $\beta = .37$ ,  $SE = .12$ ,  $p < .002$ , respectively. In addition, there was an effect of math achievement on degree of improvement, where higher achieving children improved more from pre-test to post-test.

A further study by Stevenson, Heiser, and Resing<sup>17</sup> focused on the role of working memory in training and transfer effects of inductive reasoning, using the AnimaLogica dynamic test. Regression models revealed that visuo-spatial working memory was moderately related to initial performance of the inductive reasoning task ( $r = .35$ ). The correlation between visuo-spatial working memory and pre-test was  $.307$ ,  $p < .05$  and between verbal working memory and pre-test  $.277$ ,  $p < .05$ . Similarly to the research by Stevenson, Hickendorff, et al.<sup>18</sup>, the authors also compared children in two experimental conditions- graduated prompts or repeated practice- with the children in graduated prompts condition scoring higher than those in the practice condition.

Stevenson and her colleagues<sup>19</sup> also examined individual differences in feedback effects on children's performance on a computerized pre-test – training – post-test assessment of analogical reasoning. Three groups of children received either: 1) stepwise elaborated feedback (using graduated prompting techniques in the AnimaLogica dynamic test), 2) repeated simple feedback (right/wrong outcome), or 3) no feedback during the training sessions. The elaborate feedback appeared to be the most effective form of training for children with initially weaker analogical reasoning strategies. The children who were already capable of applying analogical reasoning strategies did not show any differential benefit in the different types of feedback training. The role of working memory was also taken into account in these analyses. The results of this research supported the findings of the above mentioned study<sup>20</sup> about working memory significantly predicting initial ability to learn.

The study carried out on analogical reasoning<sup>21</sup> delivers information about working memory and dynamic measures of analogical reasoning as unique predictors of children's reading and math achievement. The results

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<sup>17</sup> C.E. Stevenson, W. J. Heiser, W. C. M. Resing, *Working memory as a moderator of training and transfer of analogical reasoning in children*, "Contemporary Educational Psychology" 2013, nr 38(3), s. 159–169.

<sup>18</sup> C.E. Stevenson, M. Hickendorff, W.C.M. Resing, W. Heiser, P. de Boeck, *Explanatory item response modelling...*

<sup>19</sup> C.E. Stevenson, P. de Boeck, W.C.M. Resing, W.J. Heiser, *Individual differences in the effect of feedback on children's change in analogical reasoning*, Memphis 2013.

<sup>20</sup> C.E. Stevenson, W.J. Heiser, W.C.M. Resing, *Working memory...*

<sup>21</sup> C.E. Stevenson, C. Bergwerff, W.J. Heiser, W.C.M. Resing, *Working memory and dynamic measures of analogical reasoning as predictors of children's math and reading achievement*, "Infant and Child Development" 2014, nr 23(1), s. 51–66.

indicated that verbal (but not visuo-spatial) working memory and dynamic reasoning measures formed unique predictors of achievement in maths and reading. Verbal working memory efficiency was positively related to math and reading achievement:  $.363, p < .01$  and  $.181, p < .05$ , respectively. The performance on a dynamic test of analogical reasoning (post-test score) correlated with math and reading  $.595, p < .01$  and  $.245, p < .01$ , respectively.

The most recent study by Stevenson, Alberto, Van den Boom, and de Boeck<sup>22</sup> investigated differences in the difficulty of visual relations across different age-groups. Individual transformations in the AnimaLogica dynamic test were analysed: generally, the “what” visual relations (animal, colour, quantity and size) were the easiest, whereas the “where” relations (orientation and position) were the most difficult. The results showed that with increasing age and greater memory span all visual relations were processed more accurately. The significant main effects of age and working memory were  $\beta = .29, SE = .01, p < .001$  and  $\beta = .17, SE = .01, p < .001$ , respectively.

### 3. Present study

As it was also presented in the studies above<sup>23</sup>, using a dynamic test allows us to assess learning potential based on several indices, such as:

(1) the level of performance improvement. Within the dynamic test, the post-test score is understood as an indicator of learning potential. Individuals differ in the range that they can profit from the opportunities for development. Hence a child with a high initial score in the pretest achieves a lower score in learning potential than a child with a lower initial score in the pretest, if they score the same in the post-test;

(2) the need for prompts in the training phase. The training process is hierarchically structured and based on the system of graduated prompts, which enables a situation where a child is given only the necessary amount of help to solve a given task. The Graduated Prompt Approach (GPA)<sup>24</sup> uses prompts prepared in advance, ordered from implicit to explicit. For example in the AnimaLogica dynamic test, described below, graduate help starts with general meta-cognitive prompts, such as focusing the child's attention. Meta-cognitive prompts are followed by cognitive prompts, which intentionally stress the transformation in the given item. Next, help with problem solving is provided through gradual modelling of the correct answer in a step by step process. Therefore change in the number and character of prompts needed during the training phase indicates the level of analogical strategies during problem solving;

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<sup>22</sup> C.E. Stevenson, R.A. Alberto, M. Van den Boom, P. de Boeck, *Visual relations children find easy and difficult to process in figural analogies*, “Frontiers in Psychology” 2014, nr 5, s. 1–9.

<sup>23</sup> see also M. Filičková, *Dynamické testovanie učebného potenciálu: teoretické východiská a praktická aplikácia v podobe testu AnimaLogica*, „Acta Paedagogicae Presoves – Nova Sandes“ 2014, nr 9, s. 35–43.

<sup>24</sup> A. Brown, R.A. Ferrara, *Diagnosing zones of proximal development*, w: *Culture, communication and cognition: Vygotskian perspectives*, red. J.V. Wertsch, Cambridge 1985, s. 273–305.

(3) flexibility in using solving strategies. The choice of solving strategy – such as the moves themselves and the order of the moves that the child uses while problem solving – acts as an indicator for solving strategies. The child can exhibit several solving strategies: 1) analogical strategies which represent solutions with all the transformations correct; 2) semi-analogical strategies which include one to two incorrect transformations; 3) duplicate strategies for example, copy animal figures already placed in the matrix; 4) non-analogical strategies which are solutions with three or more incorrect transformations<sup>25</sup>.

The present paper aims to answer the question about the difference between the level of learning potential achieved by children from standard population and talented children. In this study, we wanted to find out whether the level of learning potential differs in certain populations. The hypotheses were formulated as follows: 1) There is a difference in the level of learning potential between the groups. 2) There are intra-group differences in the use of prompts. 3) The groups differ in solving strategies.

### 3.1. Method

#### Participants and procedure

The sample comprised 233 children (N=233). There were 206 (9 years 9 months) children from standard population and 27 (9 years 3 months) talented children from primary schools in Prešov and Košice municipalities. Talented children attended specialized schools for talented pupils.

Children were tested in the morning, each was seated in front of the computer and was provided with headphones. The test was automated and computerized, and lasted between 30–50 minutes.

#### Measures

All the above mentioned studies demonstrated that a dynamic test is able to provide us with a better view of the scholastic achievement of children than traditional IQ tests. The AnimaLogica test in particular was chosen in this case, as it has specifically proved to be a sufficient measurement tool for dynamic assessment of the ability to learn<sup>26</sup>. The AnimaLogica is aimed at children aged 5 to 12, and is based on the principle of analogical reasoning. The test comprises concrete figural analogies (A:B::C:D) in the form of 2x2 matrices with familiar animals as objects. Using a computer mouse, children are tasked with dragging and dropping animal figures into the empty box in the lower quadrant of the matrix. The animal figures used in the test represent six possible transformations (animal, colour, size, orientation, quantity, position). Each analogy consists of two animals, available in three colours (red, yellow, blue) and two sizes (large, small).

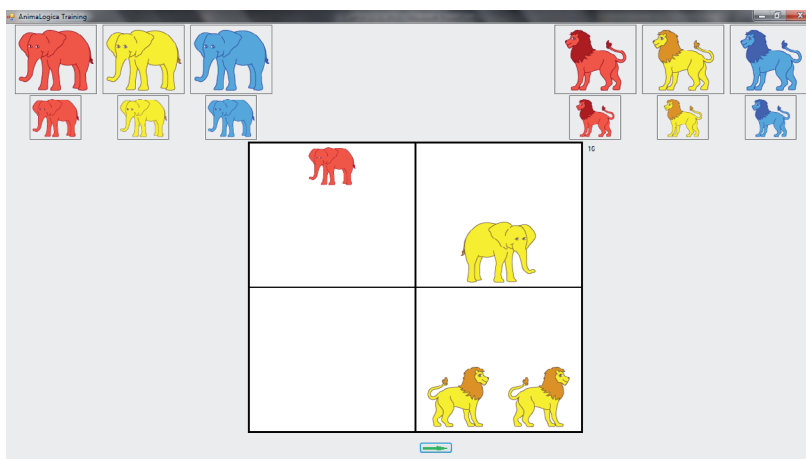
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<sup>25</sup> W.C.M. Resing, E. Tunteler, F.J. De Jong, T. Bosma, *Dynamic testing in indigenous and ethnic minority children*, "Learning and Individual Differences" 2009, nr 19(4), s. 445–450.

<sup>26</sup> C.E. Stevenson, W.J. Heiser, W.C.M. Resing, *Working memory...*

The orientation (facing left or right) can be changed by clicking the animal figure. Quantity (one, two) can be specified by dragging desired number of animal figures into the empty box. Animal figures can be positioned in the bottom, middle or top of the empty box.

The AnimaLogica dynamic test has been translated and adapted to Slovak context (APVV-0281-11). The production of the Slovak version of the test required several consultations with the author of the test as well as video conferences with a computer programmer, who made an additional script to the original test. The process of producing the Slovak version of the test involved the conversion of spoken English words and sentences into scripts and their translation into Slovak, taking into consideration the peculiarities of target language, especially the declension system of nouns and adjectives; we could not make a one-to-one translation. We created sound files for the software in Slovak, which were incorporated into the test. The Slovak sound files were then matched with the English version, subsequent corrections and further sound files were created until the final version was achieved.



**Figure 1.** Computerized dynamic test AnimaLogica. In this example, a child is asked to drag and drop the pictures into the grid so that the pattern is kept.

### 3.2. Data analysis and interpretation

Prior to conducting analyses, psychometric properties of the data were assessed. The distribution was normal; the Cronbach's alpha coefficient of internal consistency (pre-test  $\alpha = .90$ , post-test  $\alpha = .83$ ) was almost identical with the coefficient in the original validity study (pre-test  $\alpha = .90$ , post-test  $\alpha = .91$ ) ( $N = 255$ ), carried out by the authors of the test, Stevenson and her colleagues<sup>27</sup>.

<sup>27</sup> C.E. Stevenson, M. Hickendorff, W.C.M. Resing, W. Heiser, P. de Boeck, *Explanatory item response modelling...*

The analysis of the data was conducted, focusing on i) the level of learning potential, understood as performance improvement following the training phase, ii) the nature of prompts in training phase, and iii) solving strategies.

**Table 1.** Descriptive statistics from the standard population children

	Minimum	Maximum	Mean	Median	Std.Deviation	Skewness	Kurtosis
Pre-test	25	96	49,7	49	13,6	,61	,21
Training phase	0	24	3,7	3	3,3	2,1	7,6
Post-test	24	92	39,3	38	9,2	1,4	4,8

**Table 2.** Descriptive statistics from the talented population children

	Minimum	Maximum	Mean	Median	Std. Deviation	Skewness	Kurtosis
Pre-test	28	54	38,2	38	6,2	,32	,00
Training phase	0	8	2,4	1	2,1	1,5	1,4
Post-test	26	45	33,1	33	4,9	,77	-,11

The level of learning potential was taken as a degree of improvement a child underwent after completing the training phase of the AnimaLogica dynamic test. The post-test score was used to define the level of learning potential. Children from the standard population gained significantly higher scores in the post-test phase ( $Mdn=38$ ) than in the pre-test phase ( $Mdn=49$ ),  $z=11,3$ ,  $p<.001$ . The associated effect size of  $r=.78$  indicates a large<sup>28</sup> effect. Similarly, talented children gained significantly higher scores in the post-test phase ( $Mdn=36$ ) than in the pre-test phase ( $Mdn=42$ ),  $z=2,9$ ,  $p=.004$ . The associated effect size of  $r=.55$  signifies a large effect. Based on these findings, it can be interpreted that both groups of children achieved statistically significant improvement in solving analogy tasks; or in other words both groups showed an improved performance in their ability to learn.

Level of learning potential was compared between the standard group ( $Mdn=38$ ) and talented group of children ( $Mdn=36$ ), finding no significant difference in post-test scores  $U=2260$ ,  $z=1,7$ ,  $p=.09$  (two-tailed). It was expected that the children from the talented group would score higher on the level of learning potential defined by the post-test score than the children from the standard group. However findings failed to provide a clear cut answer to this hypothesis, with the difference between the groups edging towards statistical significance ( $p=.046$ ) with low effect size. The findings did not reveal statistically significant differences between the post-test score in groups of talented and standard children.

<sup>28</sup>J. Cohen, *Statistical Power Analysis for the Behavioral Sciences*, Hillsdale 1988.



Recall, in the training phase, children are given immediate feedback as well as prompts if they struggle with providing the correct solution. Prompts are hierarchically structured and graduated in character. Assistance starts with meta-cognitive prompts (which focus children's attention on what they are supposed to do), these are followed by cognitive prompts (which focus on analogies) and ends with specific help with individual transformations. The nature of the prompts needed during the training phase are proven to be the best indicator of the level of analogical strategies the child will use whilst in the problem solving phase<sup>29</sup>. Furthermore, the nature of prompts provides information on what type of instruction children may benefit most from in future interventions<sup>30</sup>. The maximum number of prompts in the AnimaLogica dynamic test is five. In the training phase, children from the standard population group needed 3 prompts on average to reach the solution (Tab. 1); children from the talented group needed 1 prompt on average to reach the solution (Tab. 2). From these results it can be assumed that the meta-cognitive prompt is the best aid for this solution for the children from the talented group, as the meta-cognitive prompt guided the children to correctly solve the given task and helped them to focus their attention without the need for any further prompts. On the other hand, children from the standard population group most frequently used cognitive prompt that stressed transformations in given item. The analysis between the number of prompts in the standard ( $Mdn=3$ ) and talented ( $Mdn=1$ ) group of children revealed a significant difference,  $U=1996$ ,  $z=2,4$ ,  $p=.015$ . Although these are statistically significant values, associated effect size was low,  $r=.16$ .

Information about the character of solving strategies in both examined populations is derived from the pre-test and post-test analyses. From the several solving strategies (analogical, semi-analogical, duplicate, non-analogical), children from standard population group relied on semi-analogical solving strategies in the pre-test phase (median 2 and average 2,1). The post-test phase showed children from the standard population group improved in their use of solving strategies; demonstrating a shift towards analogical strategies (median 1 and average 1,6). This shift can be explained as a result of the training phase, where children acquired the expected solving strategies. Similarly, there was also the improvement in talented children population, although very moderate in comparison to standard population. Children from talented population group relied on analogical strategies in both the pre-test and post-test phase (median 1 and average 1,6 in pre-test; median 1 and average 1,4 in post-test).

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<sup>29</sup> C.E. Stevenson, W.J. Heiser, W.C.M. Resing, *Working memory...*

<sup>30</sup> W.C.M. Resing, *Dynamic testing...*

## 4. Discussion

The aim of this paper was to examine the difference in the level of learning potential between two populations (standard group and talented group) using the AnimaLogica test. The results indicated low effect sizes within the difference in the use of prompts in talented and standard children, although the difference was statistically significant and implied that children from the standard group relied more on more specific, cognitive prompts than children from the talented population group. These results correspond with the study of Kanevsky<sup>31</sup>, where children from talented population needed less meta-cognitive, cognitive and concrete help to complete the patterns and to learn to solve them.

The results also revealed that the training with graduated prompts significantly improved the level of analogical solving in both talented and standard children populations. However, the statistically significant difference in the post-test score between the groups was small with low effect size. These findings are quite remarkable and raise further questions. Why there is not a difference in the level of learning potential between standard and talented children? Should not children from standard population group have exhibited greater learning potential if they can profit more from given help in training phase<sup>32</sup>? Or should not talented children have scored better in dynamic test because they are able to maximize their learning potential<sup>33</sup>? The analysis of the data revealed that there is no statistical difference in the performance of standard and talented children. Yet, the large associated effect size ( $r=.78$ ) in the post-test score of learning potential in children from standard population group in comparison to the large associated effect ( $r=.55$ ) of learning potential in children from talented population group suggests that children from standard population group did better and might exhibit higher ability to learn. Further research on this issue is needed to shed more light on this unexpected result and answer the questions about the difference in standard and talented children's learning ability.

Another finding emerging from this study is that standard children exhibited improved solving strategies after the training phase. The shift from semi-analogical to analogical strategies confirmed the ability of dynamic test to advance the level of children's analogical reasoning, what

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<sup>31</sup> L. Kanevsky, *Learning potentials of gifted students*, "Roeper Review" 1995, nr 17(3), s. 157–163.

<sup>32</sup> N. Katz, S. Goldstand, R. Bar-Ilan, S. Parush, *The dynamic occupational therapy cognitive assessment for children (DOTCA-Ch): A new instrument for assessing learning potential*, "American Journal of Occupational Therapy" 2007, nr 61(1), s. 41–52.

<sup>33</sup> R.A. Fabio, *Dynamic assessment of intelligence is a better reply to adaptive behaviour and cognitive plasticity*, "The Journal of General Psychology" 2005, nr 132(1), s. 41–64; L. Kanevsky, J. Geake, *Inside the zone of proximal development: Validating a multifactor model of learning potential with gifted students and their peers*, "Journal for the Education of the Gifted" 2004, nr 28, s. 182–217.

was suggested also in previous studies on dynamic testing<sup>34</sup>. Furthermore, the present study emphasized individual differences in the ability to profit from the training in analogical reasoning. In both examined groups, children with lower score in pre-test improved in analogical reasoning more than children with higher score. These results support the findings from previous studies<sup>35</sup> dealing with the learning potential.

The study brings also educational implications. As Džuka and Kovalčíková<sup>36</sup> imply, the concept of learning potential explains how the learner can solve the task with given support, if they cannot master it by themselves. Learning potential thus represents the ability to profit from assistance provided during the training phase of dynamic test. Although the experts in the field originally and primarily apply dynamic testing to children with some kind of learning disability, dynamic testing has also been used with talented children<sup>37</sup>. For instance, according to Lidz and Elliott<sup>38</sup>, the use of dynamic testing with talented children demonstrates the utility of this approach for the purpose of determination of eligibility for gifted programs. Similarly, the findings of the present study support the use of dynamic test both with standard and talented children. This approach finds its applied level in school practise. Dynamic testing is useful not only as a main indicator of children's learning potential<sup>39</sup>, but also as a main indicator of their academic achievement<sup>40</sup>. The knowledge of children's individual needs in cognitive field thus brings a teacher the information about children's learning abilities and specific suggestions how to help children in developing their cognitive potential, either its standard or talented children.

#### SUMMARY

The article deals with dynamic testing, understood as a means of learning potential assessment. In the paper, basic features of the dynamic test as well as theoretical background for dynamic testing are presented. The AnimaLogica dynamic test is being introduced and studies conducted in the recent past using this test are presented. The main aim of the article is to compare analogical reasoning in two populations: children from standard population and talented children. The focus

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<sup>34</sup> C.E. Stevenson, *Puzzling with potential...*

<sup>35</sup> W.C.M. Resing, C.E. Stevenson, T. Bosma, *Dynamic testing...*; C.E. Stevenson, M. Hicken-dorff, W.C.M. Resing, W. Heiser, P. de Boeck, *Explanatory item response modelling...*

<sup>36</sup> J. Džuka, I. Kovalčíková, *Dynamické testovanie latentných učebných schopností*, "Československá Psychologie" 2008, nr 52(4), s. 366–377.

<sup>37</sup> L. Kanevsky, *Learning potentials...*; L. Kanevsky, J. Geake, *Inside the zone of proximal development...*

<sup>38</sup> C. Lidz, J. Elliott, *Use of dynamic assessment with gifted students*, "Gifted Education International" 2006, nr 21(2–3), s. 151–161.

<sup>39</sup> W.C.M. Resing, I. Xenidou-Dervou, W.M.P. Steijn, J.G. Elliott, *A "picture" of children's potential for learning: Looking into strategy changes and working memory by dynamic testing*, "Learning and Individual Differences" 2011, nr 22(1), s. 144–150.

<sup>40</sup> R. A. Fabio, *Dynamic assessment...*

in the present study was put on 1) the level of learning potential, understood as performance improvement following the training phase, 2) the nature of prompts in training phase, and 3) solving strategies. Data analysis revealed that there was no difference between standard and talented population in post-test.

**KEY WORDS:** dynamic test, learning potential, talented children, AnimaLogica