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Factors Determining Student Achievementⁱ

Abstract This study aims to review and summarize national and international literature that seeks to determine what quality education actually is, as well as look at what is happening as regards students' achievements. The current study aims to carry out a literature review with the purpose of laying down the foundations of future empirical research related to student achievement and educational effectiveness. This literature review indicates relevant results and comes to conclusions regarding analyses and research in the topic of student achievement. First, the study briefly introduces the connections between quality, effectiveness and equity; then it reveals the context of student achievement at schools; and, finally, it looks at the most important factors determining student and school achievement. The results of this literature review will support the conceptualisation and operationalisation of a future empirical examination of student achievement.

Keywords student achievement, educational quality, teaching quality, teacher effectiveness, school effectiveness, socio-economic status

Introduction

The strategic framework for European cooperation in education and training ("ET 2020") has four main objectives, of equal importance, for all the levels of education and training (Council of the European Union, 2009): (1) ensuring lifelong learning and mobility, (2) improving quality and efficiency, (3) promoting equity, social cohesion and active citizenship, and (4) enhancing creativity and innovation; so it is an obvious tendency in the European Union educational policy that an equity-based approach is becoming prominent – that is, among the functions of the educational system and schools, social mobility is becoming more and more highlighted, together with the enhancement and strengthening of equal opportunities in persons' access to education.

Teachers who are professionally, financially and socially acknowledged, who work in optimal circumstances and in a constructive atmosphere, and who are satisfied with their jobs, are able to contribute much more to a strengthening of students' competency than those who are not. The existence of factors influencing educational effectiveness in a positive way should be expected even more in those schools where a majority of children with low socio-economic status are being taught. This is why it is important to get an overview and summary of the factors that may determine the quality of educational activity in schools, and, via this, student achievement. In our study, we shall first give a short introduction to the connections between educational quality, effectiveness and equity, and we shall then explore the context of student achievement in schools; finally, we examine the most important parameters determining student and school achievement.

Educational quality: effectiveness, efficiency, equity

In the international literature the notion of quality, effectiveness, efficiency and equity are closely connectedⁱⁱ; thus, quality education can only be interpreted if education simultaneously fulfils the criteria of effectiveness, efficiency and equity (Lannert, 2004). This also means that we can only talk about quality teaching activities if they at the same time represent effectiveness, efficiency and equity. These notions, however, can be approached with several perspectives, which leads to the notional framework being extremely broad and varied. There is currently still no obvious professional consensus as regards the notion of *educational effectiveness*; nevertheless, it usually signifies the relationship between results and educational aims – that is, exploration and utilisation of the factors leading to the enhancement of educational performance as well as the mechanisms fostering performance enhancement (Horn & Sinka, 2006). *Educational efficiency* means the achievement of educational performance with the smallest possible investment, or its maximisation with the given investments (Báthory & Falus, 1997).

Equity education can be approached in two ways. The first is fairness, which means the creation of an educational environment where personal or socio-economic circumstances (e.g. sex, ethnic or family background) do not represent an obstacle to someone's attaining educational success. Second is inclusion, which makes the formulation and development of the individual abilities and skills necessary for social inclusion (e.g. reading, writing, arithmetic) available to everybody. These two dimensions are closely linked: as managing and turning around a lack of success at school helps to combat the effects caused by social deprivation that are responsible for school failure (Field, Kuczera & Pont, 2007).ⁱⁱⁱ Equity in education has its returns, however, since in the best-performing educational systems high educational performance and equity go hand in hand (OECD, 2012).

Consequently, quality and educational effectiveness are closely linked to student achievement and to what limits there are on opportunities for disadvantaged students as well as to the socio-economic and socio-cultural background of students and schools. This means that the school and the family fundamentally influence the achievement of students, teachers, schools, and the educational system as a whole.

The context of student achievement at school

The majority of empirical research dealing with the quality of education measures achievement in relation to students' performances in their studies and to test results – which are, of course, the most frequent indicators of the effectiveness and quality of the teachers and of the school.^{iv}

Currently, the most frequent method for measuring teacher quality and school achievement is the value-added model (VAM). Besides noting the difference between a student's performance between two given points in time, the model also takes into account the socio-economic status (SES) of the individual and the school, together with their respective compositions; that is, it tries to filter out those factors that cannot be influenced by the school. In educational achievement tests the resultant outcome can also be termed 'added value'. There is a broad consensus in the literature that any measurement of teacher and school achievement cannot be limited to merely student performance, especially if the appraisal having this as its basis will have specific consequences. Furthermore, it is also widely believed that the application of student results as a means of appraisal is far more relevant in an evaluation of schoolwork as a whole than it is for the individual appraisal of teachers (OECD, 2013).

The much-debated Coleman report found the effect of school background and school parameters on student achievement to be negligible; yet it did highlight the significant effect of family and social background factors (Coleman et al, 1966). Since then, ever more research has proved that school achievement is context-dependent to a great extent - that is, students' performance is determined not just by their family and social background but also by the school's atmosphere and the educational environment of the school (Lannert, 2006a). The results of international surveys measuring student performance clearly indicate that in the majority of countries – and especially in Hungary – factors affecting achievement are primarily parental background and the social and cultural environment of the family.^v In addition, in most countries the socio-cultural background of the school as a whole will have a deeper effect on students' results than the individual socio-cultural background of individual students; and this is especially characteristic of the Hungarian educational system, where any 'performance-scattering' or unevenness of performance emanating from differences between individual schools is greater than what we see in the OECD average (Balázs et al, 2010; OECD, 2010a).

Research on cognitive and social skills and abilities highlight the fact that while a certain proportion of students do develop continuously, a quarter or third of students practically stop improving in abilities from the 4–6th forms. From here onwards, though, developmental differences existing between students not only stop declining – they show a continuous and clear increase. This means that the level of school entry serves to determine later opportunities for further education for the majority of students (Nagy, 2008); and this is even truer for underprivileged children, since empirical research data proves that children coming from an unfavourable socio-economic background are at a disadvantage already upon entering school – and

these disadvantages prevail for the whole period of their schooling and also show further increases (Havas, 2008). Given this, we can say that schools and teachers have an extremely important role to play in the enhancing of 'added value'.

There are at the moment two significantly different approaches to measuring teachers' performances and the effect of their work on student performance in the relevant literature: (1) measuring teacher achievement regardless of individual teacher parameters, and (2) an examination of the connection between the different teacher parameters and students' performances – the latter of which cannot necessarily be interpreted as indicating a causal effect (Hermann, 2010). In the next part of the paper we will introduce the teacher qualities and the parameters of teachers' work that need to be taken into account when one is measuring student and school achievement, both quantitatively and qualitatively.

Factors influencing student and school achievement

There are several factors affecting student or school achievement, at the level of students (e.g. gender, place of living, family background, attitudes to learning, motivation, network of connections), of schools (infrastructure, location, size of school, atmosphere, number and composition of students), and also regarding the 'level' of teachers (e.g. professional training, attitudes to teaching, motivations, cooperation); and these all clearly show that certain parameters of educational achievement *can* be influenced by educational policy, while others cannot.

It is acknowledged as obvious that teachers are of major importance in the creating of a quality and successful education, the development of students and in student achievement at school (Barber & Mourshed, 2007; OECD, 2005, 2010b). The first McKinsey report clearly concludes that (1) the educational system is only as good as the teachers constituting it are; (2) successful learning cannot be imagined without quality teaching; (3) for an excellent performance the success of every child is a prerequisite (Barber & Mourshed, 2007). Thus, if we include student development and school achievement among the factors that can be influenced by educational policy, we can say that the quality of teachers and the provision of equal opportunities are the most determining factors.

Researchers usually agree that the parameters describing teachers' quality can be divided into two major groups (Santiago, 2002, p. 81):

1. *Parameters that can be observed and measured empirically, among which the factors most examined are:*

- a.) Teacher Education and Subject-Matter Knowledge
- b.) Teacher Certification Status
- c.) Academic Tested Ability
- d.) Teaching Experience
- e.) Degree of in-service training

2. *Parameters that cannot be observed and measured empirically, or only indirectly and with difficulty are:*

- f.) Verbal Ability, Clarity
- g.) Communication skills
- h.) Teamwork skills
- i.) Classroom skills
- j.) Motivation to work with students
- k.) Commitment to students' success
- l.) Flexibility
- m.) Creativity
- n.) Task-oriented behaviour
- o.) Vision of purposes of instruction

Research carried out up to now is more cautious when looking at the connections between factors that can be more easily measured empirically and teachers' effectiveness as measured via student achievement. Among teacher parameters, the majority of examinations focused on analysing the effects of factors that can be measured more easily – i.e. time spent teaching, level of training etc. Research done to assess

teaching experience unanimously shows that beginner teachers have a significantly lower level of achievement; though, later, the effect of the amount of time spent in the profession becomes insignificant (Hanushek et al, 2005; Rockoff, 2004; Slater, Davies & Burgess, 2009). Assessments of the specific effects of training are much more contradictory – so some analyses see a major effect, while others do not show any correlation between teachers` qualifications and their students` achievements (e.g. Darling-Hammond, 1999; Darling-Hammond et al, 2005; Gamoran & Long, 2006; Hanushek et al, 2005; Slater, Davies & Burgess, 2009; Wenglinsky, 2000).

The other important factor playing a part in the quality of teachers` performance is the learning-teaching environment, which can be approached in two ways (Santiago, 2002, p. 81):

1. Teaching Technology
 - a. *Teaching and Learning Practices*: Interaction between Teachers and Students; Materials and Resources used in the Classroom (e.g., ICT); The Nature of Learning Tasks Done by students.
 - b. *Academic Standards and Assessment Practices*: Curriculum content and graduation requirements; Methods for Assessing Student Progress (e.g., Tests, homework)
 - c. *Class Size and Teaching Loads*.
2. School Environment
 - d. *Partnerships*: Parental and Community Involvement
 - e. *Peer Effects*
 - f. *Internal Organisation of Schools, Leadership, Academic Norms*
 - g. *Safety*
 - h. *Quality of facilities*

The above indicates that the quality of teaching, learning achievement and teacher quality all have within them complex, closely related micro- and macro level elements of observable qualities, also elements that cannot be or can only indirectly be observed; while there are additionally factors making up the teaching environment (teaching technology, school environment).

The notable role of teacher quality is emphasised via a number of research results, and we can see that other school activity parameters – like financial conditions, the number of students per class, school structure or equipment – hardly have any detectable effect (Hanushek, 1992; Hanushek et al., 2005; Rivkin, Hanushek & Kain, 2005; Rockoff, 2004; Woessmann & West, 2002). Thus, the existence of teaching technology and equipment in itself is no guarantee of quality education, i.e. such items will only have a favourable effect if the school employs quality teachers as well. Infrastructural parameters do not influence achievement directly, yet they do communicate the effect of other, non-observable factors – and they also determine existing opportunities and limitations quite well (Hanushek, Kain & Rivkin, 2004). From the point of view of student and school achievement, teachers` professional qualities and dedication are of the utmost importance, together with the applied teaching practices and methods; and these, in an optimal case, will be coupled with a knowledge of students` attitudes and motivations and the use of information technology (Darling-Hammond, 2006).

According to research data examining teaching practice indicators, student achievement can be linked to the characteristics of classroom practice. It is true, however, that this only explains a small part of any `achievement scattering`, a reason for which might be the fact that the indicators of classroom practice correlate with other, non-observed teacher characteristics (Bonesronning, 2004; Wenglinsky, 2002). Research data also indicates that students` cognitive and deductive abilities are developed much more effectively if teachers have a constructivist attitude as opposed to an immediate knowledge-transfer one (Kim, 2005).

Teachers` professional communities and cooperation between teachers also influence student achievement positively; furthermore, the existence of professional communities and cooperation reduces the size of the abyss between performances determined by ethnic and socio-economic status (Moller, 2013). Hungarian analyses focusing on successful schools indicate that although the success of schools is very much determined by the composition of students, it depends on the devotion, attitudes and activity of directors, other `heads` and teachers to the same degree (Horn, 2006; Lannert, 2006b). Besides this,

parents' connections with the school, their expectations of the school and their attitudes to learning are also factors weakening or strengthening educational achievement and the motivations and ambitions of students (Dearing, Kreider & Weiss, 2008).

Knowledge measured with the use of competence tests is important, however; and an even more important factor is the way this leads to gained knowledge, together with the learning environment and the climate of the school. The effect of school can be most deeply felt in classrooms through the teacher-student relationship. A good teacher-student relationship and the resulting social-relationship benefits will have a strong effect on learning achievement - and the less beneficial the student's family background is, the more intensive the effect here can be (Coleman, 1988; Pusztai, 2009). A positive school climate partly determined by a good teacher-student relationship also favourably influences learning performance (Cohen et al, 2009). The positive effect generated by the school's atmosphere is well illustrated by a Finnish survey carried out in the 2000s, according to which a great majority of teachers have already decided to become a teacher in their first few years of school, and the reasons the respondents gave is the creative and constructive milieu and the strong social esteem involved.^{vi}

The so-called Pygmalion effect is a phenomenon that is closely linked to school climate and the teacher-student relationship (Rosenthal & Jacobson, 1968). It stipulates that those students whose performance is favourably judged by the teacher will develop significantly more during the school term than those who are judged less favourably. Naturally, this does not necessarily happen directly, but indirectly; and it does not come about through verbal communication necessarily. Several international research papers have concluded that the future expectations of teachers towards students orientate pupils a great deal; and these positive or negative expectations are often coupled with the external aspects of students – such as gender, build, ethnicity or family background (Lannert, 2006a).

Summary

In conclusion, international research data underlines that teachers' quality has a significant effect on student performance; and there are also major differences in teachers' qualities. The other important conclusion is that differences in teachers' qualities are at least as big *within* a certain school as *between* schools (Hermann, 2010).

This may lead to uncertain results if we interpret the quality of teachers' work solely on the basis of measurable factors – though such measurable factors do provide educational policy with extremely useful information and feedback; and we cannot forget about the fact either that there could be significant quality differences between the actual work done by teachers who otherwise possess similar qualities (Rivkin, Hanushek & Kain, 2005).

Hungarian and international research have highlighted that there is no uniform indicator that might exactly measure teachers' performances, effectiveness and the quality of their work (see e.g. Darling-Hammond, 1999; Lannert-Nagy, 2006). This does *not* mean that teachers and the parameters of the teaching environment do not influence student achievement, though; it rather means that we cannot find a sole variable that would be able to have a notable effect just by itself, for only common development could lead to a positive change from the point of view of added pedagogical value (Vidákovich, 2008); so we need to examine factors connected with teachers' activities in their complexity, rather than just measuring individual indicators (Sági, 2006). This is even truer when we want to evaluate the achievements of schools that have a lower socio-economic status.

Consequently, it is not advisable to evaluate teaching activity at schools solely based on simple performance indicators, since personal qualities, financial, social and cultural relationships, society, educational policy and (last but not least) the actual school and the teachers' activities all contribute to quality pedagogical work and the development of students' knowledge, abilities and skills. This wide and complex interpretation network can be translated as a pedagogical culture that incorporates all the pedagogical factors that can be seen in a latent or manifest way through pedagogical work. In this respect, one part of pedagogical culture is – among other things – teacher training and pedagogical competences

transferred and gained via classroom teaching activity, the applied teaching-educational programmes and methods, motivations, ambitions and attitudes to teaching, and cooperation and relationships between the players in education.

In conclusion, in relation to the quality of teachers' activity only a more complex form of examination is likely to be able to produce the desired result: namely, one that mixes quantitative and qualitative research elements, and one that takes into account not only differences in individual student performances as measured between two points in time but also the socio-economic situation of the individual and the school, together with the latter's composition, classroom processes, the atmosphere of the school and the socio-economic context.

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ⁱⁱ See e.g. OECD-publications related to education.

ⁱⁱⁱ In Hungary, an underprivileged status is currently to be associated with certain family circumstances, social status and with parents' educational background. Social, economic and/or cultural disadvantages may be of two types: (1) an underprivileged child or student is one who is entitled to receive child protection benefits, (2) an underprivileged child or student is one entitled to receive child protection benefits and whose parent(s) – based on a voluntary declaration – had at most a primary school education, or who is being raised by foster parents. (1993. year LXXIX. law on public education 121. § point 14.– but new law will be in force from September 2013.)

^{iv} The effectiveness and quality of the teachers and of the school may naturally have other indicators too, e.g. further education, further school studies, teacher dropout, future wages.

^v The close connection between study results and the social situation of students is clearly supported by the data and results coming from international surveys (see: PISA: <http://www.oecd.org/pisa/pisaproducts/>, TIMSS and PIRLS: <http://timss.bc.edu/>)

^{vi} Based on the presentation of the counsellor of the Finnish Educational Directorate *Ritva Jakku-Sihvonen*, delivered at the conference organised by Finnagora, entitled "Teacher Training in Finland and Hungary" (the Finnish Embassy in Budapest, 16 October 2009)