Explaining primary pupils' differences in reading achievement by teaching patterns and socioeconomic background - Reanalyses with the PIRLS-data

Dr. Michael PFEIFER
Institute for School Development Research (IFS), University of Technology Dortmund,
Vogelpothsweg 78, 44227 Dortmund, Germany, pfeifer@ifs.tu-dortmund.de

ABSTRACT

This contribution presents the outcomes of multilevel analysis in the context of the Progress in International Reading Literacy Study (PIRLS) 2001 that are unique in Germany so far. The PIRLS survey 2001 revealed that in Germany especially pupils with a low socioeconomic status (SES) and with migration background have a significant lower reading achievement of more than one school year compared to pupils with a high SES and without migration background. The PIRLS survey 2006 evidenced that, although this difference did reduce over the years, there is still a disadvantage for those pupils' reading achievement of more than one school year.
Thus, one of the main research questions of this work was, if there are certain concepts, strategies and methods of teaching, which contribute to a better acquirement of reading achievement of pupils with low socioeconomic and migration background.
As a result of the analyses certain aspects of teaching could be identified that contribute to a better reading achievement of those pupils.

Keywords: Reading Achievement, Socioeconomic Background, Teaching Patterns, ICT, Multilevel Analysis.

1. INTRODUCTION

Already after the first measurement of the Progress in International Reading Literacy Study (PIRLS) it became obvious, that Germany is one of the countries with the strongest connection between the pupils' socioeconomic background / migration background and their reading achievement [1, 2].
The trend-perspective of PIRLS 2001 & PIRLS 2006 reveals that the connection between the pupils' migration background & their reading achievement has decreased significantly (7 points), but pupils with migration background still have a deficit of 48 points. In practise that means that those pupils have a deficit in their reading achievement of one school year. The connection between the pupils' socioeconomic background and their reading achievement has not changed significantly. Pupils with a low socioeconomic background still have a deficit in reading achievement of 40 points. So in practical means those pupils also have a deficit in their reading achievement of one school year [3].
That means that especially pupils with a low socioeconomic and migration background need more support in school but of course also from their families. The results of the analyses from Klieme, Neubrand and Luedtke [4] with the German PISA 2000 data emphasize that. They found out that the connection between the socioeconomic background of the pupils and their math achievement is negligible if their reading achievement is controlled. So reading achievement is an important key competence. Also the German Action Board of Education appealed in its annual report 2007 that the empirical educational research has to examine questions of equal chances in education more intensively [5].

2. OBJECTIVES

This contribution presents the outcomes of multilevel analysis in the context of the Progress in International Reading Literacy Study (PIRLS) 2001.
The main research question was, if there are certain aspects of teaching, which can contribute to a better acquirement of the reading achievement of pupils with low socioeconomic and migration background.
Furthermore a second research question was, if the use of information and communication technology (ICT) and media can contribute to a better acquirement of reading achievement of those pupils.

3. THEORETICAL FRAMEWORK

The dynamic model of educational effectiveness [6] has been used as a starting point and as a theoretical framework for the analyses. The model connects the three dimensions of school quality: Inputs (system preconditions, system and regional steering), processes (education on school and classroom level) and outputs (quality of student achievements, attitudes and behaviours). Also the socioeconomic background of the pupils as an individual precondition is included in the dynamic model. It is based on other school effectiveness models, like those from Ditton [7] and from Scheerens and Bosker [8].

4. METHODS

The empirical analyses in this contribution had been conducted with the quantitative data of the Progress in International Reading Literacy Study (PIRLS) Germany 2001. The sample size of the primary pupils (individual level) was N = 5935 and the sample size of the teachers (classroom level) was N = 308.
As a main research technique multilevel analyses with the software HLM [9] had been conducted. This technique makes it possible to have a separated view on the effects of the individual level (e.g. pupils' SES) and of the classroom level (e.g. special patterns of teaching) on the pupils' reading achievement.
To be able to have a special focus in the analyses on pupils with low socioeconomic and migration background, subgroups out of the whole sample of 5935 primary pupils in 308 classrooms have been created according to these criteria (socioeconomic background and migration background). As emphasized in the introduction especially those pupils' reading achievement needs to be improved. Thus, the results of the multilevel analyses that

will be presented in this contribution are based on the subgroup (1088 pupils in 61 classrooms) with the lowest socioeconomic background and with the most distinct migration background.
This subgroup approach also has been chosen to make the complex structure of the multilevel analyses better interpretable. This methodological approach also fulfills the postulate of the relevant literature [10, 11, 12].

5. RESULTS

Referring to the second research question it became apparent that the usage of ICT and media in this subsample did not have significant effects on the pupils' reading achievement. Also in the whole PIRLS population these aspects did not have significant effects on the pupils' reading achievement. The usage of ICT and media in the classroom was operationalized in two scales which were developed by PIRLS 2001. This finding will be discussed in the conclusions section.
As a result of the multilevel analyses certain patterns of teaching could be identified that may contribute to a better reading achievement of pupils with a low socioeconomic and migration background.
For a better interpretation of the results that are presented in the following it has to be outlined that the mean for the reading achievement is 150 points, that a standard deviation is 30 points and that 10 points difference in the presented results have a practical meaning of one school year.
Keeping that practical interpretation in mind, it becomes obvious that in this subpopulation especially the early building up of the reading strategy of practising the relation between letters and their phonemes is important ($\gamma = 6{,}39$). This finding is in line with a framework of the development of reading literacy, developed by Frith [13, 14].
Since this subpopulation consists of the pupils with the lowest socioeconomic background and with the most distinct migration background, those pupils would be allocated in the lowest, in the logographic phase of the development of reading literacy according to Frith [13, 14]. And for those pupils such a basic approach of training their reading skills would have the most benefit.
This finding corresponds with the findings of further analyses that have been conducted for the subpopulation with the highest socioeconomic background and with no migration background. It turned out that for those pupils a more elaborated approach of training their reading skills like practicing reading whole sentences fostered those pupils' reading achievement most.
Further for pupils with a low socioeconomic and migration background, an atmosphere in school ($\gamma = 1{,}49$) but also in the classroom ($\gamma = -1{,}91$) that is characterized by structure and discipline turned out to have a positive effect on the pupils' reading achievement.
Interestingly, the analyses show that for fostering the reading achievement of pupils with heterogeneous skills in a classroom, an adaptive timeframe given to the pupils (according to their skills) for working on tasks during lessons has a positive effect ($\gamma = 1{,}17$). So providing the same learning material / media with different timing in relation to the individual needs of each student may be a promising alternative than using different learning material / media in the classroom.

6. CONCLUSIONS

Beyond the results presented in this contribution also multilevel analyses for other subgroups of the PIRLS population have been conducted (e.g. high socioeconomic background and no migration background; low and high reading achievement). All these different subgroup-results cannot be presented in this journal-format, but on a meta-perspective it became obvious that especially in subgroups with a low socioeconomic background, with migration background or with low reading achievement the same certain aspects have strong effects (up to half a school year in a practical meaning) e.g. discipline / structure in classroom / in school and building up certain reading strategies early. These results replicate the findings / models e.g. of Frith [13, 14] and of Van de Grift & Houtveen [15].
Concerning the distinct effects of discipline and structure in classroom and in school for the subpopulation with a low socioeconomic and migration background Ko [16] poses the hypothesis that structured lessons help these pupils more because they experience less discipline at home when they are young and they have to rely on themselves in learning while pupils with a high socioeconomic background can get support through private tutoring or from higher educated parents (social and cultural capitals).
Wieckert [17] raises the interesting thesis that discipline in classroom may be more helpful for pupils with a low socioeconomic and migration background because they are more used to a restrictive climate in their families and therefore discipline in classroom meets their experiences concerning human interactions. On the other hand students with a high socioeconomic background may be more used to an educational style that is mainly based on discussions and on negotiating about limitations.

Regarding to the second research question (if the use of ICT and media can contribute to a better acquirement of reading achievement) the analyses showed that the usage of ICT and media did not have significant effects on the pupils' reading achievement, whether for the subsample nor for the whole PIRLS population.
A reason for this finding could be that the usage of ICT in classroom (e.g. computer, learning software) needs to be linked more elaborated to the content of the lesson. That means that the quality of the learning software needs to be evaluated if it meets the goals of the current teaching unit. Furthermore the usage and the level of difficulty of the software should correspond with the conception of the present learning process.

Since the analyses presented in this contribution are cross-sectional the results cannot be interpreted as causal effects. Nevertheless the results indicate that certain elaborated teaching patterns can contribute to a better acquirement of reading achievement of pupils from a low socioeconomic background and with migration background.
As a **desideratum** it can be stated that certain aspects of teaching have different effects on reading achievement, in consideration of pupil-composition in classroom and thus, more differentiated, longitudinal research on this issue is indicated.
In a currently running European Collaborative Research Project (ECRP) the topic discussed in this contribution is researched more differentiated in a longitudinal and European-wide design. The project is conducted by the author of this contribution in the Institute for School Development Research (IFS) in Germany together with seven European partner institutions.

7. REFERENCES

[1] Ogle, L.T. et al. (2003), **International Comparisons in Fourth-Grade Reading Literacy: Findings from the Progress in International Reading Literacy Study (PIRLS) of 2001** (No. NCES-2003-073).

[2] Bos, W. et al., Lesekompetenzen deutscher Grundschülerinnen und Grundschüler am Ende der vierten Jahrgangsstufe im internationalen Vergleich. In: W. Bos, et al., (Eds.), **Erste Ergebnisse aus IGLU. Schülerleistungen am Ende der vierten Jahrgangsstufe im internationalen Vergleich**, Waxmann: Münster, pp. 69-142.

[3] Bos, W., Schwippert, K., & Stubbe, T. (2007), Die Kopplung von sozialer Herkunft und Schülerleistung im internationalen Vergleich. In: W. Bos, et al. (Eds.), **IGLU 2006 : Lesekompetenzen von Grundschulkindern in Deutschland im internationalen Vergleich,** Waxmann: Münster, pp. 225-247.

[4] Klieme, E., Neubrand, M., & Luedtke, O. (2001), Mathematische Grundbildung: Testkonzeption und Ergebnisse, In: J. Baumert, et al. (Eds.), **PISA 2000 – Basiskompetenzen von Schülerinnen und Schülern im internationalen Vergleich**, Leske + Budrich: Opladen, pp. 141-191.

[5] Blossfeld, H.-P. et al. (Eds.) (2007). **Bildungsgerechtigkeit : Jahresgutachten 2007.** 1. Aufl., Wiesbaden: VS Verl. für Sozialwiss.

[6] Creemers, B.P.M., & Kyriakides, L. (2008), **The dynamics of educational effectiveness: a contribution to policy, practice and theory in contemporary schools,** London u.a.: Routledge.

[7] Ditton, H. (2007). Schulqualität – Modelle zwischen Konstruktion, empirischen Befunden und Implementierung. In: J. van Buer & C. Wagner (Eds.), **Qualität von Schule: ein kritisches Handbuch**, Frankfurt a. M.: Lang, pp. 83-92.

[8] Scheerens, J., & Bosker, R.J. (1997). **The foundations of educational effectiveness**, Oxford: Pergamon.

[9] Raudenbush, S.W., & Bryk, A.S. (2006). **Hierarchical linear models: applications and data analysis methods** (2. ed.), Thousand Oaks, CA u.a.: Sage Publications.

[10] Janke, N. (2006). **Soziales Klima an Schulen aus Lehrer-, Schulleiter- und Schülerperspektive. Eine Sekundäranalyse der Studie "Kompetenzen und Einstellungen von Schülerinnen und Schülern - Jahrgangsstufe 4 (KESS 4)" (Vol. 3)**. Münster: Waxmann.

[11] Stanat, P. (2006). Schulleistungen von Jugendlichen mit Migrationshintergrund: Die Rolle der Zusammensetzung der Schülerschaft. In J. Baumert, P. Stanat & R. Watermann (Eds.), **Herkunftsbedingte Disparitäten im Bildungswesen** (pp. 189-219). Wiesbaden: Verlag für Sozialwissenschaften.

[12] Voss, A. (2009). **The Acquisition of Language Competencies of Children (Age 4-15) with Social and Migrational Disparities: Results of Empirical Studies.** Paper presented at the European Conference on Educational Research.

[13] Frith, U. (1985). Beneath the surface of developmental dyslexia. In K. Patterson, J. Marshall & M. Coltheart (Eds.), **Surface Dyslexia, Neuropsychological and Cognitive Studies of Phonological Reading.** (pp 301-330). London: Erlbaum.

[14] Frith, U. (1986). **A developmental framework for developmental dyslexia.** Annals of Dyslexia, 36; 69-81.

[15] Van de Grift, W., & Houtveen, T. (2009). Improving Reading Achievements of Struggling Readers, **International Congress for School Effectiveness and Improvement (ICSEI)**. Vancouver, BC, Canada.

[16] Ko, J. (2010). **Consistency and Variation in Classroom Practice: A Mixed-Method Investigation Based On Case Studies Of Four EFL Teachers Of A Disadvantaged Secondary School in Hong Kong.** The University of Nottingham, UK.

[17] Wieckert, S. (2011). **Classroom-Management.** University of Technology Dortmund, Germany.