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The impact of effective teaching characteristics in promoting student achievement in Ghana

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ABSTRACT

This paper investigates the extent to which teacher behaviour in classroom affects student achievement gains in mathematics in Ghana. A representative sample of primary schools from three districts of the Upper East Region of Ghana was selected (n = 73) using stage sampling procedure, and written tests in mathematics were administered to all grade six students at the beginning and end of school year 2013–2014. Two observation instruments and a student questionnaire were used in collecting data on quality of teaching. Multilevel analyses revealed that teacher factors are associated with student learning outcomes. Implications for promoting quality in education are drawn.

1. Introduction

During the last three decades international studies such as TIMSS and PISA published results on the performance of students in different learning outcomes for several countries around the world. These findings raised attention to both policy makers and the public since results were treated as indicators for the quality of education in each participating country. The media drew attention to the fact that some countries were found to perform less well than others and policy makers in these countries had to respond to criticisms about the effectiveness of their educational systems (Reynolds, 2006). Students in sub-Saharan Africa were found to perform less well than almost all the participating countries in these studies. This low student academic performance also emerged from evaluation studies conducted in this region and national assessments (Hungi et al., 2010; MOE, 2007, 2014; Moore et al., 2012).

In this context, policy makers in this region, and especially in Ghana where this study has been conducted, should search for ways of improving the quality of their educational system. To address this issue, policy makers may take into consideration the results of educational effectiveness studies which aim to address the question of what works in education and why. Effectiveness studies did not only reveal that teachers and schools matter but also showed that the classroom level is more important than the school level in terms of explaining the variance in student achievement gains (e.g., Kyriakides et al., 2000; Scheerens and Bosker, 1997). Moreover, effectiveness studies and meta-analyses revealed that a large proportion of the classroom level variance can be attributed to teacher behaviour in the classroom; namely what teachers do in the classroom and how they interact with their students rather than to teacher personal characteristics, such as their beliefs and values (Muijs et al., 2014). For example, teacher ability to effectively deal with student misbehaviour, or teacher ability in providing structuring tasks to create linkage between different lessons and/or parts of a lesson can be considered as some aspects of teacher in-class behaviour that promote student learning outcomes (Kyriakides et al., 2013; Seidel and Shavelson, 2007). In fact, without effective teacher guidance and instruction in the classroom, learning cannot be achieved.

Factors related with teacher in-class behaviour have often been realized as uni-dimensional constructs. Such realization however is not able to provide a complete understanding of how the functioning of these factors may affect student outcomes. Consequently, many recent studies have started to consider teacher factors as multidimensional constructs, taking into account both their qualitative and quantitative characteristics when examining their functioning. This way, researchers may not only come to more holistic inferences on what makes teachers and

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schools effective, but also assist the development of specific strategies for improving educational practice (Kyriakides and Creemers, 2008).

Despite however the progress made over these years in highlighting the role that teachers have in promoting student learning, little of this strand of research has been conducted in developing countries; particularly in sub-Saharan Africa (Riddell, 2008; Muijs et al., 2014). Studies in sub-Saharan African countries mentioned above (i.e., SACMEQ, NEA) are based on cross-sectional data and explore the impact of various student background factors on student achievement. While studies of this nature shed some light on the status of educational attainment in these countries and revealed the importance of taking actions to promote learning outcomes; their findings cannot help policy makers identify ways of improving student learning outcomes due to their cross-sectional design. On the contrary, studies that collect data in more than one time point may demonstrate factors that affect student progress over time. At the same time, findings of educational effectiveness research (EER) stressing the importance of improving teaching skills to promote learning outcomes (e.g., Antoniou and Kyriakides, 2013; Muijs et al., 2014) may be seen as not relevant for promoting learning in classrooms with much more difficult working conditions (e.g., class size in developing countries is almost twice as big as the class size in developed countries). Additionally, studies conducted in developing countries have mostly focused on factors relating to the economic aspects of education, such as the provision of resources (e.g., Botha and Herselman, 2015; Stols et al., 2015; Uduku, 2015) and teacher content knowledge (Pournara et al., 2015), with fewer studies being focused on teaching skills that promote quality of teaching (Carnoy et al., 2015). The economic approach followed in these studies focused on estimating the relationship between the provision of educational inputs and educational outputs, assuming that increased provision of inputs would lead to increased outputs (Kyriakides, 2005). In this context, the study reported here investigates the extent to which teacher in-class behaviour should also be examined more systematically and more focused in-service training courses should be promoted based on both the quantitative and qualitative characteristics of teacher behaviour. Thus, the aim of this study is to identify the extent to which teacher factors included in the dynamic model of educational effectiveness (Creemers and Kyriakides, 2008) are associated with student achievement gains in mathematics in Ghana.

2. The dynamic model of educational effectiveness

The dynamic model is multi-level in nature and refers to factors operating at four different levels: the student, classroom, school and educational system. The teaching and learning situation is emphasized, and the roles of the two main actors (i.e., teacher and student) are analyzed. Above these two levels, the model refers to school factors which are expected to influence teaching and learning by developing and evaluating school policy for teaching and policy for improving the school learning environment (SLE). At the highest level, the model refers to the influence of educational systems in developing and evaluating educational policy for teaching and learning. A major distinction of the model as compared to the integrated models developed in the 1990s (i.e., Creemers, 1994; Scheerens and Bosker, 1997; Stringfield and Slavin, 1992) is that a specific framework to measure the functioning of effectiveness factors is used. The model refers not only to how frequently each effectiveness factor is present in a class, school, or educational system, but also to *qualitative* characteristics of the functioning of each factor. Thus, each factor is defined and measured using five dimensions: *frequency, focus, stage, quality, and differentiation* (see Creemers and Kyriakides, 2015). Results of previous studies provide support to the construct validity of the five measurement dimensions of the effectiveness factors at the classroom level, supporting the notion that viewing them as unidimensional constructs is rather restricting (Kyriakides and Creemers, 2008). Studies in the field of teacher professional development have also demonstrated the practical use of measuring both the quantitative and qualitative characteristics of teacher behaviour, in terms of being able to implement more focused and effective teacher training courses based on each teacher's specific professional development needs (Antoniou and Kyriakides, 2011; Antoniou et al., 2015). These studies however have only been conducted in western countries. Research in developing countries may examine whether the five measurement dimensions proposed by the dynamic model can be used for measuring effectiveness factors in a diverse context, providing further support to their generic nature and a basis for teacher professional training in developing countries.

Since this study is concerned with the effect of teacher factors, some further information about these factors is provided below. At the classroom level, the model refers to eight factors found to be related to student achievement (e.g., Brophy and Good, 1986; Muijs et al., 2014). The eight factors are: orientation, structuring, questioning, teaching modeling, application, management of time, teacher role in making classroom a learning environment, and assessment. These eight factors do not refer only to one approach of teaching such as structured or direct teaching (Joyce et al., 2000) or to approaches associated with constructivism (Schoenfeld, 1998). An integrated approach in defining quality of teaching is adopted. For example, the dynamic model does not refer only to skills associated with direct teaching and mastery learning such as structuring and questioning but also to orientation and teaching modeling which are in line with theories of learning associated with constructivism (Brekelmans et al., 2000). Moreover, the different aspects of collaboration (i.e., teacher-student and student–student interactions) are included under the overarching factor concerning teacher's contribution to the establishment of the classroom learning environment. Table 1 presents the main elements of the teaching factors included in the model.

Longitudinal studies (e.g., Creemers and Kyriakides, 2009, 2010a, 2010b; Kyriakides and Creemers, 2008; Panayiotou et al., 2014) and meta-analyses (Kyriakides et al., 2010; Kyriakides et al., 2013) provided empirical support to the validity of the model but available data on the effects of these factors come from western countries. However, the transferability of models of school effectiveness generated from developed countries in another context is not straightforward. This is because factors determining educational effectiveness can be complex, interwoven and dependent on local context (Heneveld and Craig, 1996; Saunders, 2000). Schools in the industrialized and western countries share similar characteristics in terms of their context and therefore, the way results emanating from such countries apply in contexts that are different may be more complicated than assumed (Fleisch, 2007; Hopkins, 2002). More importantly, to be useful beyond the countries where they are initiated, studies offering policy guidance need to be based on a sound understanding of how far prevailing conditions are the same or different in other contexts (Saunders, 2000).

As a result of economic constraints in sub-Saharan African countries, the learning conditions in many schools are inadequate for education provision (Gauthier and Dembélé, 2004). Specifically, teaching and learning resources (e.g., classroom space, textbooks, usable blackboard, enough desk places), and particularly the quantity and quality of teaching are comparatively inadequate in these countries (Motivans et al., 2006). The Ghanaian educational environment therefore, which differs at a large extent in terms of school characteristics, quality and quantity of teaching, and