

Examining the Relationship Between the “Matthew Effect” in Hungarian Students’ Reading Developmental Trajectory and School-Readiness Skills

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Introduction

Cross-sectional studies conducted in domains other than reading have already pointed out as a by-product of analysis that the development of low-performing students stagnates during their school career (e.g. Nikolov & Dijugonovic, 2006). A similar effect was identified in the field of reading termed the “Matthew effect” by Stanovich (1986), implying that poor readers fall further and further behind their more literate peers. However, this performance deficiency throughout school does not only influence students’ reading achievement but success in other academic areas depends largely on it as well (Chall, Jacobs & Baldwin, 1990).

Since previous studies found large differences in the level of intellectual and social development of students of the same age (Nagy, 2008) and the gap in literacy achievement between the children of low- and high-SES families poses a major challenge for both educators and researchers (Jenkins, Micklewright & Schnepf, 2008), examining the developmental curve of low-performing readers and the impact of poor performance in reading on other domains is of crucial relevance.

The present study aims to examine whether the “Matthew effect” in reading occurs in a Hungarian context and map out the relationship between the developmental levels of students’ school-readiness skills and reading performance as part of the Hungarian Educational Longitudinal Program – HELP (Csapó, 2007).

The objectives are

- (1) to characterize subgroups of students who experience difficulties in reading over time based on maternal education
- (2) to examine the relationship between students’ school-readiness skills and reading performance between Grade 2 and Grade 6.

Educational and scientific importance

Data yielded by national and international large-scale studies (e.g. OECD PISA, PIRLS, National Assessment of Basic Competencies) reveal that a sizeable percentage of Hungarian students experience difficulties in reading. Even though these data provide us a snapshot on the structure and outcomes of the Hungarian school system, the impact of the teacher-student interaction on the development of students' reading skills is yet unclear. Furthermore, the relationship between students' school-readiness skills and their impact on students' future reading development needs to be made more salient as well. Examining students' reading achievement and mapping out what cognitive and demographic factors influence it may help educators to develop targeted and tailor-made intervention programs for poor-readers.

Theoretical background

Acquiring reading literacy is a long and complex process extending beyond elementary education (e.g. Chall, 1996). This process requires the integration and coordination of multiple skills and abilities. The initial phase of development is rather characterized by the emergence and growth of precursor skills than with traditional reading skills such as decoding or reading comprehension (Dickinson & Tabors, 2001).

Stanovich (1986) identified a phenomenon in children's reading development termed the "Matthew effect", claiming that students who are unsuccessful in acquiring and mastering the basic component skills (e.g. phonological awareness, letter-sound correspondence) during the process of learning to read are generally less successful in reading to learn. Hence, poor readers in the initial phase of acquiring reading literacy will find difficulty catching up and developing with their good reader peers. Since the optimal development of reading comprehension is a prerequisite to academic advancement, poor readers experience difficulties in other domains as well.

Previous studies showed that a Hungarian school-readiness test-battery has a marked influence on students' academic progress (e.g. Molnár, Józsa, Molnár & B. Németh, 2007) as well as on students' reading performance. However, studies longitudinally examining the specific effects of students' school-readiness skills on later reading performance throughout the elementary school period are scarce.

Previous research also showed that there is a significant achievement gap in literacy between students with high- and low-socioeconomic status (NAEP, Jenkins, Micklewright & Schnepf, 2008; OECD, 2010). Nevertheless, no studies have attempted to trace the achievement of students with different socioeconomic status in longitudinal context in Hungary.

Methods

Sample and data collection

In this study, a subsample (N=2477) of a longitudinal database was analyzed (males: 50%). We only examined data of students whose results were available in all measurement points. The longitudinal sample was nationally representative for geographic coverage, gender and socio-cultural background. The data collection was carried out between 2003 and 2009 within the framework of HELP. The DIFER school-readiness test battery was administered to students at the beginning of the first school year in 2003 autumn (aged 6-8). Teachers were also asked to fill out a background questionnaire regarding mothers' education of students. Students also completed reading tests in Grade 2, 4 and 6.

Instruments

At the beginning of schooling, the DIFER school-readiness test was administered, which is a research-based, validated, reliable (Cronbach- $\alpha=0.95$) and standardized instrument for the diagnostic assessment of basic skills (Nagy, Fazekasné, Józsa & Vidákovich, 2004a, 2004b). It measures the developmental level of five basic skills (motor coordination for writing, vocabulary of relations, elementary arithmetic, comprehension of relations, and social skills), the acquisition of which are considered a gateway opening up or preventing further development in reading as well. In addition to scores in the basic skills targeted, a composite skill index is calculated, which has been shown to be an appropriate measure of school-readiness (Józsa, 2004). DIFER scores place students in one of five performance categories indicative of the stage they are in as regards the acquisition of the targeted skill: preparatory, beginning, intermediate, advanced and optimum levels. Those scoring at the preparatory and beginning levels are not equipped with the necessary set of skills to start school, so we merged these subgroups of students together and use four subgroups of students.

We analyzed students' test scores on three reading tests at three assessment points at two-year intervals. The internal consistency of the tests proved to be good (Cronbach- $\alpha=0.89-0.91$). The grade-level-based reading literacy tests aim to assess to what extent students are capable of using, retrieving and evaluating written pieces of information in Grade 2 (59 items), in Grade 4 (69 items) and in Grade 6 (69 items).

Analysis and results

Our results reveal that based on the developmental level of the five skills measured by DIFER, 10.2% of students was not cognitively mature enough to start a successful school career. These students were either at a preparatory or beginning level when entering school. 24.6% of students were at an intermediate, 36.4% at an advanced and 28.8% were at an optimum developmental level at the beginning of the first primary school year.

The four categories of the school-readiness test implying the developmental level of students' school-readiness skills served as a basis for following students' reading achievement (*Table 1*). When examining students' reading performance from Grade 2 to 6 Dunnett's T3 proved that students' achievement differ significantly in any grades. According to the post hoc analysis the differences remain stable in the examined period (*Figure 1, 2, 3*). Students who are less developed at the beginning of school tend to achieve less than 1 standard deviation below the average (in Grade 2: 48.3%; in Grade 4: 51.0%; in Grade 6: 47.5% of the students). Students, who were at the advanced or optimal level at the beginning of school, scored 2 standard deviations above the average in reading (Grade 2: advanced level: 6.4%; optimum level: 30.0%; Grade 4: advanced level: 11.3%; optimum level: 28.9%; Grade 6: advanced level: 14.3%; optimum level: 27.9%).

The results show that the developmental levels at the beginning of schooling have a marked influence on students' reading achievement (*Table 2*). The correlations between the DIFER skill scores and the reading performance remain steady throughout the later school years ($r_{\text{Grade2}}=.518$, $r_{\text{Grade4}}=.504$, $r_{\text{Grade6}}=.478$; $p<.000$).

When taking a look at the maternal education of students who started school with lower cognitive potentials (preparatory and beginning level), data show that 71.6% has a mother who only accomplished the eight compulsory years or less in primary education or finished a vocational school, whereas this proportion is much smaller (30.5%) in case of students whose school-readiness skills fell within the optimally developed category.

Maternal education has a significant effect on students' reading performance, it explains from 13.03 to 13.98% of the variance of the reading performance in the measured years.

Summary and conclusion

Based on the developmental level of school-readiness skills the reading achievement of students in the preparatory and beginning category is significantly lower in all data collection points. This implies that the cognitive deficiency occurring at the beginning of

primary school remains largely unchanged. Thus, students, who begin schooling with poorly developed basic skills, have a very low probability to catch up and progress with the pace of their peers.

The developmental level of school-readiness skills of a large proportion of students experiencing reading difficulties is well below the average. Most poor readers have a mother who does not have a matura exam (i.e. finished vocational school or 8 or less years in primary education). Students who do not drop out of school experience immense hardship in keeping up with their peers. Our results also confirm that the Hungarian school system is less efficient in compensating for the initial cognitive deficiencies of students. Therefore, establishing an early and accurate diagnosis on the developmental level of skills students carry throughout the transition from pre-primary to primary education is of crucial importance to their future school attainment.

The DIFER test does not only provide detailed information on students' developmental level of five basic school-readiness skills but it also has a strong predictive value on students' academic performance in reading. Furthermore, in line with the criteria applied in previous studies, we can also claim that the measured skills can be considered as reading precursor skills exerting influence on students' reading development trajectory.

Future research needs to clarify the nature of these precursor elements in literacy development and to identify how these elements work together to support early literacy learning. Moreover, this research paves the way to further analyze the impact of reading deficiency on academic performance in other domains.

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Appendix

<i>Students' developmental level by the DIFER</i>	<i>N</i>	<i>Grade 2</i>		<i>Grade 4</i>		<i>Grade 6</i>	
		<i>Mean (%)</i>	<i>SD (%)</i>	<i>Mean (%)</i>	<i>SD (%)</i>	<i>Mean (%)</i>	<i>SD (%)</i>
Preparatory and beginning	253	59.0	16.6	49.8	15.2	63.8	13.8
Intermediate	608	68.5	15.1	60.5	14.5	70.9	12.3
Advanced	902	76.1	12.5	67.7	13.5	77.1	10.4
Optimum	714	82.9	10.3	74.3	12.0	81.7	9.3
Total sample	2477	74.5	15.0	66.0	15.4	75.5	12.3

Table 1. Students' reading achievement based on the DIFER composite index categories

<i>DIFER skills</i>	<i>Grade</i>		
	<i>2</i>	<i>4</i>	<i>6</i>
Motor coordination for writing	.218	.247	.254
Vocabulary of relations	.314	.297	.297
Comprehension of relations	.397	.364	.344
Social skills	.452	.438	.375
Elementary arithmetic	.458	.448	.431
DIFER composite index	.518	.504	.478

$p < .001$

Table 2. Correlation between the DIFER skill scores and students' reading performance

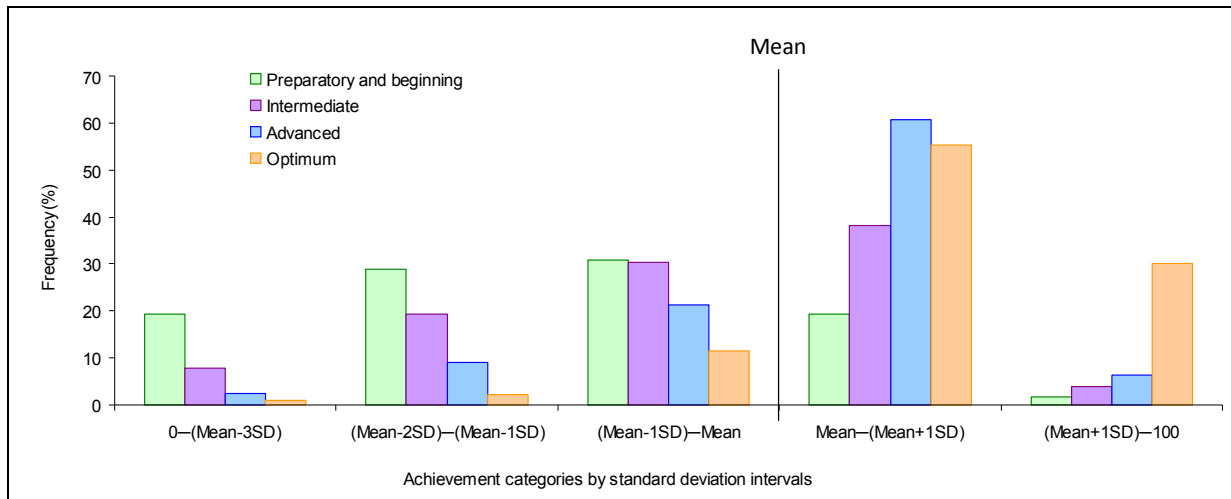


Figure 1.

Distribution of reading achievement based on the DIFER composite index categories in Grade 2.

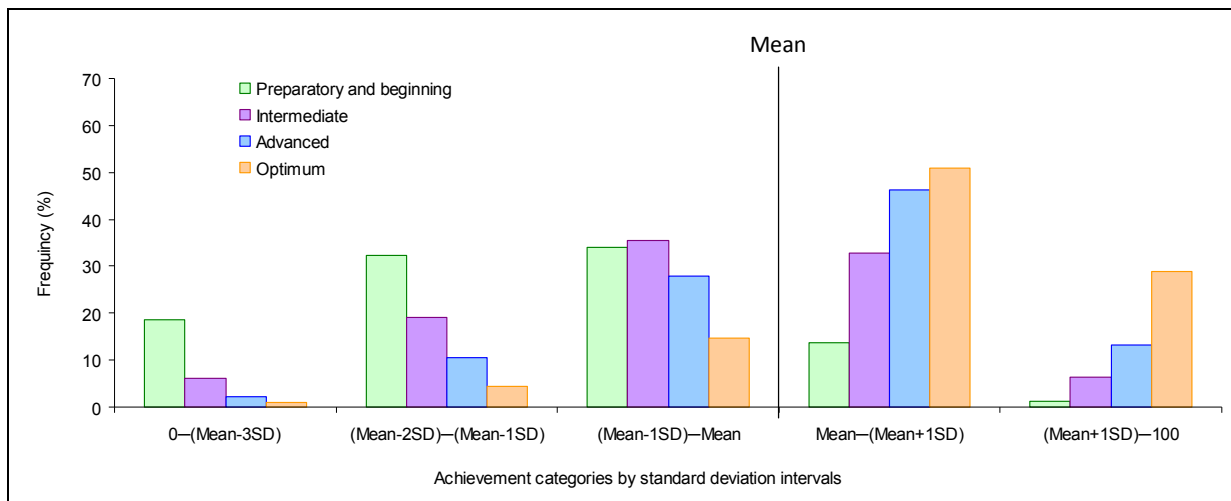


Figure 2.

Distribution of reading achievement based on the DIFER composite index categories in Grade 4.

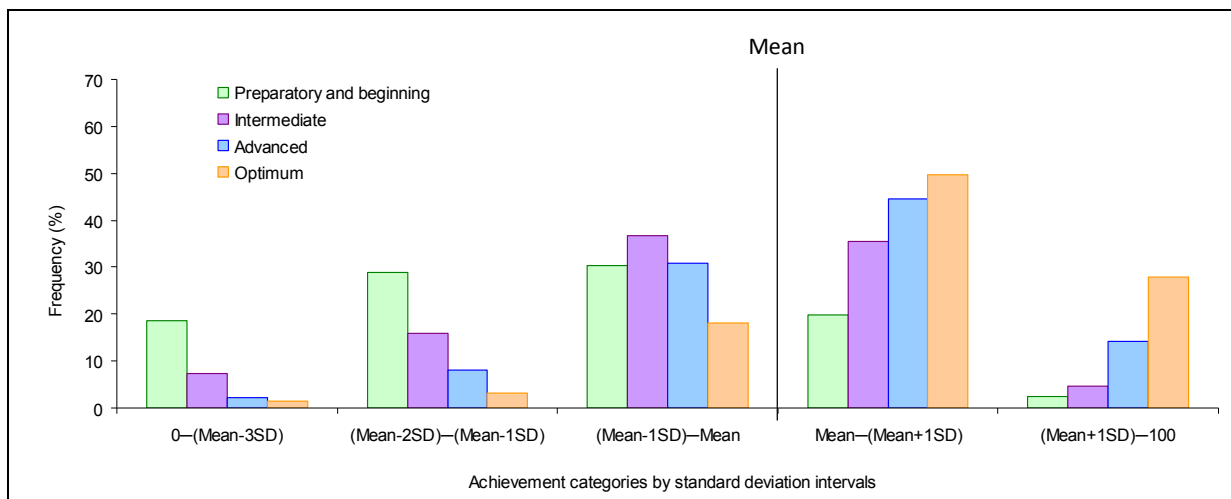


Figure 3.

Distribution of reading achievement based on the DIFER composite index categories in Grade 6.