Description of the Collaborative Research Project

The Theoretical Framework

This project aims to develop a theoretical framework that can be used to provide answers to current debates on the improvement of learning outcomes and on specific issues concerned with educational policies in the participating countries such as the national policy on quality of teaching, policies on teacher initial training and professional development, and policy on the establishment of the learning environment of the schools. In this project we will also help participating countries to establish an evidence-based and theory-driven approach for designing reform policies. Specifically, the extent to which the dynamic model of educational effectiveness (Creemers & Kyriakides, 2008) can be used as a starting point for establishing such approach is investigated. A brief description of the dynamic model is provided below and main findings of studies testing the validity of the model are presented. This justifies our choice to use the dynamic model as a starting point to design this study.

An essential difference of the dynamic model with other theoretical models of effectiveness is concerned with its attempt to reflect the complex nature of educational effectiveness by:

- pointing out the importance of factors operating at different levels
- searching for grouping of factors within and between levels,
- using five dimensions to measure the functioning of each factor: frequency, stage, focus, quality and differentiation. (In this way both quantitative and qualitative characteristics of each factor are taken into account.)
- incorporating results of research into differential effectiveness
- taking into account the new goals of education. (This implies that the model is not restricted to explaining student outcomes in terms of basic skills, but also in terms of skills like reasoning, conceptual understanding, metacognitive and self-regulation. Additionally new theories of teaching and learning are used in order to specify factors at classroom and school level associated with these new learning outcomes.)

Regarding the student level factors, the model refers to the following two main categories of background factors which can influence the effectiveness of education: a) socio-cultural and economical background variables emerged from the sociological perspective of EER (e.g., SES, gender, ethnicity) and b) background variables emerged from the psychological perspective of EER (e.g., thinking style, subject motivation). In addition, variables related to specific learning tasks such as aptitude, opportunity to learn, and perseverance are also treated as significant student-level factors. Evidence showing that these variables affect learning has been provided (Scheerens & Bosker, 1997; Opdenakker & Van Damme, 2006).

The dynamic model also refers to eight factors which describe teachers' instructional role: orientation, structuring, questioning, teaching-modelling, applications, management of time, teacher role in making classroom a learning environment, and classroom assessment. These eight factors do not refer only to one approach of teaching such as the direct teaching model or the constructivist approach. An integrated approach in defining quality of teaching is adopted since we refer not only to teacher-guided instruction models like direct teaching and mastery learning but also to more student-guided teaching and learning models which are in line with new theories of teaching (Muijs & Reynolds, 2001).

The definition of the school level is based on the assumption that school factors are expected to influence classroom factors, especially the teaching practice. Therefore, the dynamic model refers to school factors which are related to the same key concepts of quantity of teaching, provision of learning opportunities, and quality of teaching which were used to define classroom-level factors. In particular, the following four overarching school factors are included in the model:

a. school policy for teaching and actions taken for improving teaching practice,
b. evaluation of school policy for teaching and of actions taken to improve teaching,
c. policy for creating a school learning environment (SLE) and actions taken for improving the SLE, and
d. evaluation of the SLE

Finally, the dynamic model refers to the most important factors operating at the system level that may affect achievement. Emphasis is given to the:

a. national policy and the actions taken to improve the quality of teaching and the SLE
b. evaluation of the national educational policy
c. wider educational environment of a country and especially its ability to increase opportunities for learning and develop positive values for learning.

Although this framework is more complex than the other models of effectiveness, it is based upon research evidence. Empirical support to the validity of the model has also been provided through a national study testing the effects of school and classroom level factors upon achievement of both cognitive and affective outcomes and through a quantitative synthesis of studies on school effectiveness conducted during the last two decades (Creemers & Kyriakides, 2008). These studies reveal that basic elements of the model are relevant to effectiveness in at least one country and also can provide the basis for an evidence-based and theory-driven approach to improvement of education (Kyriakides & Creemers, 2008). An international study may provide further support to the dynamic model and also investigate some further issues concerned with the effective functioning of education. The first issue is concerned with the extent to which factors of the dynamic model are associated with learning outcomes irrespective of the context whereas others have differential effects and are therefore

more relevant for policy making in specific socio-cultural contexts. Findings on this issue will show under which conditions a factor is associated with outcomes in some countries. Thus, the project will help policy makers understand the complexity of educational effectiveness and avoid a simplistic transplant of some factors which seem to be imported without any detailed knowledge of possible contextual factors that might explain how factors that work in one country may be ineffective in another country (Reynolds, 2006). The second issue regards the theoretical assumption of the dynamic model that the relation of some factors with achievement is non-linear. In order to test this assumption, a wide variation in the functioning of factors is needed and this variation is provided by collecting data from schools and classrooms in different countries. Thus, findings of this project may reveal non-linear relations of some factors with achievement and may help policy-makers and practitioners use these results for improvement purposes. Specifically, by finding non-linear relations of some factors with achievement, optimal points of their functioning can be identified and thereby different priorities for improvement may emerge in each country, school, and classroom. Third, only an international study may provide strong evidence about the effects of the system level factors and such study may also help us expand the system level further. By looking at the impact of overarching system factors, we will explore relations of these factors with student outcomes in different countries and search for impacts on the functioning of classroom and school level factors. Moreover, the study will produce information about system level factors operating in different countries, which can be used to develop the dynamic model at system further and formulate research questions on the impact of specific national policies on outcomes in different socio-cultural contexts. This is in line with arguments in the literature supporting the importance of re-designing comparative studies by drawing on theoretical frameworks that define precisely the significant variables in the process of education (Gustafsson & Rosen, 2006; Lassibille & Gomez, 2000).

Research design and methods

Given that it is impossible to conduct a randomised experimental study, a longitudinal design is used in all countries which help us draw credible conclusions about causal relations between factors and outcomes. Specifically, in each participating country (Belgium/Flanders, Cyprus, Germany, Greece, Ireland, Netherlands, Slovenia, and UK) we will draw a sample of at least 50 primary schools and administer tests in mathematics and science to all grade 4 students in September 2010. In most countries stratified sampling procedure will be used to select the 50 schools whereas a purposive sampling procedure will be used in countries where most schools are consisted of only one grade 4 classroom (e.g., the Netherlands). Tests on mathematics and science will be administered to the student sample when they will be at the

beginning and when they will be at the end of grade 4. For the construction of the tests, permission was obtained from IEA to use the released items of TIMSS 2007. The properties of each item and its relation with the curricula of grades 3 and 4 in each country will be taken into account for developing the two types of test in each subject. During the school year 2010-2011, data on the following factors will also be collected.

Regarding, the student level factors, we will restrict ourselves to prior-knowledge, SES, ethnicity and gender. These factors explain the majority of variance at student level and can be used to search for differential effects of classroom and school factors. Implications for policies on equal educational opportunities can be drawn. Moreover, all classroom and school level factors of the model will be measured. Concerning the classroom factors, we will adapt the student questionnaires which have been developed and tested in the study mentioned above. Similarly, the teacher questionnaire of this study will be adapted in order to measure the school factors.

For measuring the system level factors, a description of the actors at different layers of the system level in each country will be conducted. Based on this analysis, we will determine which actors have to be addressed in each country in order to get full information about the system factors operating in each country. Data on system level factors will be generated through not only a content analysis of policy documents but also by interviews and questionnaires to policy makers and other stakeholders and professionals. Furthermore, a questionnaire will be developed to measure the perceived impact of national policy on schools and will be administered to teachers and head teachers of the school sample in each country. In regard to the measurement of the wider educational environment, we will measure the perceptions of policy makers, teachers, and school leaders about what constitutes the wider educational environment and how this affects policy at national and school level. For this purpose, group interviews will be conducted. Taking into account the results which will emerge from the interviews, we will develop questionnaires that will be administered to policy makers, teachers, and head teachers investigating the functioning of factors associated with the wider educational environment in the country.

For the construction of the instruments mentioned above, the procedure of translation and back translation will be used. Further, attention will be given to the training of the research teams. Moreover, pilot studies will be conducted in each country in order to test the face and the construct validity of each instrument. As regards the analysis of qualitative data, the constant comparative method will be used in order to see whether consensus about the main elements of the wider educational environment and their ways of functioning can be established. Structural equation modelling techniques will be used to test the construct validity of the instruments which will be developed.

Multilevel modelling techniques (Goldstein, 2003; Snijders & Bosker, 1999) will be used to analyse the data. Within-country analyses will be conducted in order to identify the extent to which each classroom- and school-level factor is associated with achievement in each outcome. Moreover, across-countries analysis will help us identify the importance of context level factors and reveal both generic and differential factors operating at different levels. Furthermore, we will search for differential impact of factors for different groups of students in order to provide suggestions on how education addresses the diversity in the society. Finally, the impact of factors in relation to equity (e.g., reducing the gap between achievement of different groups) will be examined.

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