



Erasmus+

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Drawing Implications of Findings for Policy and Practice

A) The theoretical framework of the project

Schools are expected to deliver consistently high results in different domains of learning and subject areas. However, international evaluation studies reveal that in Europe approximately 20 per cent of students are not equipped with basic skills in mathematics. While the latest PISA study revealed that 22 per cent of European students were low achievers in mathematics, it also revealed that a 15-year-old student from a relatively disadvantaged home is 2.37 times more likely to be a poor performer (obtaining a score below the level 2 that measures basic skills in mathematics) than a student from an affluent family (see OECD 2012). PISA also reports that 40 per cent of the variation in student performance in mathematics is found between schools within a country and implies that there are significant differences in the performance of students attending different schools. Therefore school-based interventions aiming to improve the quality of education are needed. Research also shows that interventions supporting primary school children who are at risk have stronger effects than those addressing students at secondary school level. Indeed, a synthesis of various effectiveness programmes aiming to improve the attainment of primary students with low basic skills reveals that *whole school* interventions are more effective in this regard (Creemers and Kyriakides 2012).

In this context, our PROMQE study aimed to support primary schools' use of an evidence-based and theory-driven approach to help pupils achieve basic skills in mathematics. This approach draws on a theoretical model which provides a dynamic perspective on the functioning and effects of education and refers to factors operating at different levels (i.e., student, classroom, school and context) that need to be addressed to promote quality in education. Various national and international studies (including a European study) have provided empirical support for the validity of the model and show that the factors of the model are associated with student achievement gains in terms of different learning outcomes. Creemers and Kyriakides (2015) provide a review of the studies and meta-analyses conducted to test the validity of the model. Drawing on this research, therefore, our study aimed to support schools in socially disadvantaged areas to develop their own strategies and actions by using the *Dynamic Approach to School Improvement (DASI)* (Creemers and Kyriakides 2012) and adapting it to the specific context and problems they face. The next part of this section provides an overview of this approach, which highlights the importance of a close working relationship between the target schools and the Advisory and Research team (A&R Team) to:

- i. Collect data on the functioning of school factors and identify improvement priorities:* The A&R Team provides support for schools to help them establish/reinforce school self-evaluation (SSE) mechanisms. School stakeholders discuss the findings of SSE and decide whether their action plans address one or more targeted priorities concerning the factors included in the theoretical framework.
- ii. Design school improvement strategies and action plans by considering research on promoting quality and equity in education:* Schools (in collaboration with the A&R Team) make use of the literature on the factors that are to be addressed and then develop their strategies and action plans.
- iii. Monitor the implementation of the improvement project by establishing formative evaluation mechanisms:* As a result of establishing formative evaluation mechanisms and collecting data, school stakeholders can identify ways to improve their action plans. Thus decisions can then be made as to how to make modifications, taking into account the needs of those involved in each task and their implementation skills.

- iv. *Measure the impact of this approach:* Finally, school stakeholders and the A&R Team evaluate the impact of the implementation of these strategies/actions and identify under which conditions the use of an evidence-based and theory-driven approach can reduce the number of low-achieving students.

Given that children in socially disadvantaged areas are more likely to have low basic skills, the study investigated not only the impact of the intervention on promoting student learning outcomes (quality), but also searched for the extent to which schools and teachers have managed to reduce the gaps in schooling outcomes among students with differences in their background characteristics that are unlikely to change, such as the socioeconomic status (SES), gender and ethnicity (equity).

The dynamic approach to school improvement: An overview

A) The dynamic model of educational effectiveness: Rationale

The DASI has its own theoretical framework which is briefly described below. Specifically, the rationale of the *dynamic model of educational effectiveness* (Creemers and Kyriakides 2008) is outlined and factors operating at the school level found to be associated with student learning outcomes are described in this section. The major steps of DASI are also presented in the next part of this section.

It is first of all important to note that the dynamic model is multilevel in nature (see Figure 1), which means that it addresses factors associated with student learning operating at different levels (student, classroom, school and system). Critically, the model was carefully designed in a such way that it supports policy-makers and practitioners in improving educational practice by taking rational decisions concerning the optimal ‘fit’ of the factors with the present situation in the schools or educational systems (Sammons 2009; Scheerens 2013). Furthermore, the dynamic model can be a useful tool in helping school stakeholders (school leaders, teachers, parents and students) to realise that they can actively contribute to the promotion of positive student learning outcomes. It therefore has implications for school leaders, teachers and parents as they endeavour to improve the school, classroom and home learning environments. It is also based on the assumption that the ultimate aim of any school reform effort must result in an improvement in student learning.

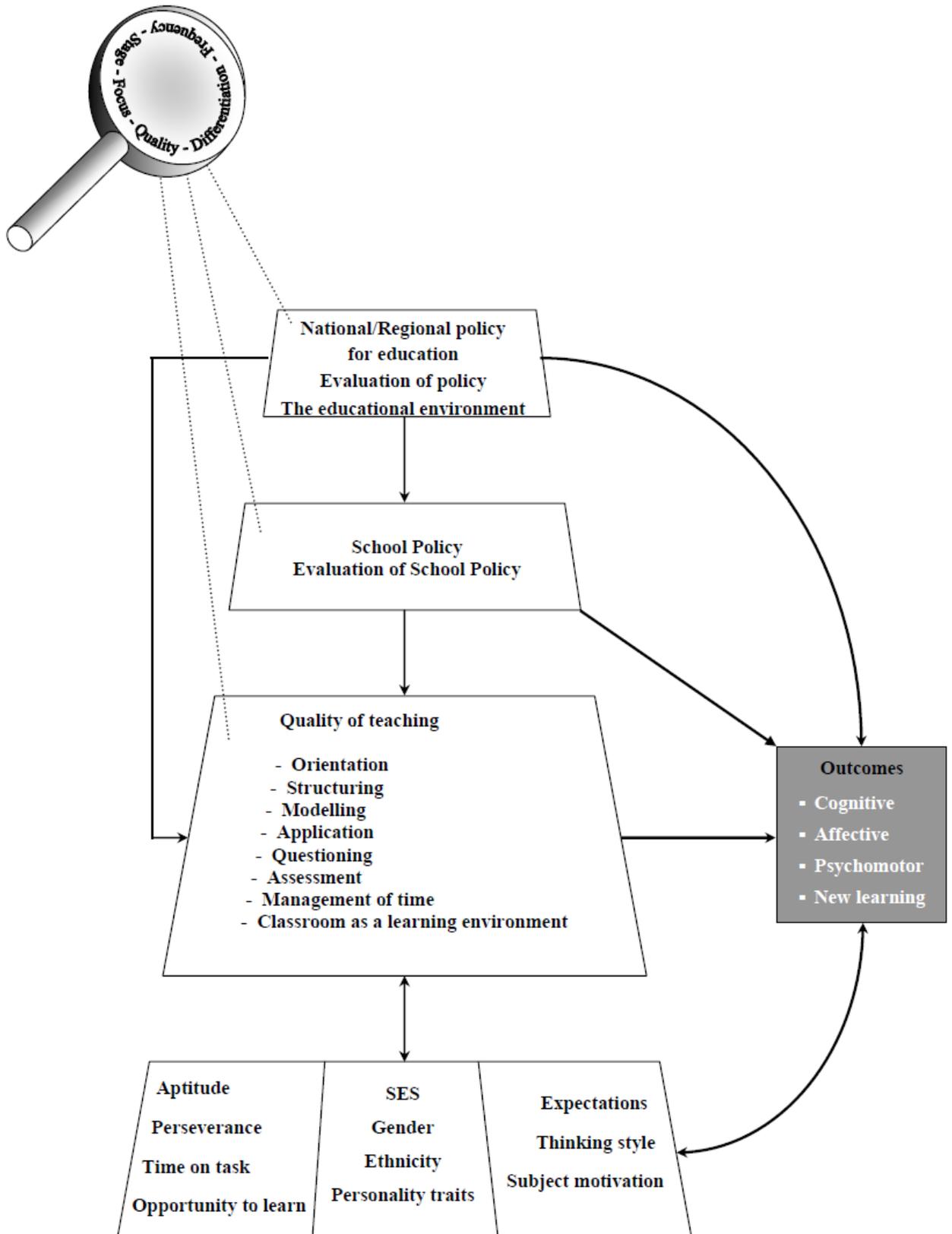


Figure 1. The dynamic model of educational effectiveness

The model introduces a specific *framework for measuring the functioning of factors*. Specifically, five measurement dimensions (see Figure 1) are taken into account: *frequency*, *focus*, *stage*, *quality* and *differentiation*. *Frequency* is a quantitative way of measuring the functioning of each effectiveness factor (which we know from previous research helps to improve student learning), whereas the other four dimensions examine qualitative characteristics of the functioning of the factors and describe the complex nature of educational effectiveness. In the next paragraphs we explain briefly how each dimension is used to measure the effect of a factor on student achievement.

The *frequency* dimension refers to the extent, in quantitative terms, to which an activity associated with an effectiveness factor is present in a system, school or classroom. This is probably the easiest way to measure the effect of a factor on student achievement.

The factors are also measured by taking into account the *focus* of the activities associated with a factor. For example, in the case of school policy on parental involvement, the policy could either be *specific* in terms of concrete activities that are expected to take place (e.g., it refers to specific hours that parents can visit the school) or more general (e.g., it informs parents that their presence is welcome in the school but without giving them specific information about what, how and when). Moreover, an activity may be expected to achieve a *single or multiple purposes*. In the case of school policy on parental involvement, the activities might be restricted to a single purpose (e.g., parents visit the school to get information about student progress). On the other hand, the activities might aim to fulfil more than one purpose (e.g., parents visit the school to exchange information about children's progress and to assist teachers within and outside the classroom). A *balance* between specific and general tasks should exist. For example, guidelines on parental involvement, which are very general, may not be helpful either for parents or teachers in establishing good relations to support student learning. On the other hand, a school policy which is very specific in defining activities may restrict the productive involvement of teachers and parents, preventing them from creating their own ways of implementing the school policy. Similarly, if all the activities are expected to achieve a single purpose, then the likelihood of success is high, but the effect of the factor might be small due to the fact that other purposes are not achieved and synergy may not exist (Scheerens 2013; Slater and Teddlie 1992). On the other

hand, if all the activities are expected to achieve multiple purposes, there is a danger that specific purposes are not addressed in such a way that they can be implemented successfully.

In addition, the activities associated with a factor can be measured by taking into account the *stage* at which they take place. We know from other research that the factors need to take place over a long period of time to ensure that they have a continuous direct or indirect effect on student learning (Creemers 1994; Slater and Teddlie 1992). For example, school policy on student absenteeism is expected to be implemented throughout the year and not only through specific regulations announced at a specific point in time (e.g., only at the beginning of the school year). It is also expected that the continuity will be achieved when the school is flexible about redefining its own policy and adapting the activities related to the factor by taking into account the results of its own self-evaluation mechanism (Kyriakides and Campbell 2004; Visscher and Coe 2002).

The *quality* dimension can be determined in two different ways. The first one refers to the properties of the specific factor itself, as these are discussed in the literature. For instance, school policy on assessment can be measured by looking at the mechanisms which have been developed in order to establish instruments which meet psychometric standards (e.g., valid, reliable, representative of the content taught). At the same time, this policy should ensure that teachers are expected to make use of the information gathered from assessment in order to meet their student's needs. In this way, the school policy is expected to place more emphasis on the formative function of assessment (Christoforidou, Kyriakides, Antoniou, and Creemers 2014).

Finally, *differentiation* refers to the extent to which activities associated with a factor are implemented in the same way for all the subjects involved. The importance of treating differentiation as a separate dimension of measuring effectiveness factors arises from the fact that students of any age and in any culture will differ from one another in various intellectual and psychomotor skills, in both generalised and specialised prior knowledge, in interests and motives, in their socioeconomic background, and in personal styles of thinking and working when learning (Dowson and McInerney 2003). Thus adaptation to the specific needs of each subject or group of subjects will increase the successful implementation of a factor and will ultimately maximise its effect on student learning outcomes. Headteachers are also expected to adapt their leadership to the specific needs of the teachers

and other school stakeholders (e.g., parents, pupils) by taking into account the extent to which they are ready to implement a task. For example, information communicated to parents (e.g., letters informing them about the school's policy, regulations, excursions, activities etc.) should be made available in different ways, for example, written communications in their mother tongue, telephone calls or messages, and email. The differentiation dimension does not imply that the subjects are not expected to achieve the same purposes. On the contrary, adapting the policy to the special needs of each group of schools, teachers or students may ensure that all of them will become able to achieve the same purposes (Kyriakides 2007).

In the next part of this section, we will discuss further the school-level factors and explain the way that they affect student achievement. Since one of the main aims of this study was to reduce the gaps in schooling outcomes between students with differences in their background characteristics (promoting equity), which implies that personal or socioeconomic characteristics should not be obstacles to success in education, here it is stressed that some student factors, such as student motivation and expectations, are likely to change so the school management team and the teachers should take targeted actions to improve motivation and expectation. This can also be done indirectly by providing relevant guidance and support for students and parents. Other student factors are unlikely to change (e.g., SES, ethnicity, gender) but schools should be aware of how these factors affect learning in order to adapt their policy to the special needs of students coming from different backgrounds. In addition, they should help parents and students to improve their home learning environment, especially those coming from a low SES background.

B) School factors: Promoting quality and equity by taking actions to improve school policy on teaching and the learning environment

The dynamic model is based on the assumption that factors at the school level should influence classroom-level factors, particularly teaching practice. Since learning takes place both inside and outside the classroom, the model emphasises not only how to improve *teaching*, but also the *school learning environment (SLE)*. As a consequence, the model refers to: a) the school policy on teaching, and b) the school policy on creating a learning environment at school. Based on the assumption that the

essence of a successful organisation in the modern world is the search for improvement (Hopkins 2001), the processes and the activities which take place in the school in order to improve the teaching practice and the SLE are also examined. For this reason, the processes which are used to evaluate the school policy for teaching and the SLE are investigated. Thus the following four factors at the school level are included in the model (see Figure 2):

- a) *School policy on teaching and actions taken for improving teaching practice;*
- b) *Policy on creating the SLE and actions taken for improving the SLE;*
- c) *Evaluation of school policy on teaching and of actions taken to improve teaching;*
- d) *Evaluation of the SLE.*

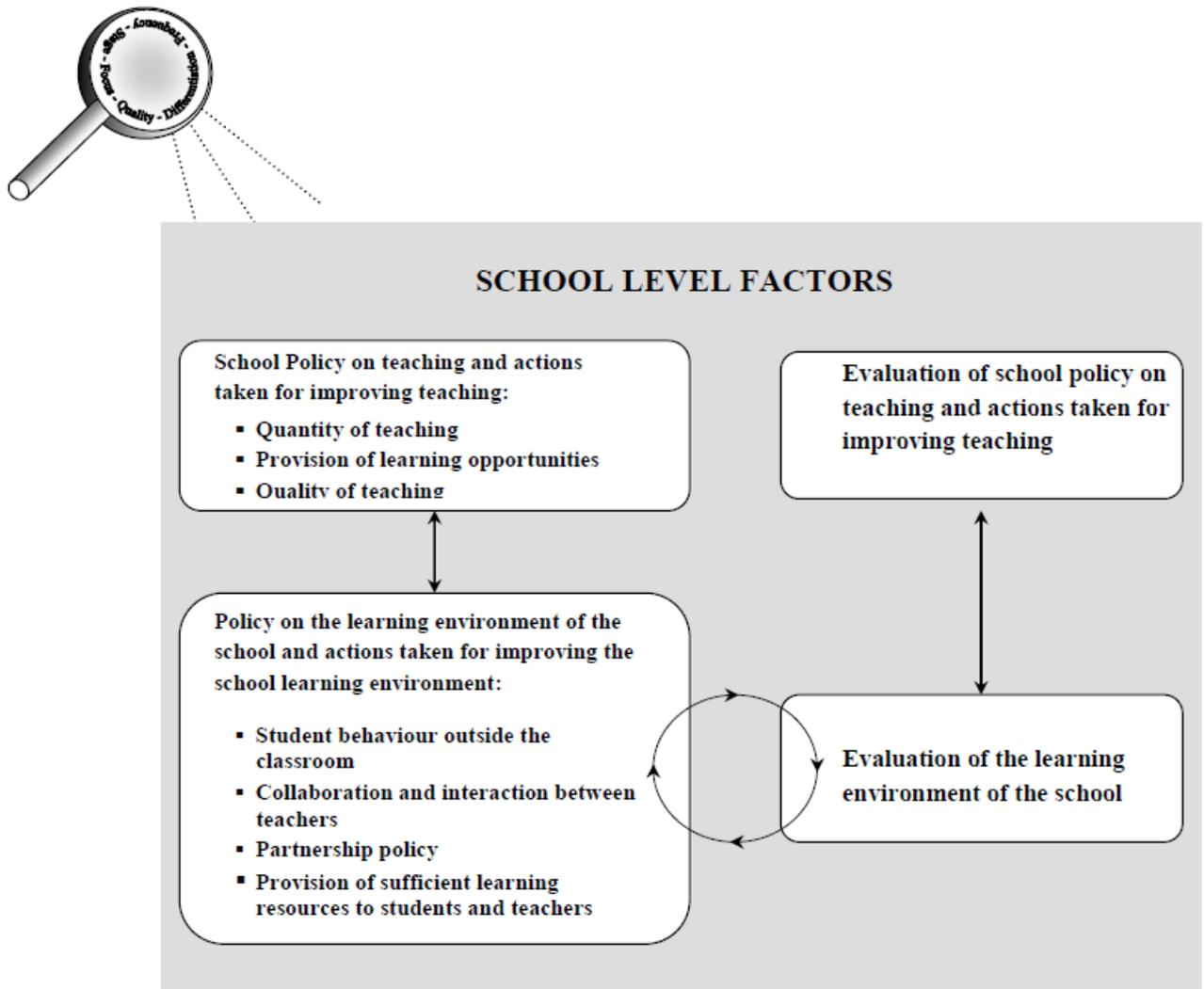


Figure 2. Factors of the dynamic model operating at the school level

It is important to note that school policy on teaching does not refer to one particular policy necessarily, but to the collection of school policies that focus on particular subjects and/or pedagogical practices in the school. In order to explain concisely how and under what conditions school policy may have an impact on student achievement, we present a framework (Kyriakides, Creemers, Antoniou, Demetriou, and Charalambous 2015) containing the main assumptions of this impact (see Figure 3). The first assumption, which is supported by various effectiveness studies (see Reynolds et al. 2014) posits that there are many factors associated with student achievement, which operate at four different levels: the student, classroom, school and system levels. Secondly, the framework places emphasis on the school policy and actions taken to improve both teaching and SLE. Thirdly, the framework assumes that the impact of school policy depends on the extent to which stakeholders implement the policy guidelines. This is based on research suggesting that viewing implementation failure as a result of poor policy clarity neglects the complexity of human sense-making processes consequential on implementation (Spillane 2005). For example, a school may develop a clear policy on partnership, which includes the involvement of parents in teaching. However, not all teachers may be persuaded to implement this policy, especially if they believe that parental involvement may jeopardise their professional autonomy. This implies that stakeholders' actions may have a direct impact on improving the SLE and teaching practice, whereas school policy may have an indirect impact by changing stakeholders' actions.

School introducing a policy should:

- 1) Make clear what is expected to be done
- 2) Take into account stakeholders' skills
- 3) Provide support

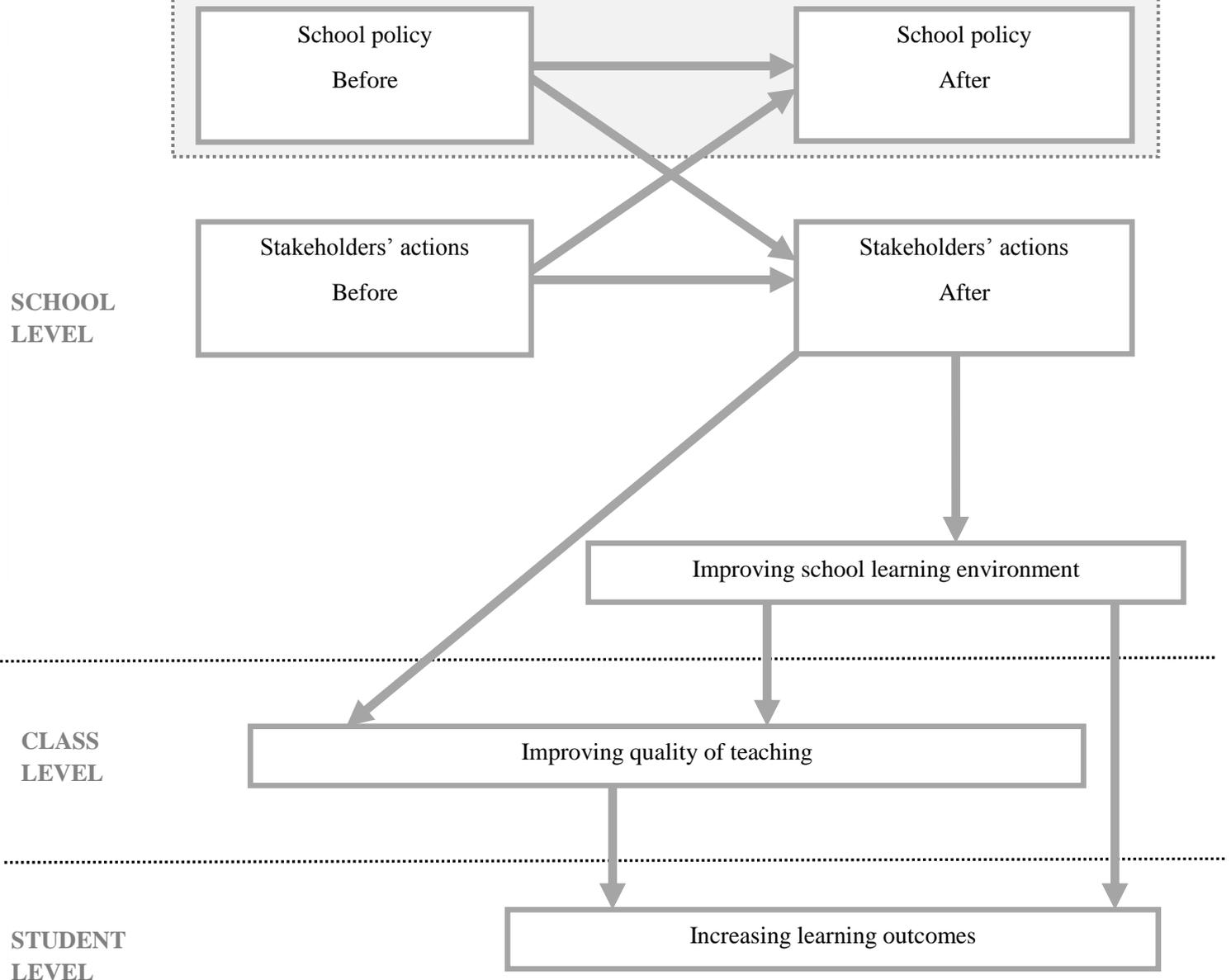


Figure 3. A theoretical framework investigating the impact of school policy on teaching and school policy on SLE on student learning outcomes

Fourthly, it is assumed that there is a reciprocal relationship between school policy and school stakeholders' actions. Changes in school policy may have an impact on changing the actions of school stakeholders: at the same time, it is also possible that the stakeholders' actions may influence school policies by stressing the need to change the policy or policies in order to address current stakeholders' needs. To illustrate this reciprocal relationship, consider student absenteeism. A new school leadership team appointed in a school with student absenteeism problems may develop a policy on student absenteeism to ensure that it is minimised. This move indicates the direct impact that a change in policy may have on changing stakeholders' actions. By contrast, in schools where the great majority of students regularly attend school, there is no need to develop such a policy. This illustrates the effect of the stakeholders' actions on setting or changing school policies.

Finally, the framework assumes that school policy has a situational effect on student achievement, implying that its impact may vary depending on the current situation of the school under investigation. This situational character of school policy suggests that, in developing the school policy, school leaders should take into account the *abilities and readiness* of those who are expected to implement it. For example, take a school that originally had no minority ethnic students from a particular country and teachers had to teach a geography lessons on that country mainly by using secondary sources of information (e.g., books, the Internet). When students from that country join the student population, the school could, for example, invite the parents of these students to talk about their country.

Three elements of school policy are therefore considered. Firstly, it is expected that school policy should *clarify the role of all stakeholders* in improving learning. When the school policy is clear, the stakeholders are more likely to consider its recommendations and decide whether it is worth making the effort to change their actions. Guidelines are seen as one of the main indications of school policy. In using the term 'guidelines', the dynamic model refers to a range of documents (see Creemers and Kyriakides 2008). These include staff meeting minutes, announcements and action plans and make the policy of the school more concrete for school stakeholders. However, this factor does not imply that each school should simply develop formal documents to institute policy. The factors concerned with the school policy mainly refer to the *actions* taken by the school to help teachers and other stakeholders

have a *clear understanding* of what is expected of them. Secondly, the framework assumes that in introducing a school policy, the *skills and the willingness of school stakeholders* should be taken into account. If a certain policy expects stakeholders to undertake roles they do not have the skills to perform or to which they are strongly opposed, it is unlikely that the policy will be implemented effectively. The third element of school policy is concerned with the *support* that the school management team should provide for stakeholders to help them change their actions. Introducing a policy on teaching and/or the SLE that addresses these three elements is likely to influence stakeholders' actions. The elements of the school factors are presented in detail below to clarify the concepts upon which school stakeholders' actions should be based.

School policy on teaching and actions taken to improve teaching

Meta-analyses of factors associated with student achievement show that concepts such as teaching quality, time on task and opportunity to learn are key factors that explain variation in student outcomes (Hattie 2009; Scheerens, Seidel, Witziers, Hendriks, and Doornekamp 2005; Kyriakides, Creemers, Antoniou, and Demetriou 2010). Recent theoretical models of EER (e.g., Scheerens 2013; Reynolds et al. 2014) include factors related to these key concepts at all of the different levels (i.e., student, classroom, school and system). In this context, the definition of the dynamic model at the classroom level refers to factors related to the key concepts of *quality, time on task, and opportunity to learn*. Therefore the model attempts to investigate aspects of school policy on teaching associated with a) the quantity of teaching, b) provision of learning opportunities, and c) quality of teaching. Actions taken to improve the above three aspects of teaching, such as the provision of support for teachers to improve their teaching skills, are also taken into account.

1) *Policy on quantity of teaching*. The following aspects of school policy on quantity of teaching are taken into account:

- School policy on the management of teaching time (e.g., lessons start on time and finish on time; lessons are not interrupted for staff meetings and/or for preparation of school festivals and other events);
- Policy on student and teacher absenteeism;

- Policy on homework;
 - Policy on lesson scheduling and timetable.
- 2) *Policy on provision of learning opportunities.* School policy on provision of learning opportunities is measured by looking at the extent to which the school has a mission concerning the provision of learning opportunities beyond those included in the formal curriculum. Therefore school policy on long-term and short-term planning as well as provision of support for students with special needs is examined. Furthermore, the extent to which the school attempts to make good use of school trips and other extra-curricular activities for teaching/learning purposes is investigated.
- 3) *Policy on quality of teaching.* School leaders are expected to encourage teachers to discuss, what they consider to be the characteristics of effective teaching. By drawing on teachers' views and on the literature on effective teaching, guidelines on effective teacher behaviour in the classroom are expected to be produced, resulting in a school policy on teaching. The school management team should also identify ways to support teachers to improve their teaching skills accordingly.

Therefore an examination of school policy on teaching reveals that effective schools take decisions about maximising the use of teaching time and the learning opportunities offered to their students. In addition, effective schools support their teachers in their attempt to help students learn by using effective teaching practices (Hallinger and Heck 2011; Heck and Moriyama 2010). In this context, the definition of this factor implies that the school management team strives to ensure that:

- i. Appropriate and adequate teaching time is provided for students.
- ii. Students are provided with learning opportunities beyond those offered by the official curriculum.
- iii. Teachers take actions to improve the quality of their teaching

School policy on creating the SLE and actions taken to improve the SLE

Since learning does not only take place inside classrooms, we also need to explore the impact of the school policy on improving the SLE. Over the past four decades, the work on the SLE has rapidly

expanded to cover issues such as interpersonal relationships between the school personnel and the management team, as well as the support provided for students (e.g., Lüftenegger et al. 2012; Mainhard, Brekelmans, and Wubbels 2011). From this array of elements, we focus here on policy initiatives only if they aim to improve stakeholders' learning, and through that student learning. This is accomplished by focusing on the following four aspects of school policy on improving SLE, which have been systematically found to be associated with student learning outcomes:

- 1) *Student behaviour outside the classroom;*
- 2) *Collaboration and interaction between teachers;*
- 3) *Partnership policy (i.e., relations of school with community, parents, and advisors);*
- 4) *Provision of sufficient learning resources for students and teachers.*

The first three aspects refer to the practices which the school has developed to establish a learning environment inside and outside the classroom. Here the term *learning* does not refer exclusively to student learning. For example, collaboration and interaction between teachers may contribute to their professional development (i.e., learning of teachers) and may also have an effect on teaching practice, with the possibility of improving student learning (Goddard, Goddard, and Tschannen-Moran 2007). Similarly, by involving parents in the functioning of schools and also providing them with opportunities for learning, the school facilitates learning on two fronts: through the classroom learning environment (e.g., when parents provide teachers with information regarding their children or bring human and other resources to the school) and the home learning environment (e.g., when parents are informed about how to support/supervise their children when doing their homework) (Fan and Chen 2001; Kyriakides 2005). The fourth aspect refers to the policy on providing resources for learning. The availability of learning resources in schools may not only have an effect on student learning, but may also encourage the learning of teachers (Hattie 2009). For example, the availability of computers and software for teaching geometry may contribute to teacher professional development as it encourages teachers to find ways to make good use of the software in their teaching.

Actions taken to improve the SLE beyond the establishment of policy guidelines are also taken into account. Specifically, such actions can be directed at changing the school rules and providing educational resources (e.g., teaching aids and educational assistance). For example, a school may have

a policy on promoting teacher professional development. However, this may not be enough, especially if some teachers do not consider professional development to be an important issue. In this case, actions may be taken to help teachers develop positive attitudes towards learning, which may help them become more effective (see Creemers and Kyriakides 2012).

School evaluation

The dynamic model also refers to the mechanisms used to evaluate school policy on teaching and the SLE. The following paragraphs aim to clarify how school evaluation is examined in terms of the five measurement dimensions of the dynamic model described above.

Frequency: Frequency is measured by exploring how many times during the school year (if at all) the school collects evaluative data concerning its own policies on teaching and the SLE. Emphasis is also given to the sources of data that are used. Previous research tells us that effective schools use various sources from which to collect evaluative data, and that these data are collected periodically during the school year, not just at the beginning and the end of the school year (Kyriakides et al. 2010; Reynolds et al. 2014; Scheerens 2013).

Focus: Evaluation and reflection on school policy may attempt to measure the properties of school policy (e.g., clear, concrete, in line with the research literature), its relevance to the problems which teachers and students have to face, and its impact on school practice and student outcomes. This dimension also considers whether each school evaluates not only the content of the policy on teaching and the actions taken to improve teaching practice, but also the knowledge/understanding and readiness of those who are expected to implement the policy. Moreover, the focus dimension is measured by looking at the extent to which information gathered from the evaluation is too specific or too general. Research on school self-evaluation reveals that data collected should not be too specific or place blame on any individual (e.g., Fitz-Gibbon 1996; Hopkins 2001; Visscher and Coe 2002) because such an approach serves the summative purpose of evaluation and does not help the school to take decisions on how to improve its policy. At the same time, information gathered from evaluation should not be too general but should be focused on how to influence decision-making. In particular, the process of

allocating responsibilities to school partners in order to introduce a plan for improving the effectiveness of their school is essential (Kyriakides and Campbell 2004; MacBeath 1999; Meuret and Morlaix 2003).

Stage: The stage dimension is examined by looking at the period in which evaluative data are collected. More effective schools are those who conduct evaluation regularly and systematically (i.e. not just at the end of school year); they establish evaluation mechanisms which operate on a continuous basis throughout the school year. More effective schools are also those that review their own methods and systems of reflection and evaluation adapting them in order to collect appropriate and useful data (Cousins and Earl 1992; Torres and Preskill 2001).

Quality: Quality is measured by looking at the psychometric properties (i.e., reliability, validity and use) of the instruments schools use to collect data. It also is expected that evaluation data will be used for formative rather than summative reasons, as school evaluation is seen as closely related to the school improvement process (Hopkins 1989; Kyriakides 2005).

Differentiation: Finally, the differentiation dimension is measured by looking at the extent to which the school places a greater emphasis on conducting evaluation for specific aspects of, or reasons for, the policy on teaching. This is especially relevant to those aspects which refer to the major weaknesses of the school. For example, if policy on homework is considered problematic, the school may decide to collect data related to homework practices more often and in greater depth instead of collecting data concerning any other aspect of school policy on teaching.

C) Testing the validity of the dynamic model

Some material supporting the validity of the dynamic model has been produced since 2003, when the model was first developed (Creemers and Kyriakides 2015). Specifically, the model has received empirical support (see Table 1) from national studies (e.g., Antoniou and Kyriakides 2011, 2013; Azigwe, Kyriakides, Panayiotou, and Creemers 2016; Azkiyah, Doolaard, Creemers, and Van Der Werf 2014; Christoforidou, Kyriakides, Antoniou, and Creemers 2014; Christoforidou and Xirafidou 2014; Creemers and Kyriakides 2010; Kyriakides and Creemers 2008, 2009; Kyriakides, Anthimou, and Charalambous 2016), international studies (e.g., Kyriakides, Archambault, and Janosz 2013; Panayiotou et al. 2014), and two meta-analyses (quantitative syntheses) of studies investigating the

impact of teacher and school factors (i.e., Kyriakides, Chistoforou, and Charalambous 2013; Kyriakides et al. 2010) as well as from empirical and theoretical reviews (see Heck and Moriyama 2010; Hofman, Hofman, and Gray 2010; Sammons 2009; Scheerens 2013). These studies reveal that factors included in the dynamic model are associated with achievement gains in the different learning domains of primary students. In addition, research also suggests that the greatest difference can be made in schools that are in underprivileged communities and/or with initially low-achieving students (Kyriakides 2007; Reynolds et al. 2014).

One could therefore assume that all the above-mentioned school factors are not only important in promoting quality but also in promoting equity in education (see Kyriakides and Creemers 2011). In this context, our European study aims to explore whether schools, especially those in disadvantaged contexts, can simultaneously improve the quality of what they do as well as realise greater equity (reducing differences between children) through the intervention. That the majority of students in the schools participating in this study are from a low-SES background is significant not only when it comes to designing the intervention, but also in searching for its impact on promoting both quality and equity (see Intellectual Output 7). In the final part of this section, the rationale of DASI and its main steps are presented. This approach was used in our experimental study to help schools improve their effectiveness in terms of quality and equity.

Table 1. Empirical evidence supporting the main assumptions of the dynamic model emerging from empirical studies and meta-analyses

Assumptions of the dynamic model	Studies	Meta-analyses
1. Multilevel in nature	All	All
2. Five dimensions can be used to measure		
a) teacher factors	1, 2, 4, 5, 7, 11, 12	2
b) school factors	1, 3, 4	1
3. Impact of teacher factors on learning outcomes	1, 2, 4, 5, 6, 7, 11, 12	2
4. Impact of school factors on learning outcomes	1, 3, 4, 6	1
5. Situational character of school factors	1	
6. Relationships between factors operating at the same level: stages of effective teaching	1, 5, 6, 7, 8, 9, 10	2
7. Changes in the functioning of school factors predict changes in the effectiveness status of schools	3	
<i>Negative results in relation to any assumption</i>	None	None

Studies:

- 1) A longitudinal study measuring teacher and school effectiveness in different subjects (Kyriakides and Creemers 2008).
- 2) A study investigating the impact of teacher factors on achievement of Cypriot students at the end of pre-primary school (Kyriakides and Creemers 2009).
- 3) A follow-up study testing the validity of the model at the school level (Creemers and Kyriakides 2010).
- 4) A European study testing the validity of the dynamic model (Panayiotou et al. 2014).
- 5) A study in Canada searching for grouping of teacher factors: stages of effective teaching (Kyriakides, Archambault, and Janosz 2013).
- 6) An experimental study investigating the impact upon student achievement of a teacher professional development approach based on DASI (Antoniou and Kyriakides 2011).
- 7) Searching for the impact and sustainability of the dynamic approach on improving teacher behaviour and student outcomes (Antoniou and Kyriakides 2013).
- 8) Searching for stages of teacher's skills in assessment (Christoforidou, Kyriakides, Antoniou, and Creemers 2014).
- 9) The effects of two intervention programs on teaching quality and student achievement (Azkiyah, Doolaard, Creemers, and Van Der Werf 2014).
- 10) Using the dynamic model to identify stages of teacher skills in assessment in different countries (Christoforidou and Xirafidou 2014).
- 11) Using observation and student questionnaire data to measure the impact of teaching factors on mathematics achievement of primary students in Ghana (Azigwe, Kyriakides, Panayiotou, and Creemers 2016).
- 12) Searching for the impact of teacher behavior on promoting students' cognitive and metacognitive skills (Kyriakides, Anthimou, and Charalambous 2016).

Meta-analyses:

- 1) A quantitative synthesis of 67 studies exploring the impact of school factors on student achievement (Kyriakides, Creemers, Antoniou, and Demetriou 2010).
- 2) A quantitative synthesis of 167 studies searching for the impact of generic teaching skills on student achievement (Kyriakides, Chirstoforu, and Charalambous 2013).

The dynamic approach to school improvement: Rationale and major steps

As was explained in the previous section, DASI has its own theoretical framework (i.e. the dynamic model of educational effectiveness), which refers to school factors that need to be considered in designing and implementing school improvement strategies and action plans. This approach is also based on the assumption that school stakeholders themselves decide which improvement actions and tasks should be carried out. However, school stakeholders are not left alone to develop their improvement strategies and action plans. The school improvement approach used in this European study is based on the assumption that an A&R Team should support school stakeholders and share its expertise and knowledge with practitioners in order to help them develop strategies and action plans that are in line with the knowledge-base of research in this area. Finally, DASI emphasises the role of school evaluation and self-reflection (especially its formative function) in improving the learning outcomes of the school.

Figure 4 illustrates the main steps in DASI. It highlights the fact that school stakeholders and the A&R Team are expected to be actively involved in each step. Their ability to work together and exchange skills, expertise and experiences is critical to the success of any school improvement project. The main purpose of our study was to implement an improvement plan to promote both quality and equity in a school, and it is considered essential that each step of this approach is followed.

Step A: Establishing clarity and consensus about the general aims of school improvement by considering student learning as the main function of the school.

It is important to start with a clear understanding of the aim of the project and how improvement in quality and equity of education will be achieved. Therefore it is important to establish procedures to ensure clear understanding on the part of all school stakeholders about the ultimate aim of school improvement. The project is based on the premise that school improvement is centred on the promotion of student learning (quality) and the reduction of unjustifiable differences in student learning outcomes (equity).

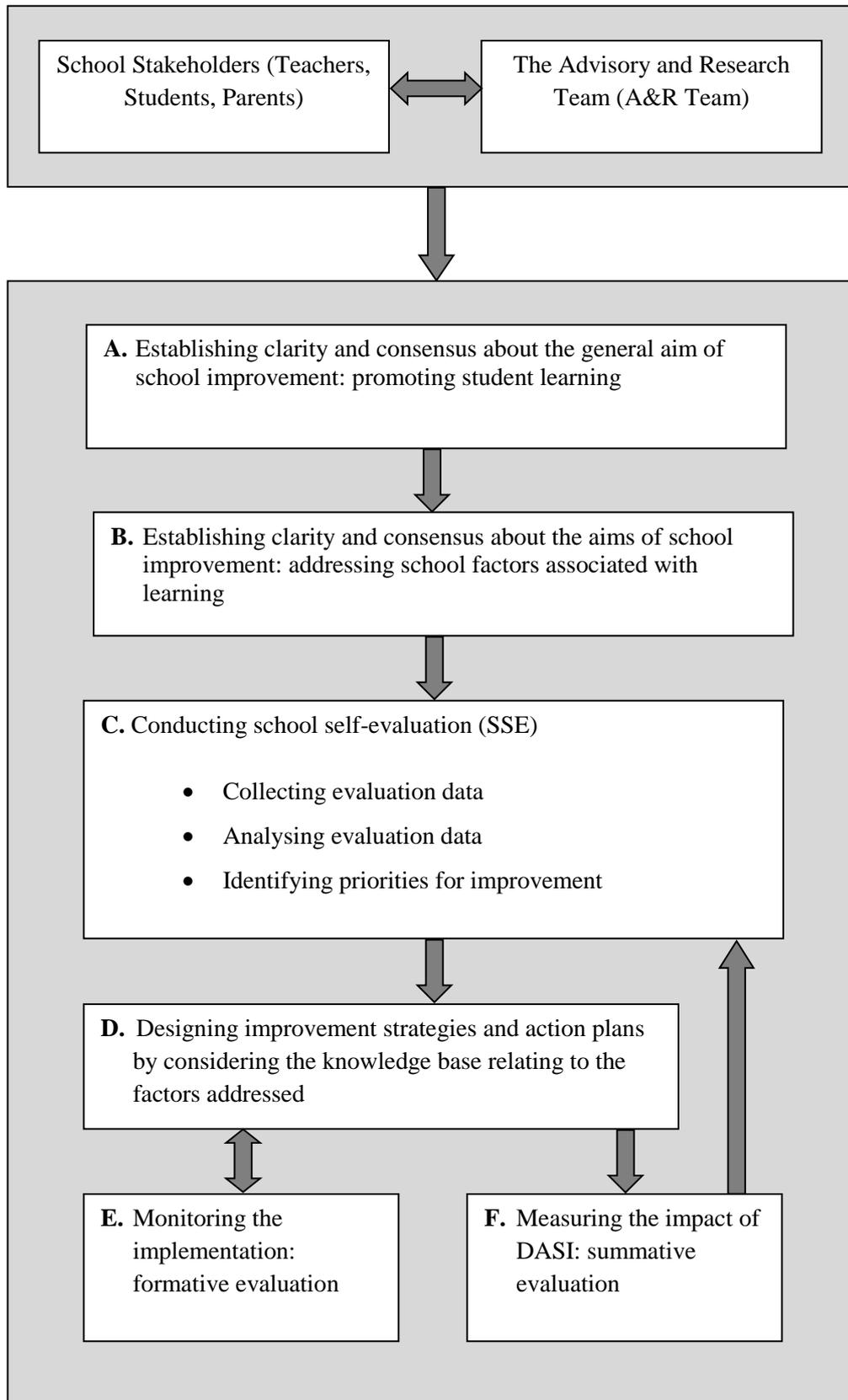


Figure 4. The major steps in the Dynamic Approach to School Improvement (DASI)

Step B: Establishing clarity and consensus about the aims of school improvement by addressing school factors which influence teaching and learning.

The dynamic model and its factors are presented to the school stakeholders. This presentation helps teachers understand how and why addressing the school factors promotes student learning.

Step C: Collecting evaluation data and identifying priorities for improvement.

The collection of the evaluation data is undertaken jointly by the research team and the school stakeholders. The research team could afterwards proceed to analyse the data and help school stakeholders identify their priorities for improvement. The improvement areas are then announced to the whole school community and suggestions are considered to define the specific area/areas of improvement.

Step D: Designing school improvement strategies and action plans by considering the available knowledge base that relates to the factor(s) to be addressed.

This step is one of the most important steps of DASI. Members of the research team share their expertise with school stakeholders providing additional input to existing ideas, experiences and knowledge in order to help schools develop their own strategies and action plans. Whilst the research team is expected to provide suggestions for school stakeholders, which are based on research evidence, it is the schools themselves that must decide on the content of their action plans, having considered their evaluation data, needs and stakeholders' abilities as well. In developing action plans it is important to specify which tasks need to be undertaken, who is going to be responsible for carrying out each task, when each task is expected to be completed and which resources should be provided for the stakeholders in order to implement these tasks (see Creemers and Kyriakides 2012).

Step E: Monitoring the implementation of the improvement project by establishing formative evaluation mechanisms.

School stakeholders should not only develop strategies and action plans, but should also establish formative evaluation mechanisms in order to be able to take decisions on how to improve these action

plans. Both school stakeholders and the research team are involved in conducting formative evaluation. In addition, an internal school evaluation mechanism should be developed whereby school stakeholders may reflect upon their abilities not just with respect to implementing the action plans, but also improving the functioning of school factors. Once having established formative evaluation mechanisms and collected data, school stakeholders can identify weaknesses in their action plans and take targeted measures to improve them.

Step F: Measuring the impact of DASI.

Finally, the A&R Team and the school stakeholders should develop summative evaluation mechanisms in order to measure the impact of DASI on promoting student learning. This step may also reveal the importance of identifying a new priority area for improvement. If summative evaluation reveals that a school has managed substantially to improve the functioning of the factor(s) addressed, school stakeholders and the A&R Team may decide to collect new evaluation data and identify a new priority improvement area. By conducting school evaluation (moving back to Step C) the new priority area is identified and a new improvement project is developed and implemented. It can be argued, therefore, as shown in Figure 4, that more effective schools always seek to improve their effectiveness status irrespective of how effective they are.

Investigating the impact of DASI on promoting both quality and equity

This part of this section advocates the use of DASI to promote quality and equity in education. With regard to its impact on quality, it is stressed that four experimental studies (see Table 2) have revealed that DASI had a stronger impact on improving learning outcomes than the participatory approach to teacher and school improvement, which places emphasis on professional experience (Creemers and Kyriakides 2015). The first two studies were concerned with interventions addressing the quality of teaching (Antoniou and Kyriakides 2011; Christoforidou et al. 2014) and revealed that the use of DASI had a statistically significant impact on improving the teaching and assessment skills of teachers and, through that, the learning outcomes of their students. The other two studies were concerned with interventions addressing school factors. Specifically, the third study focussed on the attempt by schools

to establish self-evaluation mechanisms for improvement purposes (Demetriou and Kyriakides 2012). DASI was found to have a stronger impact on student achievement gains in mathematics than the participatory approach. The fourth study took place in five European countries (i.e. Belgium, Cyprus, England, Greece and the Netherlands) and was concerned with the use of DASI to reduce bullying (Kyriakides, Creemers, Muijs, et al. 2014). Schools which made use of DASI were able to reduce bullying to a significantly greater extent than the schools in the control group.

Table 2. Experimental studies investigating the impact of using DASI rather than participatory approaches that are based on practitioner’s expertise and effects on student learning outcomes

Area of investigation	Impact on factors	Ultimate aims
1. Using DASI rather than HA to offer INSET to primary teachers (n=130).	Only teachers employing DASI managed to improve their teaching skills.	DASI had an impact on student achievement.
2. Using DASI rather than CBA to offer INSET course on assessment (n=240).	DASI had a stronger impact than CBA on improving assessment skills of teachers at stages 2, 3 and 4.	DASI had an impact on student achievement.
3. Using DASI to establish school self-evaluation mechanisms in primary schools (n=60).	Not examined since schools had to deal with different improvement areas.	DASI had an impact on student achievement.
4. Integrating DASI with research on bullying to help schools (n=79) in five European countries to establish strategies to face and reduce bullying.	DASI had an impact on school factors.	DASI had an impact on reducing bullying.

Studies:

1. The impact of a dynamic approach to professional development on teacher instruction and student learning: results from an experimental study (Antoniou and Kyriakides 2011).
2. Searching for stages of teacher skills in assessment (Christoforidou, Kyriakides, Antoniou, and Creemers 2014).
3. The impact of school self-evaluation upon student achievement: a group randomisation study (Demetriou and Kyriakides 2012).
4. Using the dynamic model of educational effectiveness to design strategies and actions to face bullying (Kyriakides, Creemers, Muijs, Rekers-Mombarg, Papastilianou, Van Petegem, and Pearson 2014).

Although these four studies provide some empirical support for the impact that DASI can have on promoting student learning outcomes (quality), participating schools were not situated in socially disadvantaged areas. Thus the study reported here moves forward a step to investigate the impact of DASI on promoting quality in socially disadvantaged schools. Given that early effectiveness studies were concerned with identifying ways to help schools in disadvantaged areas to achieve improved learning outcomes, it is important to find out whether DASI can help schools in disadvantaged areas to become more effective.

With regard to the impact that DASI may have on promoting equity, the effectiveness factors situated at the school level of the dynamic model are considered to be multidimensional constructs. As was explained above, the dynamic model incorporates a specific framework for measuring the functioning of factors, comprising five measurement dimensions (frequency, focus, stage, quality and differentiation). The fact that DASI pays attention to differentiation should be taken into account when arguing that it can help schools promote both quality and equity. Specifically, DASI incorporates research findings supporting the view that adaptation to the specific needs of each subject or group of subjects can increase the successful implementation of a school factor and ultimately maximise its effect on student learning outcomes (Kyriakides 2007). This implies that in addition to differentiation in teaching, we also need to consider the differentiation dimension when defining school factors and especially when taking actions to improve the school learning environment and the school policy on teaching (Creemers and Kyriakides 2010). Thus DASI raises awareness of the importance of promoting differentiation at class and school level as a result of which learning differences between students coming from different socioeconomic backgrounds may be reduced. For example, there is a debate on the impact that interventions concerned with parental involvement may have on the equity dimension of effectiveness. There are studies which show that improving parental involvement in general may promote learning outcomes, but not for students with less favourable home learning environments and thus may increase the impact of the SES on student learning outcomes (Feuerstein 2000; Grolnick, Benjet, Kurowski, and Apostoleris 1997; Lareau 1987). On the other hand, there are some other studies which show that projects aiming to improve parental involvement may be more effective in schools in socially disadvantaged areas and may contribute to reducing the impact of SES on student achievement

(Epstein 1991; Christenson, Rounds, and Gorney 1992; Singh et al. 1995). These contradictory findings could be attributed to the importance of considering differentiation in developing and implementing school policy on partnership (Fan and Chen 2001; Kyriakides 2005). Similarly contradictory results can be identified in studies investigating the impact of school policy on homework, which also reveal the importance of encouraging differentiation at classroom level as well as at the school level and especially in designing the school policy on homework and its relationship to partnership policy (Kyriakides et al. 2010; Scheerens et al. 2005). It is finally important to mention that DASI places emphasis on school evaluation, which can generate data that may help schools identify their own improvement priorities by taking into account the extra needs of specific groups of children. Therefore the study reported here took place in socially disadvantaged schools and attempted to examine the impact that DASI may have not only on student achievement gains in mathematics (quality), but also on reducing the effect that SES can have on students' mathematical achievement (equity). Thus, in the next section we present the methods of this study as well as the main results revealing the impact of DASI on promoting quality and equity. In the final section of this report, we draw implications of these findings for research, policy and practice.

B) Methodology and main findings of the project

The project aimed to measure the impact of the dynamic approach to promoting quality and equity in schools situated in socially disadvantaged areas in four European countries (Cyprus, England, Greece and Ireland) during the school year 2015-2016. For this reason, a value-added approach was used by collecting data both at the beginning and at the end of the intervention. A sample of 72 primary schools in the four European countries was selected and were randomly allocated to two groups (the experimental and the control group) and two different types of intervention (the dynamic and the holistic approach) were implemented. By following this design, we were in a position to conduct summative evaluation of the dynamic approach and to seek its impact on:

- a) Student achievement gains in mathematics;
- b) Reducing the gaps in learning outcomes in mathematics among students with differences in their background characteristics, such as SES, gender, and ethnicity;

c) Improving the school learning environment (SLE);

d) Improving the school policy on teaching.

Specifically, the data were analysed by using multilevel modelling techniques and the impact of each type of intervention on each of these four indicators was examined. Both cross- and within-country analyses were conducted. In this way, we were able to examine whether DASI could be used equally effectively in the participating countries. Moreover, we used multilevel structural equation modelling techniques to find out whether the intervention had an impact on student learning outcomes as a result of improving the school factors (i.e., school policy on teaching and SLE). In this way, not only the impact of DASI, but also its main assumptions, were examined. The methodology of this experimental study is described in detailed in the Intellectual Output 7.

With regard to the main findings of this experimental study, cross-countries analysis revealed that students of schools implementing DASI managed to achieve better results in mathematics than schools in the control group. This finding revealed that DASI had an impact on the quality dimension and its actual effect size was found to be higher than the impact reported in most studies investigating the impact of interventions in education on student learning outcomes. Within-country analyses were also conducted and revealed positive effects of DASI in each country. Small differences in the effect of DASI were observed in the four participating countries. With regard to the effect of DASI on the equity dimension, we show that the impact of SES on student achievement was similar at the beginning of the intervention in both the experimental and the control schools. However, at the end of the intervention, the impact of SES on student achievement in mathematics was smaller in schools implementing DASI. In addition, the effect of SES on achievement gradually increased in the schools in the control group, whereas it remained the same in the experimental group. This means that the initial gap in achievement based on SES increased in the schools in the control group but no further increase was observed in the experimental schools. It can therefore be argued that DASI had an impact not only on the quality, but also on the equity dimension of school effectiveness. Finally, it is also demonstrated that DASI had an impact on student learning outcomes through improvement in the school factors of the dynamic model. In this way, empirical support for the main assumption of DASI was provided. A detailed description of the findings of this experimental study is reported in the Intellectual Output 7.

C) Drawing implications of findings for improving research, policy and practice

This section is concerned with providing suggestions for researchers, policy-makers and practitioners on how to promote both quality and equity in education. This section is divided into two parts: implications for research and implications for developing policies and taking actions to promote equity. In the first part of this section, we provide suggestions for researchers in the field of educational effectiveness research (EER) about the development of the methodology concerned with measuring equity and searching for factors at different levels associated with the equity dimension of effectiveness at teacher, school and system level. We also consider that further research is needed to test the generalisability of the findings of our experimental study (see Intellectual Output 7), and take into account the fact that criterion consistency cannot be taken for granted when measuring equity. Additionally, proposals on conducting longitudinal and experimental studies to contribute to the further theoretical and methodological development of research on equity in education are made. Further research is also needed to investigate the relationship between equity as fairness and equity as inclusion to expand the area of EER and explore whether these two perspectives could be combined. In the second part of this section, we draw implications for policy and practice regarding promotion of equity at the national and school levels. It is argued that there is a need to establish evaluation mechanisms to measure the effectiveness status of teachers, schools and educational systems in terms of both quality and equity dimensions because of the dynamic nature of educational effectiveness. Moreover, the use of these evaluation mechanisms could help us evaluate specific policies on equal opportunities and identify the extent to which both quality and equity have improved. Furthermore, we propose that there is a need to develop a comprehensive policy on promoting equal educational opportunities for different groups of students, addressing not only the impact of SES, but also that of other student background factors. In addition, we stress the importance of making use of the differentiation dimension in the exploitation of human and material resources in an educational system and also of providing effective teacher professional development programmes to address the needs of different groups of students. In addition, suggestions to the ministries of the countries on how they might support the implementation of DASI in their schools are provided. Finally, in the last section we provide suggestions about the work

that needs to be done in order to establish a theory-driven and evidence-based approach to promote quality and equity in education.

Research on equity in education: A proposed agenda

One of the principal objectives of our project is to make a contribution to knowledge and theory-building in research on equity in education. In this study, we emphasised the importance of evaluating schools by investigating their contribution not only to the progress of their students in terms of different learning outcomes (*quality*), but also to reducing the gaps in outcomes among groups of students with different background characteristics (*equity*). We therefore have searched for evidence demonstrating the strong impact that student background factors that are unlikely to change (and especially SES) have on student learning outcomes (see Intellectual Output 3). This implies that schools have to deal with an extra challenge in supporting their students to achieve specific learning outcomes, which has to do with the support received by different groups of students in their home learning environment. Schools are expected to provide extra support for those students that are more likely to fail than others and to contribute to improving the learning opportunities offered to them. The importance of addressing equity in education has been a topic high on the agenda of EER but has gradually received less attention due to the assumption that by promoting quality, equity could also be achieved. This change in the focus of this field had methodological implications. As a consequence, many effectiveness studies in a very large number of countries have been conducted in order to identify the factors that can promote quality. With regard to equity, such development has not occurred despite the fact that the effectiveness studies conducted in many countries around the world have revealed the importance of measuring student learning outcomes after controlling for the impact of student background factors. Thus the first part of this section draws implications for research on equity and provides suggestions about research on the promotion of not only quality, but also equity. Implications for policy-makers and practitioners also include the need to consider the importance of promoting equity in education and, through that, reducing school failure. Studies searching for appropriate methods that can be used to measure equity (see Allison 1978; Atkinson 1970; Kelly 2012, 2015; Sen and Foster 1997) and for the extent to which teachers/schools/countries can promote both quality and equity (Caro and Lenkeit 2012; Caro,

Sandoval-Hernández, and Lüdtke 2014; Kyriakides and Creemers 2011; Lenkeit, Caro, and Strand 2015; Strand 2010, 2011) have been published and have revealed the importance of expanding the research agenda of EER to address equity in education. We see four areas that need to be developed further.

Firstly, researchers should contribute by defining equity in a more precise way. In the case of quality, the attention paid to student achievement gains (rather than to final learning outcomes) has helped researchers to make use of value-added approaches in order to measure quality at different levels and identify factors associated with these learning outcomes. As a consequence, EER has been seen as the field which attempts to find out what works in education and why (see Creemers and Kyriakides 2006). Recently more attention has been paid to differential teacher and school effectiveness. In this context, Scheerens (2016) gives a broader definition of EER, arguing that it should not only identify what works in education and why, *but also under which conditions and for whom* these factors have an effect on learning outcomes. This broader definition of effectiveness reveals the complexity of generating theoretical models of effectiveness as well as the importance of examining equity by investigating whether specific factors are more or less effective for specific groups of students. By questioning *for whom a factor is effective*, it is implied that a factor might promote learning but we need to find whether it promotes the learning of specific groups of students. To address this need, the dynamic model of educational effectiveness presented above proposes a framework to measure the functioning of each factor that places emphasis on differentiation.

One could therefore claim that EER should contribute not only to defining equity, but also to developing a specific methodology that can be used to evaluate teachers/schools/systems in terms of promoting both quality and equity in education. In this context, our PROMQE study illustrates how this approach can be used in conducting naturalistic (cross-sectional and longitudinal) and experimental studies respectively. The weaknesses of the proposed methodology (see Intellectual Output 7) are also noted, especially since it cannot be used to examine quality and equity simultaneously. A network of researchers with an interest in the methodological developments of EER could study this area further and contribute to further methodological development of the field in measuring equity and identifying

factors at different levels associated with the equity dimension of effectiveness at teacher, school and system level

Secondly, we acknowledge the fact that a group of researchers in the psychology (Teddle & Reynolds, 2000; Muijs et al., 2014), sociology (see Reynolds et al., 2014; Scheerens, 2016; Scheerens, Glas, & Thomas, 2003) and economics of education (e.g., Chingos, 2012; Dee & West, 2011; Hoxby, 2000; Kyriakides, Stylianou, & Eliophotou Menon, forthcoming) who have treated quality and equity as being in competition with each other and have supported different approaches to how to deal with the 'cost' of promoting one rather than the other. This can partly be attributed to the fact that equity has not been explicitly defined, and mechanisms to measure teacher/school/system effectiveness in terms of equity have not been established. We therefore anticipate that the development of a methodology for measuring equity may also help us to generate evidence testing this assumption and to investigate the relationship between the two dimensions of effectiveness. In this context, we made use of a specific methodology (see Intellectual Output 7) to search for the impact of an intervention on promoting quality and equity. The results of our study did not reveal any support for those arguing that there is a negative relationship between quality and equity. Further research is needed to test the generalisability of these findings and investigate the extent to which, by promoting equity, quality can also be achieved. These studies may also reveal the extent to which teachers/schools/educational systems can promote equity, especially since some researchers are less optimistic about the impact that education may have on equity (see Strand 2010). Thus we expect that systematic research on equity may not only provide answers regarding the relationship between the two dimensions of effectiveness, but may also help researchers and policy-makers set feasible targets with respect to promoting quality and equity. The results of our experimental study also revealed that the use of DASI had an effect on both quality and equity. However, in terms of equity, the impact of SES on mathematical achievement in the schools in the experimental group was smaller, due to the fact that an increase in the impact of SES was observed in the control schools, whereas in the experimental groups the effect remained the same. One might treat the results of this intervention as indicating that schools have no effect on equity but this argument ignores the fact that longitudinal studies have revealed that the total effect of SES gradually increases (Gustafsson, Nilsen, and Yang Hansen 2016) for various reasons (beyond those that can be controlled

by the schools) and by taking actions to avoid any increase in achievement gaps based on SES may be the first step towards creating a fair educational system.

Thirdly, our study revealed that DASI can promote equity in terms of reducing the achievement gaps between students coming from different socioeconomic backgrounds. However, this intervention had no impact on reducing the achievement gaps between students with differences in other background variables, such as gender and ethnicity. This means that national or school policies and actions promoting equal opportunities considering specific background factors only (e.g., SES and/or ethnicity) might not be relevant when it comes to improving equity in terms of other background factors (e.g., gender) that are unlikely to change. Therefore other studies may be needed to investigate the extent to which policies and actions which address equity in a more comprehensive way are either effective in promoting equity in terms of each background factor or are less effective when compared with policies that are focused on specific groups of students. Effectiveness studies should also focus on interaction effects of student background factors, for example, when examining the interaction between gender and SES. Similarly, interaction effects between ethnicity and SES could be explored since some ethnic groups of students are found to have lower educational achievement and the poorest progress when they are compared with other ethnic groups of students coming from the same low socioeconomic background (see Strand 2014; Kyriakides 2007). In this way, theoretical models for promoting equity with generic and/or differential factors could be developed to help policy-makers design reform policies and interventions to promote equity adapted to the needs of specific groups of students. To achieve this aim, researchers could make use of theoretical models developed during the last two decades which address factors associated with student achievement gains (i.e., the quality dimension). In this way, factors relating to both the quality and the equity dimensions could be identified as well as those that are important with respect to only one dimension. One could therefore argue that through research on equity not only could the methodology of EER benefit, but, what is more, its theoretical framework could also be expanded in order to help the research community, policy-makers, and practitioners to identify not only what works and why, but also for whom and under which conditions specific teacher/school/system factors can promote quality and/or equity in education.

Fourthly, research on equity could contribute to understanding not only how teachers, schools and educational systems can improve their effectiveness status in terms of equity. Effectiveness studies may also examine the extent to which both dimensions of effectiveness (quality and equity) are unstable and thereby a dynamic perspective on educational effectiveness could be established. However, our study has not collected data from more than one school year and therefore it was not possible to investigate stability and changes in the effectiveness status of schools in terms of quality and/or equity. In the past, one study examining changes in the effectiveness status of schools over a period of five years revealed that changes in the functioning of school factors included in the dynamic model predicted changes in the effectiveness status of schools in terms of the quality dimension (see Creemers and Kyriakides 2010). Similar studies could be conducted in order to identify factors explaining changes and stability in the effectiveness status of schools in terms of both the quality and the equity dimensions. Such studies may also reveal the long-term effect of schools in terms of promoting student learning outcomes (i.e., quality) and reducing the effect of background factors on student achievement (i.e., equity).

Fifthly, at this point it should also be acknowledged that there are very few studies investigating the long-term effect of schools (e.g., Alcott, 2017; Bressoux and Bianco 2004; De Fraine et al. 2007; Dimosthenous 2015; Goldstein and Sammons 1997; Kyriakides and Creemers 2008; Madden et al. 1993; Mendro et al. 1998; Tymms, Merrell, and Henderson 2000; Vanwynsberghe et al. 2017) so this area of investigation needs further development for the benefit of both dimensions of effectiveness as well as to contribute to the debate on what schools can offer to society by not simply achieving specific learning outcomes (within one school year) (i.e., short-term effect of schools in terms of quality), but also in promoting quality and equity through the educational opportunities offered to different groups of students over a long period, even throughout the length of compulsory education. It should be also acknowledged that our experimental study investigated the promotion of quality and equity in primary schools in four European countries (Cyprus, England, Greece, and Ireland) but not what is happening to these students after leaving primary education or even later after leaving secondary education. Therefore research that examines the impact of school-level factors and student background characteristics on post-school destinations and choices is required (Antoniou 2012).

Sixthly, it is important to note that there are two ways in which equity in education can be examined: equity as fairness and equity as inclusion. Specifically, school failure can be seen as twofold. On the one hand, school failure could be seen as the failure of an educational system, which is unable to provide an education of quality to all. In this case, overcoming school failure implies assuring inclusion: ensuring a basic minimum standard education for each and every student. The inclusion perspective has implications for designing effective national reform policies that minimize dropout rates and provide learning opportunities for all children. Secondly, school failure can be attributed to the fairness perspective which is based on the fact that factors beyond those that students can control are associated with student learning outcomes. Fairness implies ensuring that personal and social circumstances should not be an obstacle to educational success, and inclusion implies ensuring a minimum standard of education for all (Field, Kuczera, and Pont 2007). In our study, we focused on equity as fairness, which implies that the teacher/school/system effectiveness status in terms of equity can be measured by looking at the extent to which differences in learning outcomes between groups of students with different background characteristics can be reduced and how we can ensure that personal and social circumstances are not an obstacle to educational success. Therefore, we took into account this perspective in order to evaluate the impact that teachers and schools may have in promoting equity in education. Further research is, however, needed to investigate the relationship between equity as fairness and equity as inclusion. Such studies may help researchers expand the area of EER and explore whether these two perspectives can be combined by ensuring a basic minimum standard of education with respect to both.

Finally, taking into consideration the fact that the inclusive perspective of equity requires that a basic minimum standard education should be provided for each and every student, we could also seek ways of boosting the 'minimum' outcomes of all students, instead of trying to increase the achievement of good results in the school population (i.e. achievement of high overall scores in all subjects) (Freeman 2003). This way of achieving equity ensures the equal rights of all students to prosper in education and does not undermine the basic rights of some for the sake of benefiting the many (Kelly, forthcoming). Consequently, one should bear in mind that when deciding to examine equity from the perspective of achieving a basic minimum amount of learning outcomes, there are questions and implications about

how to define this minimum amount of learning outcomes, how to measure achievement and how to identify factors related to the achievement of basic standards in education. Researchers will have to find ways to define what should constitute the basic minimum learning outcomes and methodological issues will be raised regarding the measurement of the effectiveness status of teachers/schools/systems in relation to this criterion other than the use of value-added models. One could even raise questions about the relations that may exist in using different approaches to conceptualising quality. Moreover, EER could face a great challenge in exploring which effectiveness factors at the class/school/system level can contribute to achieving a basic minimum education for all and especially the impact of these factors on different groups of students, for example ‘slow learners’ (Ioannou and Kyriakides 2017). Thus this could reinforce the generic character of the effectiveness factors that are used to explain student achievement when using value-added approaches or to raise questions about their generic nature. Lastly, researchers may like to question the impact that a policy on minimum learning outcomes may have on teachers’ expectations and whether such a policy may have positive or negative effects on promoting quality and equity in education. At this point, it should be acknowledged that the results of studies which may emerge from the proposed research agenda could have implications not only for expanding the theoretical framework of EER, but also for policy and practice. Implications for policy can also be drawn from the results of our study on measuring equity. As a consequence, in the last part of this section, we provide suggestions for developing policies at national and/or school level aiming to promote both quality and equity in education.

Developing policies and taking actions to promote equity

Some evidence indicating that DASI can be used to improve equity has been provided through our PROMQE study (see Intellectual Output 7). Although there is a need for more systematic work in the area of equity (as has been discussed above), implications of this more recent work for establishing policies that promote both quality and equity are discussed in this section.

Firstly, we argue that there is a need to establish evaluation mechanisms to measure the effectiveness status of teachers, schools and educational systems in terms of both dimensions of effectiveness, namely, quality and equity. In most countries (including Cyprus, England, Greece and

Ireland) an evaluation system is in place at the teacher/school/system levels, serving primary accountability purposes (summative function of evaluation). Additionally, most evaluation systems only focus on measuring effectiveness in terms of quality, not equity. We therefore argue here that there is a need to build teacher, school and system evaluation mechanisms that are in line with the knowledge base of educational effectiveness. Specifically, evaluation mechanisms are needed which provide empirical data to help policy-makers and other stakeholders to identify the strengths and weaknesses of their schools and educational systems and to design intervention programmes to improve their effectiveness status in terms of both quality and equity. These mechanisms are expected to serve the formative function of evaluation and in this way to support teachers, schools and the different levels of the system in their attempt to provide extra learning opportunities for disadvantaged students and, through that, to reduce the impact on student achievement of the various student background factors that are unlikely to change.

Secondly, evaluation mechanisms, either at the teacher, school or system level, should not take criterion consistency in the dimension of equity for granted. As our European experimental study revealed, teachers/schools/systems that are effective in one area of equity (e.g., reducing the impact of SES on achievement) are not necessarily effective in another area of equity (e.g., reducing gender or ethnicity differences). This implies that feedback on equity should be more precise and should indicate in each instance the background factor taken into account in measuring equity. In addition, a multidimensional approach to evaluating equity at teacher, school and system level should be established.

Thirdly, when establishing formative evaluation mechanisms to measure equity, they should follow the dynamic nature of educational effectiveness, meaning that they should also be in a position to identify changes in the effectiveness status of teachers, schools and educational systems over time. In this way, one could use the data to evaluate the impact of different interventions taken to promote equity. The results that emerged from our experimental study also revealed that in interpreting the data of such evaluation mechanisms, one should bear in mind the context in which teachers and schools operate. Specifically, the total impact of SES on student achievement in the schools in the experimental group was found to remain the same. One could claim that this intervention had no effect on promoting

equity. However, this study also revealed that the total effect of SES in the control schools increased. This finding seems to be in line with those of previous naturalistic studies that investigated changes in the impact of SES on achievement and which were conducted in the countries participating in this project. One might then claim that the intervention had a positive effect on equity since, by comparing the impact of SES on achievement at two points in time, one can see that there was no difference before the intervention, whereas at the end of the intervention SES was found to matter less in the experimental schools than in the schools in the control group. This result does not necessarily imply that in order to provide feedback for schools on equity, it is necessary to compare the effect of each school with the effect of control schools since ministries are expected to support all schools in promoting equity. It can, however, be claimed that longitudinal data are needed to conduct formative evaluation and to concentrate on changes in the impact of background factors on student achievement over time. This suggestion seems to be in line with the claim that value-added approaches are needed in measuring the quality dimension and comparing the contribution that each teacher/school/system makes to student achievement gains rather than comparing schools on the basis of final student learning outcomes. In the case of equity, we should seek changes over time of the impact that SES or other background factors have on achievement and compare the changes in individual schools with those in the whole population. In case an increase in the impact of SES is observed at country level, any school with a much smaller increase (or no increase) could still be considered effective in terms of equity. Thus, by taking into account all the above-mentioned points concerned with establishing effective evaluation mechanisms, we argue for the need to establish formative rather than just summative evaluation mechanisms in order to help teachers, schools and educational systems improve their effectiveness in terms of both dimensions (quality and equity). We also stress the importance of measuring the impact of different background factors (i.e., SES, gender, ethnicity, personality, learning style etc.) on student achievement when examining equity, since criterion consistency in the dimension of equity cannot be taken for granted. Lastly, evaluation mechanisms should be able to demonstrate not only the effectiveness status of each teacher, school and educational system in terms of promoting student learning outcomes, but also the impact that each individual background factor has on student achievement over time and thereby provide data on both dimensions of effectiveness for teachers, schools and educational systems.

Fourthly, the development of evaluation mechanisms for collecting data on changes in both dimensions of effectiveness at teacher, school and system level could help us to evaluate specific national and/or school policies on equal opportunities and identify the extent to which both quality and equity were improved. In most countries, such mechanisms do not appear to exist, and when reform policies on equal opportunities are developed, policy-makers rarely examine their impact on promoting quality and almost never do so with respect to promoting equity, which is supposed to be the main target of such policies. This can partly be attributed to the fact that equity has never been explicitly defined and we never test the assumption that, by promoting quality, equity may also be achieved. Without testing this assumption, one cannot evaluate reform policies on equal opportunities without looking at their differential impact on specific disadvantaged groups of students. By taking into account the knowledge base of EER and the importance of differentiation at not only teaching, one might expect that these policies would be likely to have a negative impact on equity, especially if disadvantaged groups of students were offered less. In this way the impact of background factors on student achievement may explain a higher percentage of school failure. Obviously to test this argument, evaluation data measuring changes in the effectiveness status of schools (and of the system) in terms of both dimensions (quality and equity) are needed. Such data might also reveal that this approach is ineffective with regard to both dimensions (not just for equity) and thus actions to change this policy could be taken. Similarly, in Cyprus, policies to provide extra support for teachers and schools in socially disadvantaged areas have recently been introduced. Although policy-makers might expect that such policies could contribute to promoting equity, this argument still needs to be tested, and by collecting data on changes in the effectiveness status of schools which made use of this extra support, not only could one measure the overall effect of this reform policy on promoting quality and equity, but one could also identify schools which were making better use of this policy and managing to promote both quality and equity. In this way, specific suggestions on how to improve further this policy could emerge. We therefore argue for an evidence-based policy-making approach, which can only be established if policy-makers systematically collect data on both dimensions of effectiveness over a period of longer than one school year and in this way evaluate reform policies by looking at the impact that the policies may have on improving the effectiveness status of schools.

Fifthly, the results of our study revealed that there is no criterion consistency when investigating the equity dimension, and therefore we cannot take for granted that teachers/schools/systems that are effective in one area (e.g., reducing the impact of SES on achievement) are necessarily also effective in another area of equity (e.g., reducing gender differences). This finding could be context-specific and may have to do with the fact that policies in countries where data collected address equity in a rather restricted way and concentrate only on the impact of a specific factor (e.g. SES) were therefore less effective in other areas of equity. For example, the Ministry of Education and Culture in Cyprus has recently promoted national policy guidelines for improving equity at classroom and school level by mainly stressing the impact that SES has on student achievement (Ministry of Education and Culture 2015), without giving any special emphasis to other student background factors (such as the gender or ethnicity) that may affect student outcomes in specific learning subjects. Thus we raise awareness of the importance of investigating equity in terms of different background factors that are unlikely to change, not just SES. We argue here that there is a need to develop a comprehensive policy on promoting equal educational opportunities for different groups of students in pre-primary and primary schools in Cyprus (and also in other countries), addressing not only the impact of SES, but also the impact of other background factors, such as gender, ethnicity, personality traits and learning style. Since we assume that similar results may emerge in other countries too, we argue for the importance of developing more comprehensive policies on equity, and in this way we can determine their impact on more than one area of equity. If policies are effective in promoting one area of equity but less so another area, decisions on how to develop these interventions further could be taken and actions to support schools addressing equity through a more holistic approach rather than a specific one could be provided.

Sixthly, policy-makers in the four participating countries (i.e., Cyprus, England, Greece and Ireland) were asked to indicate the type of actions and/or policies that their state could undertake to promote both quality and equity in schools. The results of this study revealed that in each participating country there was space for promoting equity. Given that the longitudinal studies investigating the impact of SES on student achievement also revealed that the impact of SES increased over time and the same picture emerged from analysing the data of the control group, it could be argued that existing policies are not promoting equity at a satisfactory level. For example, one could claim that existing

policies or mechanisms on teacher selection might have a negative effect on equity if a country's system were either centralised (i.e. Cyprus and Greece) or decentralised (i.e. England). If more effective teachers were to be appointed to schools which are not situated in socially disadvantaged areas (for several reasons, some of which cannot be directly controlled by the state) the end result would be an observable increase in the impact of SES over time rather than a decrease. For instance, in Cyprus where the educational system is highly centralised, teachers' appointments, transfers and promotions are managed by the Educational Service Commission in cooperation with the Ministry of Education and Culture (The World Bank 2014). Once a teacher is appointed to a school, he/she enters a credit-system list according to which each teacher receives credits based on (a) his/her years of employment, (b) the types of school in which he/she has served (e.g. schools with one teacher, schools with two teachers, schools with three or more teachers) and (c) the distance of the school from the teacher's home (The World Bank 2014). At the end of each school year, the Educational Service Commission issues a list to enable decisions to be taken about the appointment of each teacher for the next school year. Teachers with more credits on this list have the opportunity to be appointed to their preferred schools. Schools situated in socially disadvantaged areas (i.e. schools with high percentages of students coming from minority ethnic groups/immigrants and/or students with low SES) are the least popular. Consequently, the greatest majority of staff in schools situated in socially disadvantaged areas comprise newly appointed teachers, who are the least qualified to serve in these schools since they do not have the experience of a teacher who has worked in schools for five to ten years. The same procedure is also carried out when appointing and transferring deputy principals and principals, thus teachers newly promoted to those administrative positions are very likely to serve in schools with high percentages of students from a low socioeconomic background. This appointment system could be considered to be one of the reasons that the educational system in Cyprus does not promote equity in education since students in these disadvantaged schools, who should be provided with more educational opportunities and more experienced teachers, are, in the end, taught by the least qualified teachers who lack the experience to address the learning difficulties of this group of students. A similar observation can be found in other countries, like England, with a decentralised educational system. Education in England is overseen by the United Kingdom's Department for Education, but local government authorities are

responsible for implementing policy on public education and state-funded schools at a local level. The overall direction of a school is usually set by a governing body, which appoints the headteacher, sets the strategic direction of the school, draws up policies and monitors the overall performance of the school. The representatives in the governing body always include the headteacher of the school, elected parents, other members of staff and local authority representatives (Challen, Machin, and McNally 2008). Consequently, the governing body of each school is responsible for the selection of the teaching staff. Governing bodies in socially advantaged areas have the opportunity to provide better working conditions for teachers and therefore attract highly qualified teachers. On the other hand, schools in socially disadvantaged areas, in which governing bodies are not able to provide good working conditions, are left to recruit the teachers who have less experience. It could be argued that the educational systems in both Cyprus and England are unable to promote equity in schools and this finding could be attributed at least partly to the teacher appointment systems in these countries. According to the results of a recent European study conducted in six countries (Belgium/Flanders, Cyprus, Germany, Greece, Ireland and Slovenia), effective teaching is an important aspect of reducing the achievement gap (Panayiotou et al. 2014; Vanlaar et al. 2016). This demonstrates the importance of placing the most effective teachers in schools with the highest percentage of underachieving students, and thus, policy-makers should encourage effective teachers to teach in low-achieving schools by providing them with good working conditions and financial resources. Therefore when designing policies to promote equity, policy-makers should make use of the differentiation dimension of the dynamic model (Creemers and Kyriakides 2006) and exploit the human resources of their educational system in an effective way.

Seventhly, policies on provision of sufficient learning resources need to promote differentiation and provide greater and more efficient support for those who need them most. A more critical analysis of current policies in various areas affecting learning outcomes (e.g., financial support for schools, provision of learning materials and other resources) in the above-mentioned countries (and probably in other countries facing similar problems, as studies on the impact of SES seem to reveal) is needed. For example, the equal funding of schools provided either by the state or the local authorities could result in widening the achievement gap between the different groups of students, since many of the schools

situated in advantaged areas often receive additional financial support from other sources, such as the students' families and the community, whereas schools situated in disadvantaged areas have no other resources and most of them require extra funding to be able to support students with financial difficulties and other problems. Therefore policy-makers might like to reconsider the allocation of funding in schools to promote equity in education by providing more financial support for those who need it.

Eighthly, there is evidence that low- and high-ability students and students coming from low and high socioeconomic backgrounds respond differently depending on the type of teaching style and teacher behaviour (Brophy 1992; Campbell, Kyriakides, Muijs, and Robinson 2004; Walberg 1986). Consequently, teachers in all schools should be educated in how to deal with multiculturalism and especially how to differentiate their instruction in the classroom when facing students coming from different socioeconomic backgrounds and with different learning opportunities at home. Thus policies on teacher professional development should take into consideration student-level factors which are unlikely to change (e.g., gender, SES, ethnicity, personality) and also factors that may change over time (e.g., subject motivation, thinking styles), when promoting equity. For example, it has been shown that both personality traits and thinking styles are associated with student achievement (Busato, Prins, Elshout, and Hamaker 1999; Diseth 2003). In the so-called Big Five Model (Taylor and MacDonald 1999) the personality factors are as follows: *extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience*. Consequently, teachers need to be educated in how to teach an extravert student who is sociable and active and, on the other hand, on how to teach an introvert student, who is withdrawn and shy. Additionally, teachers should be educated in how to help their students find or develop optimal thinking styles for particular situations in order to improve their achievement since students' thinking style belongs to the category of the factors which change over time.

Ninthly, our study which made use of DASI, supports the view that authentic changes designed to improve equity, which basically attempt to change the culture of the educational system, come from interventions taking place at the school rather than at the system level. Therefore the use of DASI stimulates a special approach to improvement whereby each party has a specific role in, and expertise that they contribute to, the intervention and thus ownership is accomplished. The relationship

established between the school and the A&R Team, reveals the main difference between DASI and other school improvement approaches that follow a top-down approach giving emphasis only to available knowledge that has emerged from educational effectiveness studies and not to the existing problems, situations, professional needs and abilities of the schools' stakeholders (teachers, students, parents). Thus this dynamic approach can be used by stakeholders, especially when it is necessary to deal with improving the effectiveness status of schools situated in disadvantaged areas, since these schools have to face problems that require special attention and handling according to their context. Policy-makers should be able to support them in implementing such an approach by providing them with all the necessary learning resources.

Finally, it should be acknowledged that one of the most important parts of an intervention programme is not only the investigation of its immediate impact on school policy and on student learning outcomes, but also an exploration of the sustainability of its effects. Sustainability can be defined as maintenance of achieved outcomes and effects of an intervention programme beyond its completion (Antoniou and Kyriakides 2013). This means that teachers and schools should be able to use the knowledge gained from the intervention programme even after it has ended. For example, when teacher professional development programmes were implemented, researchers identified the fact that most teachers do not generalise the teaching skills learned in the programme to their classrooms once the interventions or training courses have ended (e.g., Riley-Tilliman and Eckert 2001). Additionally, in a meta-analysis conducted by Rose and Church (1998), only 20 studies measuring the sustainability of the results of teacher professional development programmes have been found. The data of our study were collected over the course of only one school year and the intervention lasted for approximately eight months. Therefore changes in school policy and/or the impact of these changes on the final student outcomes were only identified with respect to this period. Thus, by taking into consideration all the above, this study revealed the potential benefit of investigating the impact of using DASI for a longer period to promote quality and equity, and, consequently, there is a need to conduct longitudinal studies to identify changes in the effectiveness status of schools in terms of both quality and equity, even after the end of the intervention (sustainability). These studies may help the A&R Teams decide to gradually

provide less support for schools that are using DASI over consecutive years and consequently allow researchers to estimate the cumulative effects of the school policies that have been implemented.

D) Presenting the results of the project to researchers, policy-makers and practitioners

An important piece of our research project was the international conference entitled “*Quality and Equity in Education: Theories, Applications and Potentials*” that was organized at the University of Cyprus on May 19th, 2017. The conference was focusing on linking research, policy and practice to promote quality and equity in education. This points to both an expanded range of inquiry and an intensified focus on establishing stronger links among researchers, policy makers, and practitioners in order to promote quality and equity in education. Specifically, the conference was drawing attention on the following themes:

- a. Establishing links between educational effectiveness research and school improvement
- b. Measuring quality and equity in education: different methodological approaches
- c. Methodological advancements in research on school improvement
- d. Educational policy-making and the politics of change and improvement at school and country level
- e. Professional development and professionalization in education

Researchers, policy makers and teachers in Europe were invited to present papers on approaches used to improve student learning outcomes in socially disadvantaged areas. Members of the country teams involved in this project also presented papers on the dynamic approach. In this way, participants were able to compare the impact of the dynamic approach to promote quality and equity in education with other approaches. A symposium session for our research programme has also taken place and the impact of our intervention on promoting both quality and equity was presented. An essential aspect of the conference was also the organization of a roundtable discussion after the symposium session where implications of the main findings of our experimental study for policy and practice were drawn. In this roundtable discussion, we also explored possibilities for expanding the use of the dynamic approach in other countries.

Moreover, the core team of our project published proceedings of this conference which were distributed to all attendees and also to policy makers, school advisory agencies, and research institutes with an interest on school improvement. All the material of the conference can be found in the web page of our project (www.ucy.ac.cy/promqe).

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