

Using the Dynamic Model to develop an evidence-based and theory-driven approach to school improvement

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This paper refers to a dynamic perspective of educational effectiveness and improvement stressing the importance of using an evidence-based and theory-driven approach. Specifically, an approach to school improvement based on the dynamic model of educational effectiveness is offered. The recommended approach to school improvement gives emphasis to quality of teaching and to conditions created at different levels for improving the quality of teaching. Moreover, we stress the importance of a whole school approach and the use of data collected through school self-evaluation mechanisms for decision-making about improvement of policies and actions. Furthermore, the improvement approach related to this model emphasizes the use of the available knowledge-base in relation to the main aims of the efforts schools are making to deal with different challenges/problems are facing. Finally, we provide suggestions for research investigating under which conditions schools can make use of the dynamic model and establish an evidence-based and theory-driven approach to school improvement.

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Introduction

Educational effectiveness research (EER) can be seen as a conglomerate of research in different areas: research on teacher behaviour, curriculum, grouping procedures, school organisation, and educational policy. The main research question of EER is which factors in the teaching, curriculum, and learning environments at different levels such as the classroom, the school, and the above-school levels can directly or indirectly explain the differences in the outcomes of students, taking into account background characteristics, such as ability, socio-economic status (SES), and prior attainment. In the last 25 years, EER has improved considerably in relation to research design, sampling and statistical techniques. Methodological advances have enabled more efficient estimates of teacher and school differences in student achievement to be obtained (Goldstein 2003). There is also substantial agreement as to appropriate methods of estimating school differences/effects and the kinds of data required for valid comparisons to be made. As far as the theoretical component of the field is concerned, progress was made by a more precise definition of the concepts used and the relations between the concepts (see Mortimore et al. 1988; Scheerens 1992; Levin and Lezotte 1990). The explicit purpose of the researchers who initiated research on the effectiveness of classrooms, schools and educational

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systems was that the results of the research could be used in practice. For example, when research shows positive effect of a teaching strategy, such as the use of active teaching or cooperative teaching, on student outcomes, it was expected that support could be provided to teachers by educational professionals in order to help them implement this strategy and improve their practice. As a consequence, the International Congress of School Effectiveness and Improvement (ICSEI) was established in 1998 and its main aim was to bring together researchers, practitioners, and policy-makers in a productive cooperation for the benefit of education in general and for the development of the participating 'disciplines' in particular. In recent years, there have been some examples of productive cooperation between the fields of school effectiveness and school improvement, in which new ways of merging the two traditions/orientations have been attempted (see Creemers and Reezigt 2005; Gray et al. 1999; MacBeath and Mortimore 2001; Reynolds and Stoll 1996; Teddlie and Reynolds 2000). However, after two decades one might conclude that the link between EER and school improvement remains problematic.

Research on school effectiveness has strongly focused on student outcomes and on the characteristics (factors) of classrooms, schools and systems associated with these outcomes without looking at the processes that are needed to change the situation in classes, schools and systems. Thus, EER has given more emphasis to establishing rich data banks and using advanced methodological techniques (e.g., multilevel modelling, structural equation modelling, item response theory) in order to test the validity of different theoretical perspectives. The end product of these efforts is interesting for the development of different sophisticated research methods to measure the effect of schooling but does not address the needs of practitioners to improve the quality of education in classrooms and schools. School improvement, by contrast, was mainly concerned with the process of change in classes and to a larger extent in schools without looking too much at the consequences for student outcomes. Their main interest was to establish a process of improvement in schools and keep it going by emphasising the importance of the process of improvement rather than being critical of the processes in relation to its impact on learning outcomes. For example, it was argued that starting the implementation of an intervention could even result in lower achievement outcomes but the school should continue to be involved because the positive effects would come after a long period of implementation. This might give the impression that the content of the intervention is less important than the process of the intervention, implying that out of the process (and irrespective of the quality of the intervention) a positive school climate will arise resulting in the improvement of the school. In several publications, the reasons for this disappointing situation are analysed in order to provide ways for a more productive cooperation between research and improvement (Creemers and Reezigt 1997; Teddlie and Reynolds 2000). After a careful analysis of the failure to link research and improvement effectively, strategies for school improvement have been developed which attempt to combine the strong elements of research and improvement. A major element of this combination is the emphasis on the evidence stemming from theory and research. Thus, the value of a theory-driven approach to school improvement is stressed. The need to collect multiple data about student achievement and the significance of classroom and school processes is also emphasized. In this way, a theory-driven and evidence-based approach to school improvement is promoted. In practice, however, there are still serious problems in the

relationship between effectiveness and improvement. The question persists on how to apply the effectiveness knowledge base in practice, in other words, how to get valid and useful information about school improvement from educational effectiveness research (Creemers and Kyriakides 2006).

In this context, we argue here that the dynamic model of educational effectiveness (Creemers and Kyriakides 2008) could contribute to establishing a theory-driven and evidence-based approach to school improvement. The claim for an evidence-based approach is accepted generally and it is used in several policy documents. The term refers to the fact that improvement programmes should be introduced when they are systematically evaluated by using designs that demonstrate their impact on quality of education (Slavin 2002). In this paper, the dynamic model is presented and it is also shown that it can be treated as a framework for developing an evidence-based approach especially given that a series of studies have provided support to its validity. Moreover, we demonstrate that a distinctive feature of the dynamic model is that it does not only refer to factors that are important for explaining variation in educational effectiveness but it also attempts to explain why these factors are important by integrating different theoretical orientations into the study of effectiveness. In this way, teachers and other school stakeholders involved in improvement efforts could become aware of both the empirical support for the factors involved in their project and the way these factors operate within a conceptual framework. Through this approach, teachers and the other school stakeholders are offered the opportunity to use in a flexible way this knowledge-base, adapt it to their specific needs, and develop their own strategies for school improvement. In order to illustrate this argument, the next section of this paper is concerned with the essential characteristics of the dynamic model. We also provide the reasons for using this model as a theoretical framework for the proposed school improvement approach. Finally, in the third section, we refer to specific strategies that can be used by different stakeholders who are planning to make use of the dynamic model to improve practice at different levels. Suggestions on conducting further research concerned with the conditions under which such an approach could result in improving the quality of education are also provided.

Establishing links between educational effectiveness research and school improvement: the contribution of the dynamic model

The development of the dynamic model is based on the results of a critical review of the main findings of EER and of a critical analysis of the integrated models of educational effectiveness which were developed during the 1990s (see Creemers 1994; Scheerens 1992; Stringfield and Slavin 1992). These models attempt to provide a comprehensive picture of educational effectiveness by referring to factors operating at different levels such as student, classroom, school and system which were found to be associated with student outcomes. Studies testing the validity of one of the most influential integrated models were conducted (i.e., de Jong et al. 2004; Driessen and Sleegers 2000; Kyriakides et al. 2000; Kyriakides 2005a; Kyriakides and Tsangaridou 2008; Reezigt, Guldmond, and Creemers 1999) and some empirical support provided to the comprehensive model of educational effectiveness (Creemers 1994) has been provided. A synthesis of these studies has revealed suggestions for further development of the model especially by taking into account the dynamic

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nature of educational effectiveness (Kyriakides 2008). In this context, Creemers and Kyriakides (2008) have developed a dynamic model of educational effectiveness which attempts to define the dynamic relations between the multiple factors found to be associated with effectiveness. The main characteristics of the dynamic model are presented below but we would like to stress here that one of the most essential differences of this model has to do with its assumption that effective schooling should be seen as a dynamic process and thereby effective schools are those which are able to identify their weaknesses and develop further their school policy on teaching and on the school learning environment (SLE) in order to influence teaching practice. This implies that all schools (including those which are among the most effective) should evaluate their policy on teaching and their SLE and take actions to improve them in order to become or remain effective. Moreover, the model points that school factors have situational effects suggesting that the impact of school factors depends on the specific needs of a school at a certain stage. For example, two schools may be at the same level in terms of the functioning of a certain factor (e.g., collaboration among teachers) but one of them will get more benefits by making efforts to improve this factor than the other, since the latter is facing more important problems with the functioning of some other factor(s) (e.g., school policy on quantity of teaching or school policy on partnership) than the first school.

The dynamic model of educational effectiveness: an overview

The main characteristics of the dynamic model are as follows. First, the dynamic model takes into account the fact that effectiveness studies conducted in several countries reveal that the influences on student achievement are multilevel (Teddlie and Reynolds 2000). Therefore, the model is multilevel in nature and refers to factors operating at the four levels shown in Figure 1. Figure 1 reveals the main structure of the dynamic model. Teaching and learning is emphasised and the roles of the two main actors (i.e., teacher and student) are analysed. Above these two levels, the dynamic model also refers to school-level factors. It is expected that school-level factors influence the teaching-learning situation by developing and evaluating the school policy on teaching and the policy on creating a positive learning environment at the school. The context level refers to the influence of the educational system in a more formal manner, especially through developing and evaluating educational policy at the national/regional level. It also is taken into account that the teaching and learning situation is influenced by the wider educational context in which students, teachers, and schools are expected to operate. Factors such as the values of the society for learning and the importance attached to education play an important role both in shaping teacher and student expectations as well as in the development of the perceptions of various stakeholders about effective teaching practice.

Second, Figure 1 does not only refer to the four levels of the dynamic model and each level's association with student outcomes. The interrelations between the components of the model are also illustrated. In this way, the model indicates that factors at the school and context level have both direct and indirect effects on student achievement since they are able to influence not only student achievement but also the teaching and learning situations. This assumption is supported by findings of effectiveness studies conducted in order to test the validity of the comprehensive model (see Kyriakides 2005a; de Jong et al. 2004) which reveal that the relationships

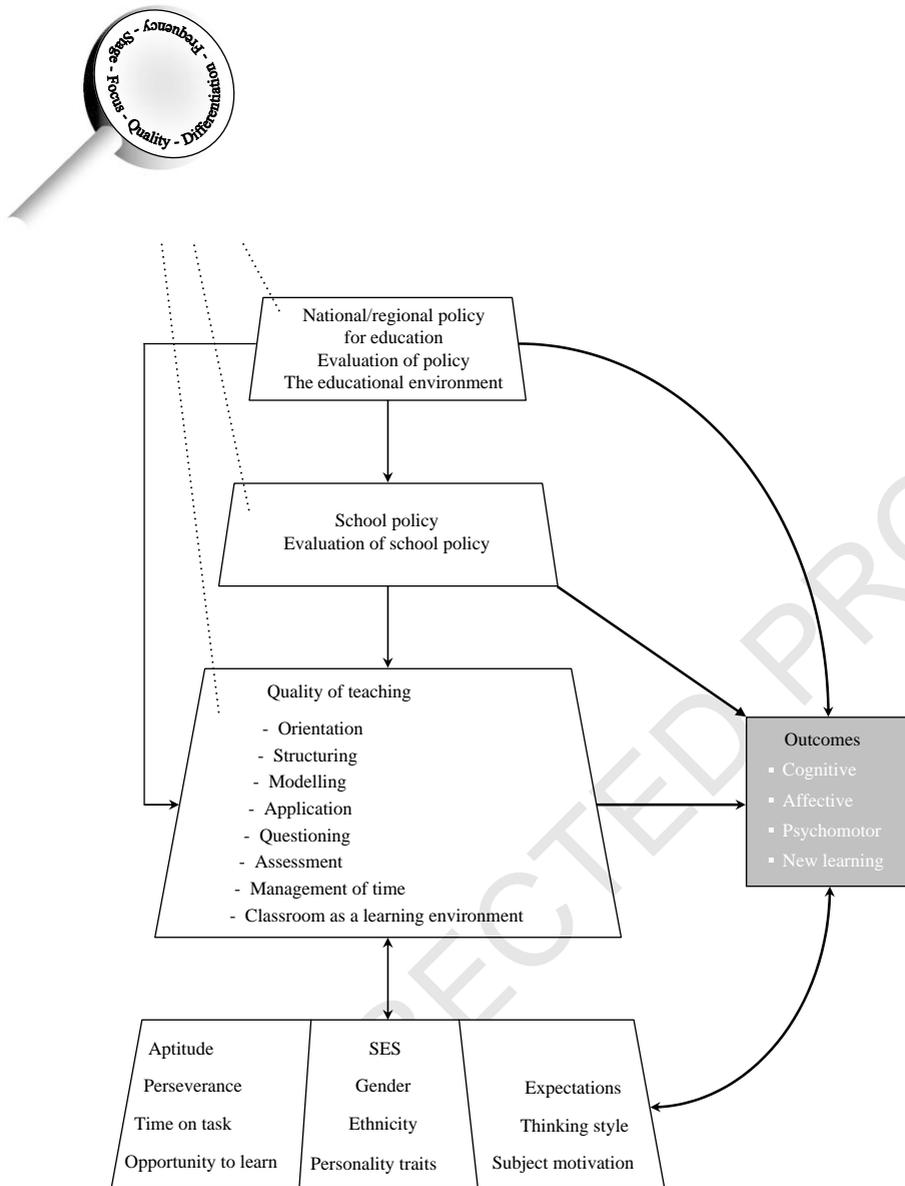


Figure 1. The dynamic model of educational effectiveness

between factors at different levels might be more complex than assumed in the current integrated models. This is especially true for interaction effects among factors operating at classroom and student level which reveal the importance of investigating differential effectiveness (Kyriakides and Tsangaridou 2008).

Third, the dynamic model also assumes that the impact of the school and context level factors has to be defined and measured in a different way than the impact of classroom-level factors. Policy on teaching and actions taken to improve teaching practice must be measured over time and in relation to the weaknesses that occur in

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190 a school. The assumption is that schools and educational systems which are able to
195 identify their weaknesses and develop policy on aspects associated with teaching and
the school learning environment are also able to improve the functioning of
classroom-level factors and their effectiveness status. Only changes in those factors
for which schools face significant problems are expected to be associated with the
improvement of school effectiveness. This implies that the impact of school and
context level factors depends on the current situation of the objects under
investigation. This characteristic of the dynamic model does not only reveal an
essential difference in the nature of this model with all the current models of
educational effectiveness but as it is shown in the next section it has some significant
implications for designing studies attempting to use the model for improvement
purposes.

200 Fourth, the dynamic model is based on the assumption that the relation of some
effectiveness factors with achievement may not be linear. This assumption is
supported by results of quantitative syntheses investigating the effect of some
effectiveness factors upon student achievement. These studies revealed that although
these variables have been perceived as factors affecting teacher or school effective-
ness, the research evidence is problematic. For example, teacher subject knowledge
is widely perceived as a factor affecting teacher effectiveness (Scriven 1994), but
teachers' subject knowledge, regardless of how it is measured, has rarely correlated
strongly with student achievement (Borich 1992; Darling-Hammond 2000). The
explanation may be, as Monk (1994) reported, that the relationship is curvilinear:
205 a minimal level of knowledge is necessary for teachers to be effective, but beyond
a certain point, a negative relation occurs. Similar findings have been reported for the
association of self-efficacy beliefs with teacher effectiveness (Schunk 1991; Steven-
son, Chen, and Lee 1993) and for the impact of classroom emotional climate and
teacher management upon effectiveness. A negative emotional climate usually shows
negative correlations, but a neutral climate is at least as supportive as a warm
climate. Beyond an optimal level of teacher direction, drill or recitation becomes
dysfunctional (Soar and Soar 1979). This implies that optimal points for the
functioning of factors in relation to student outcomes have to be identified. By doing
so, different strategies focusing on the improvement of specific factors for each
teacher/school could emerge (Creemers and Kyriakides 2006).

210 Fifth, the model assumes that there is a need to examine carefully the
relationships between the various effectiveness factors which operate at the same
level. Such an approach to modelling educational effectiveness reveals grouping
of factors that make teachers and schools effective. For example, a study has
demonstrated that the teacher factors measuring generic teaching skills can be
grouped into five levels which are discerned in a distinctive way and move gradually
215 from skills associated with direct teaching to skills concerned with new teaching
approaches. Teachers situated at higher levels were found to have better student
outcomes (see Kyriakides, Creemers, and Antoniou 2009). Therefore, interventions
can be designed to meet the needs of these five groups of teachers by addressing the
factors in their relationship to each other rather than addressing each teaching skill
independently. This implies that the dynamic model can be used to develop specific
strategies for improving effectiveness of teachers and school which are more
comprehensive in nature.

235 Finally, the dynamic model is based on the assumption that each factor can be
measured by taking into account the following five dimensions: *frequency*, *focus*,
stage, *quality*, and *differentiation*. Frequency is a quantitative way to measure
240 the functioning of each factor whereas the other four dimensions examine the
qualitative characteristics of the functioning of the factor. The frequency dimension
refers to the extent to which an activity associated with an effectiveness factor is
present in a system/school/classroom. For example, personal monitoring at school
245 level can be measured by taking into account how often and if principals use a
monitoring system to supervise teacher practices in the classroom. The functioning
of the factors can be examined by taking into account the *focus* of the activities
associated with the factor. Two aspects of focus are seen as important. The first one
250 refers to the specificity of the activities which can range from very specific to general.
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 general (e.g., it informs
255 parents that they are welcome to the school but without giving them specific
information about what, how and when). The second aspect of this dimension
addresses the purpose for which an activity takes place. 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
260 schools to get information about student progress). On the other hand, the activities
might be addressed more than one purpose (e.g., parents visit the school to exchange
information about children's progress and to assist teachers in and outside the
classroom). It is expected that there should be a balance with respect to the two
265 aspects of the focus dimension. For example, the guidelines on parental involvement
which are very general may not be helpful either for parents or teachers in
establishing productive relations which can result in supporting student learning. On
the other hand, a school policy which is very specific may restrict the involvement of
270 teachers and parents in creating their own ways for implementing the school policy.
Similarly, if all the activities are expected to achieve a single purpose, then the chance
to achieve this purpose are high but the effect of the factor might be small, due to
the fact that other purposes are not achieved and/or synergy may not exist since the
275 activities are isolated. 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. This example also points to the
possibility that an interaction between the two aspects of this dimension may exist.

270 The activities associated with a factor can be measured by taking into account
the *stage* at which they take place. It is expected 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. For example, school policy on quantity of teaching
275 (e.g., policy on teacher and student absenteeism) is expected to be implemented
throughout the year and not only through specific regulations announced at a
specific point of 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 in redefining
its own policy and adapting the activities related to the factor by taking into account
280 the results of its own self-evaluation mechanism.

The dimension *quality* can be discerned in two different ways. The first one refers
to the properties of the specific factor itself, as these are discussed in the literature.

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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 to the content taught). At the same time, this policy makes clear and guarantees that teachers are expected to make use of the information gathered from assessment in order to meet their student needs and this gives greater emphasis to the formative function of assessment (Black and Wiliam 1998; Harlen and James 1997).

Differentiation refers to the extent to which activities associated with a factor are implemented in the same way for all the subjects involved with it. 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 socio-economical background, and in personal styles of thoughts and work during learning (Dowson and McInerney 2003). Researchers in the area of educational effectiveness have shown that these differences are related to differences in students learning progress (Muijs et al. 2005). Principals are also expected to adapt their leadership to the specific needs of the teachers by taking into account the extent to which they are ready to implement a task. Similarly, policy-makers are expected to adapt their general policy into the specific needs of groups of schools. The differentiation dimension does not necessarily imply that the subjects (i.e., students, teachers, schools) are not expected to achieve the same outcomes. On the contrary, adapting the policy on the special needs of each group of schools/teachers/students may ensure that all of them will become able to achieve the same purposes.

The use of different measurement dimensions reveals that examining just the frequency of an effectiveness factor (e.g., the quantity that an activity associated with an effectiveness factor is present in a system/school/classroom) does not help us identify those aspects of the functioning of a factor which are associated with student achievement. Considering effectiveness factors as multidimensional constructs not only provides a better picture of what makes teachers and schools more effective but may also help to develop more specific strategies for improving educational practice (Kyriakides and Creemers 2008a).

The dynamic model as a theoretical framework for school improvement

In the second part of this section, we refer to the main reasons for using the dynamic model as a theoretical framework of the proposed school improvement approach. First of all, the model places emphasis on school improvement and this is reflected in the fact that two of the main overarching school factors not only refer to the actual policy on teaching and the learning environment of the school but also to actions that schools take in order to improve their policy and their learning environment. This implies that schools should continuously search for improving the school factors that are related with learning outcomes. In line with this conceptualization of improvement is the evidence which shows that effective schools should make a continuous effort to maintain effectiveness (Kyriakides and Creemers 2008b).

Second, the model represents the complexity of educational effectiveness but at the same time this representation in factors and dimensions of factors provides an opportunity to address improvement of education in a flexible way. Specifically, this

flexibility is promoted by treating differentiation as a dimension of measuring the functioning of each factor. This implies that the functioning of the school factors should be flexible enough to address differences in the student body and in school aims.

Third, the model points at the possibility of defining grouping of factors. This implies that more comprehensive strategies with synergetic effects can be developed in order to address the improvement needs of each school. Evidence supporting this assumption emerged from an experimental study investigating the impact of using the dynamic model to develop an integrated approach to teacher professional development (Antoniou 2009). As it has been mentioned earlier, teaching skills associated with the teacher factors of the dynamic model can be grouped into five stages. By providing training to teachers belonging to a specific stage, it was found that not only their skills were improved but also the learning outcomes of their students. Conversely, neither the competence-based approach addressing a single factor nor the holistic approach was found to have significant effects on teacher behaviour and/or their student outcomes.

Fourth, the model shows how school level factors (mostly the focus of school improvement) are linked with teacher factors which are directly related to the student outcomes and the effectiveness status of the school. By doing this, schools can search for improvement efforts that not only address specific school factors but also contribute to the improvement of teaching practice. For example, rather than attempting to improve all aspects of the school climate, they can focus their attention on those aspects of the climate that contribute to the learning of teachers and students. More specifically, the model provides empirical support evidence on specific aspects of the learning environment of school such as partnership policy, provision of learning resources and collaboration between teachers that are associated both directly and indirectly with learning outcomes.¹

Finally, the dynamic model emphasizes the role of school evaluation (especially its formative function) in improving the effectiveness status of the school by treating evaluation of school policy of teaching and evaluation of the school learning environment as overarching school factors. This implies that effective schools should develop their own evaluation mechanisms and make use of data emerging from evaluation to improve the functioning of their policy on teaching and their learning environment. In addition, the model refers to factors at teacher and school level for which systematic evidence on their importance for educational effectiveness was found in studies conducted during the last twenty years, as different meta-analyses have shown (see Kyriakides, Creemers, and Antiniou 2009).

A dynamic approach to improvement

In this section, we refer to specific strategies that can be used by different stakeholders who are planning to make use of the dynamic model to improve school effectiveness. It is stressed that the improvement efforts should be based at the school level and this can be done by examining the relations between the school factors and the aims of the specific improvement project. The dynamic model acknowledges the importance of the school climate, and for this reason, not only actions taken for improving teaching are treated as factors of effectiveness but also actions taken for improving the School Learning Environment (SLE) are seen as

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essential characteristics of effective schools (Creemers and Kyriakides 2008). It also
375 is assumed that teachers should be considered an essential lever of change, because
change is explicit in their classrooms and daily practices. However, for effective
school improvement, individual teacher initiatives are not enough. Teachers can
succeed in achieving major changes in their classrooms with strong effects on student
380 outcomes, but these intervention programmes are not expected to have a lasting
impact on the school as an organisation. Improvement efforts initiated by one
teacher will generally disappear (e.g., when the teacher changes school), unless the
school as an organisation sustains the efforts. This important notion is problematic
for educational systems that have no strong tradition of school-level improvement,
385 even when teacher improvement activities may occur (Kyriakides 2005b). However, it
is not suggested that all improvement activities necessarily concern all members of a
school staff. In practice, this will not happen very often. At the same time, it is argued
here that we should try to use the knowledge base of EER in order to identify needs/
priorities for improvement. Specifically, the dynamic model gives emphasis to the
390 development of school-based programmes that are aiming to improve the quality of
teaching at classroom and school level and aspects of the SLE that can contribute
directly and/or indirectly to the improvement of teaching practice.

Second, beyond the use of the available literature associated with an improve-
ment project, one should also bear in mind that the improvement strategy will not be
395 implemented successfully unless attention is given to the school factors that can
explain variation in the way different school stakeholders make use of an
improvement initiative. For example, schools making efforts to develop strategies
and actions to counteract bullying should take into account that the effective
implementation of their interventions partly depends on whether they are also
400 able to improve the school learning environment (SLE) and especially the relation of
the SLE with the strategies and actions on bullying (Kyriakides, Creemers, and
Charalambous 2008). This implies that school stakeholders should make use of
the literature associated with the aims of the specific improvement project and merge
the findings of this research area with the value assumptions and the essential
405 characteristics of the dynamic model.

Finally, it is taken for granted that the ultimate criterion for a successful
improvement effort is concerned with its impact on learning and the learning
outcomes. In this paper, we also provide the main components of the dynamic
410 approach to school improvement. Thus, the last part of this section illustrates how
the dynamic model can be used in order to contribute to the establishment of
a theory-driven approach to school improvement by providing prerequisites for a
better use of EER for the improvement of quality in education.

Establishing clarity and consensus about the aims of school improvement

The first step of any school improvement effort is based on the assumption that it is
415 important to start with a clear understanding of your destination and how you are
seeking to reach improvement in the quality of education. It could be considered
as ‘a purposeful task analysis’ (Wiggins and McTighe 1998, 8), which suggests a
planning sequence. Moreover, commitment to collaborative work needs to be
established. However, Fullan (2001) points out that people have different perceptions
of change. Hence, it is difficult to reach consensus among the participants in school

420 reform efforts, albeit this may be crucial to its success. Therefore, it is important to
establish procedures to ensure clear understanding among stakeholders as to the
aims of any school improvement programme. At this point, the dynamic model can
be a useful tool for helping stakeholders realise that the ultimate aim of any school
425 reform effort should be to improve student achievement across the school. Unless
learning and learning outcomes are improved, any school improvement effort should
not be considered truly successful no matter how much it has managed to improve
any aspect of the climate of the school. An example of such an approach can be given
to evaluation of the impact of network learning communities in England or New
430 Community Schools in Scotland where a range of positive impacts were reported by
teachers and head teachers but where little impact on student achievement was found
(Sammons et al. 2007). The model may also help schools define not only the ultimate
aim of their improvement effort, which should be concerned with the improvement
of learning outcomes, but also its intermediate objectives. Since the model refers
435 to factors that are changeable and associated with student learning outcomes, the
intermediate objectives should address the needs of schools to improve the
functioning of specific factors included in the dynamic model. The support that
the dynamic model could provide to schools to address these factors is discussed
further in the next section.

440 ***Identifying school factors that are able to influence learning and teaching to
improve and/or maintain the quality of schools***

Beyond providing support to school stakeholders to design improvement pro-
grammes, using the dynamic model in order to establish a theory driven approach to
school improvement implies that school stakeholders should attempt to build whole
school reform efforts. These efforts aim to improve the functioning of school level
445 factors included in the model. This is due to the fact that although the dynamic
model refers to factors which operate at different levels, school level factors are
expected to have both direct and indirect effects on student learning outcomes. As
mentioned above, school level factors are expected to influence not only student
achievement but also the functioning of classroom level factors (see Figure 1).
450 Therefore, designing improvement efforts focusing on the classroom level factors
may improve the teaching practice of individuals but may not necessarily improve
the learning environment of the school. In such cases, teachers who may manage to
improve aspects of their teaching practice addressed by a specific improvement effort
will need, at some stage, some other type of support to improve other teaching skills.
455 But in cases where the reform does not aim to improve the SLE, such support may
not be available when needed and the long lasting effect of a programme aiming to
improve teaching practice could be questioned. At the same time, it is acknowledged
that school stakeholders should develop interventions/improvement efforts which
will not only improve the functioning of the school level factors but will ultimately
460 promote quality of teaching that will eventually raise student achievement. There-
fore, the dynamic model supports the use of a theory driven approach to school
improvement which gives emphasis to improving teaching practice but attempts to
do so not only by influencing teaching practice but also by improving the
functioning of school level factors.

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465 In order to elaborate further on this point, we refer to the two main overarching
school factors of the model which are concerned with teaching practice and the SLE.
470 In defining these factors, the model does not only refer to school policy in relation to
teaching and the learning environment of the school. Actions taken to improve these
two aspects of school policy are seen as characteristics of effective schools. The latter
475 implies that schools can not remain effective unless actions are taken to improve
teaching practice and the learning environment. Since schools and their effectiveness
status do not remain stable (Kyriakides and Creemers 2008b; Slater and Teddlie
1992), not only research on school effectiveness but also improvement efforts and
480 evaluation mechanisms should be developed in such a way that relevant changes in
their activities will take place continuously. But in order to study change over time, it
also is necessary to study teachers and schools longitudinally (i.e., over the course of
multiple years). The dynamic model seems to take this need into account, as this is
485 reflected not only in the use of 'stage' as a measurement dimension of effectiveness
factors but also in its conceptualisation of effectiveness factors at the level of school
and at the level of the context of education. More specifically, the capacity of
schools/educational systems to improve their policy of teaching and their policy
of the learning environment of the schools is considered as an essential characteristic
490 of an effective school/educational system. Therefore, the assumption that effective-
ness is a stable characteristic of a school over time is not justified by the dynamic
model. On the contrary, it is claimed that fluctuations or changes in results over time
may reflect 'real' improvement or a decline in school/teacher performance, as well as
any random variations. Changes in results may be explained by planned or naturally
495 occurring school/teacher improvement or by non-changing school policies and
teacher practices in a changing context, or by both. Slater and Teddlie (1992) assume
that effective schooling is a dynamic, ongoing process. Moreover, the dynamic model
assumes that effective schools/educational systems are expected to change in order to
remain effective as their contexts change; they must, therefore, adapt their schooling
500 to the changing context. A study investigating changes/stability in the effectiveness
status of schools has provided support to this argument. It was also shown that
schools which were among the most effective but did not take any actions to improve
the functioning of school factors dropped to the status of typical schools (Creemers
and Kyriakides 2009a). On the other hand, schools which were among the
505 least effective but took measures to improve the functioning of the school factors
managed to improve their effectiveness status. This idea is consistent with the
contingency theory (Donaldson 2001; Mintzberg 1979) and can be seen as one of the
main assumptions upon which the dynamic model is based. Therefore, the dynamic
model reveals that the process of improving effectiveness is one that should take
place in all schools, irrespective of how effective they are. Moreover, it implies that
schools which are among the most effective should take actions to remain effective
and these actions should have a direct effect on improving teaching and the SLE.

Collecting evaluation data and identifying priorities for improvement

The use of a valid theory to design an improvement effort cannot in itself ensure that
its aims will be achieved even if the proposed reform is implemented in the way it was
510 designed (Kyriakides et al. 2006). In this paper, we do not only argue for following a
theory-driven approach to improve the quality of schools. Emphasis is given to using

empirical evidence for diagnosis in order to identify the strengths and weaknesses of a school and design relevant improvement efforts. The importance of using an evidence-based approach to school improvement arises from the fact that the dynamic model treats evaluation of school policy of teaching and evaluation of the SLE as important overarching factors operating at the school level. Therefore, the definition of the factors at the school and classroom level, especially their five measurement dimensions, can be used first for all for designing instruments that will help schools collect data about the functioning of these factors. Research instruments of studies investigating the validity of the dynamic model (Kyriakides and Creemers 2008a) may also be found helpful. Based on the results which will emerge from measuring the functioning of the school and classroom level factors, the strengths and weaknesses of schools will be identified. Moreover, stakeholders may identify priorities for improving the functioning of specific factors and/or grouping of factors. In order to do that, the measurement framework of the functioning of factors included in the dynamic model can be used. Since this framework refers to five dimensions of each factor, evaluation data may reveal more than one improvement priority for each school. The identification of more than one weakness is not always helpful for identifying how a particular teacher can be developed professionally. However, due to the dynamic nature of the model used to develop this improvement strategy, different priorities for professional development for each teacher/school/educational system will be identified.

Finally, as it was argued in the previous section, the dynamic model supports the idea that school factors have situational effects and the impact of an intervention programme which attempts to improve a specific aspect of teaching practice will depend on what the current situation of the objects under consideration (i.e., students, classrooms, schools, system) is. Therefore, data collected through this approach may help school stakeholders and policy-makers identify the dimensions that constitute the major weaknesses of their schools and design relevant intervention programmes to improve the quality of education.

Using the dynamic model to establish a developmental evaluation strategy

The dynamic model may help stakeholders establish a developmental evaluation strategy in their attempt to improve the effectiveness status of teachers and schools. According to the dynamic model and especially the stage dimension of the two school evaluation overarching factors, a continuous model of school evaluation should exist in order to allow schools adapt their policy decisions to the needs of different groups of school stakeholders. It can, therefore, be claimed that the dynamic model suggests that a developmental evaluation strategy should be established at either the macro or micro level. This strategy should ultimately contribute to the improvement of the effectiveness status of teachers and schools.

For example, a developmental evaluation strategy of the school policy and of the actions taken for improving the relations of school with parents can be used. In such a case, the evaluation process is expected to follow a linear sequence that starts with the development of a plan for school policy on partnership, from which priorities and targets will emerge with associated performance indicators. At the next stage, evaluation questions that followed from the targets and performance indicators will be established to provide the criteria for data collection. Then, the data will be

analysed and feed back into the formative process of evaluation. In this way, stakeholders will be able to find out what is happening during the implementation of the school policy on partnership.

This strategy for improving effectiveness has a number of significant features. The evaluation process is expected to assist the implementation and development of a school policy since the establishment of targets and performance indicators may specify the developmental process of the partnership policy. Moreover, evaluation data may be related, through the evaluation questions, to the aims of the policy. As a consequence, a logical chain of action that relates aims to targets, to evaluation questions, and to particular information sources can be established. However, it has to be acknowledged that, although the evaluation process is presented here as linear, it is very likely to be less tidy in practice. Once the evaluation process is underway, different working groups of stakeholders (e.g., coordinators of partnership policy, teachers of different subjects) may implement parts of the policy at different rates (see Kyriakides 2005b). However, the extent to which there is a gap between the implementation of a reform policy and the design of an intervention could be identified. Thus, the results of theory-driven evaluation studies, especially those addressing the formative purpose of evaluation, may help stakeholders take decisions on how to improve the quality of school policy or on how to provide additional support to those working groups that may need it (Kyriakides et al. 2006).

Beyond the fact that the school-level factors included in the dynamic model provide strong support for the use of this strategy to improve effectiveness, the model can also be treated as a tool from which criteria of school effectiveness could arise. Teachers and other stakeholders could be encouraged to draw their own meanings of what makes a school and a teacher effective by considering the knowledge base of educational effectiveness provided by the dynamic model. Such an approach may not only contribute to the professional development of teachers but also to the establishment of criteria of school and teacher effectiveness and the identification of the specific aims of their intervention. Moreover, the proposed measurement framework of effectiveness factors could help stakeholders establish targets and performance indicators and, thereby, specify the developmental process of designing and implementing a reform policy. Further research is, however, needed to investigate the impact that the use of the dynamic model may have on improving teaching practice through building a developmental evaluation strategy of any improvement effort of schools. Thus, in the last section of this paper, we provide suggestions for research, considering under which conditions schools can make use of the dynamic model for improvement of the quality of education.

Conclusions and suggestions for research

In this paper, the use of a theory-driven and evidence-based approach to school improvement is supported. It is argued that the dynamic model can help schools to establish such approach. The main components of this dynamic approach to school improvement are also presented. In the presentation, it is emphasised that the model can help schools to establish consensus about the ultimate and intermediate aims of their school improvement efforts and to address factors that are able to influence learning and teaching both at the classroom and school level resulting in improvement plans and actions. The role of evaluation is also emphasised. It is

605 suggested that the dynamic model can help schools to collect evaluation data and identify priorities for improvement. The role of evaluation is not restricted to identifying priorities but a developmental evaluation strategy using the dynamic model is expected to help schools to improve their plans and actions during the development and implementation of the improvement efforts. In this way, the evaluation mechanisms play a significant role in the process of improvement.

610 By comparing the dynamic approach to school improvement with more traditional approaches, a number of essential differences can be identified. First, it was argued above that the dynamic model refers to a grouping of factors and empirical support to this assumption was provided. This is an argument against approaches which focus solely on a single factor or on approaches which are very broad and take actions that address factors that are not interrelated. The proposed approach advocates the need for developing comprehensive strategies of improvement which address factors found to be interrelated and associated with student learning outcomes. Second, the dynamic model stresses the importance of using different dimensions to examine the functioning of effective factors. This implies that improvement strategies should not restrict themselves to the quantitative characteristics of the factors addressed but also look at its qualitative characteristics. Third, the dynamic model treats the effects of school factors as situational and thereby advocates the need to examine in a systematic way the needs of each school rather than introducing an intervention addressing the same factors to all schools without taking into account contextual differences that may exist. Fourth, the proposed approach is based on the assumption that effective schooling is a dynamic process implying that schools should be involved in a continuous process aiming to improve the functioning of school factors. However, by arguing that strategies and actions to improve the functioning of a school factor should be implemented during a long period does not imply that the same strategies and actions will be used. The model is flexible enough to encourage the adaptation of these strategies and actions according to the situation that a school is at in a specific moment. Fifth, in order to follow this approach to school improvement, schools need to develop self-evaluation mechanisms which concentrate on the functioning of the factors and their impact on student learning outcomes. In the literature, school self-evaluation is conceptualised in many different ways and sometimes it is only process-oriented but this approach supports that both the functioning of specific factors and their impact to student learning outcomes need to be evaluated.

630 Finally, the dynamic approach to school improvement is based on the assumption that the role of researchers and educational professionals (e.g., teachers, advisors, policy-makers) should change. Educational professionals should concentrate their actions on how to have an impact on student learning outcomes by making use of the knowledge base of EER and contribute to its further development. On the other hand, researchers should be involved in the process of school improvement with their expertise on different theoretical perspectives of effective education and on conducting systematic evaluations to monitor the improvement efforts and contribute in the decision making for the design of interventions. In this way, our understanding of the process of change will be developed further and the impact of the proposed dynamic approach to school improvement will be evaluated.

645 This argument is supported by the positive results which emerged from two experimental studies undertaken in Cyprus investigating the extent to which the

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model can be used for improvement purposes. The first study was concerned with the use of the dynamic model for establishing school self-evaluation mechanisms (Demetriou 2009). Using group randomisation, three groups of schools were created and the effects of three different approaches of establishing school-self evaluation mechanisms on student achievement in mathematics were examined. Schools which made use of the dynamic model to develop their school self evaluation mechanisms were found to make more progress than the other two groups using traditional approaches to school improvement. The second study was concerned with the use of the dynamic model for improvement purposes at teacher level (Antoniou 2009) and revealed that by establishing programmes based on grouping of teacher factors, the skills of teachers were improved to a much higher level than those of teachers attending a programme based on the holistic approach. Moreover, a positive impact of the proposed approach on student learning outcomes was observed. However, it should be acknowledged that not only experimental but also case studies are needed to identify the extent to which teachers and schools can make use of the dynamic model for improvement purposes. We also need comparative studies which will investigate the extent to which the dynamic model can help schools develop a theory-driven and evidence-based approach to school improvement. These comparative studies will eventually reveal the strengths and weaknesses of the proposed dynamic approach to school improvement and may help us identify under which conditions teachers and schools in different contexts can make use of this approach to improve the quality of education.

Note

1. A series of studies provided empirical support to the main assumptions of the dynamic model. First, a longitudinal study testing the validity of the model at the classroom and school level provided support to the importance of most teacher and school factors (see Kyriakides and Creemers 2008; Creemers and Kyriakides 2009b). The importance of using five dimensions to measure the functioning of school and teacher factors has also been demonstrated. Second, a quantitative synthesis of the results of studies exploring the impact of school factors on student achievement has provided some further support to the validity of the model at the school level (Kyriakides et al. in press). Third, a study investigating the impact of teacher factors at different phases of schooling revealed that most teacher factors can be treated as generic but some of them are more important for specific age group of students (Kyriakides and Creemers 2009). Finally, a replication study was conducted in the same schools where the original longitudinal study took place and provided support to the generalisability of the findings of the original study. Moreover, changes in the functioning of school factors could help us predict the observed changes in the effectiveness status of these schools (Creemers and Kyriakides 2009a).

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Notes on Contributors

References

- Antoniou, P. 2009. Using the dynamic model of educational effectiveness to improve teaching practice: Building an evaluation model to test the impact of teacher professional development programs. Unpublished doctoral dissertation, University of Cyprus, Cyprus.
- Black, P., and D. Wiliam. 1998. *Inside the black box: Raising standards through classroom assessment*. London: King's College London School of Education.
- Borich, G.D. 1992. *Effective teaching methods*. New York: Macmillan Publishing Company.

- Creemers, B.P.M. 1994. *The effective classroom*. London: Cassell.
- Creemers, B.P.M., and L. Kyriakides. 2006. Critical analysis of the current approaches to modelling educational effectiveness: The importance of establishing a dynamic model. *School Effectiveness and School Improvement* 17, no. 3: 347–66.
- Creemers, B.P.M., and L. Kyriakides. 2008. *The dynamics of educational effectiveness: A contribution to policy, practice and theory in contemporary schools*. London: Routledge.
- Creemers, B.P.M., and L. Kyriakides. 2009a. Explaining stability and changes in schools: A follow-up study testing the validity of the dynamic model. Paper presented at the EARLI conference, Amsterdam, the Netherlands.
- Creemers, B.P.M., and L. Kyriakides. 2009b. Situational effects of the school factors included in the dynamic model of educational effectiveness. *South African Journal of Education*.
- Creemers, B.P.M., and J.G. Reezigt. 1997. School effectiveness and school improvement: Sustaining links. *School Effectiveness and School Improvement* 8: 396–429.
- Creemers, B.P.M., and J.G. Reezigt. 2005. Linking school effectiveness and school improvement: The background and outline of the project. *School Effectiveness and School Improvement* 16, no. 4: 359–71.
- Darling-Hammond, L. 2000. Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives* 8, no 1. <http://epaa.asu.edu/epaa/v8n1/>.
- De Jong, R., K.J. Westerhof, and J.H. Kruiter. 2004. Empirical evidence of a comprehensive model of school effectiveness: A multilevel study in mathematics in the 1st year of junior general education in the Netherlands. *School Effectiveness and School Improvement* 15, no. 1: 3–31.
- Demetriou, D. 2009. Using the dynamic model to improve educational practice. Unpublished doctoral dissertation, University of Cyprus, Cyprus.
- Donaldson, L. 2001. *The contingency theory of organizations: Foundations for organisational science*. Thousand Oaks, CA: Sage.
- Dowson, M., and D.M. McInerney. 2003. What do students say about motivational goals? Towards a more complex and dynamic perspective on student motivation. *Contemporary Educational Psychology* 28, no. 1: 91–113.
- Driessen, G., and P. Sleegers. 2000. Consistency of teaching approach and student achievement: An empirical test. *School Effectiveness and School Improvement* 11, no. 1: 57–79.
- Fullan, M. 2001. *The new meaning of educational change*. New York: Teachers College.
- Goldstein, H. 2003. *Multilevel statistical models*. London: Edward Arnold.
- Gray, J., D. Hopkins, D. Reynolds, B. Wilcox, S. Farrell, and D. Jesson. 1999. *Improving schools: Performance and potential*. Buckingham: Open University Press.
- Harlen, W., and M. James. 1997. Assessment and learning: Differences and relationships between formative and summative assessment. *Assessment in Education* 4, no. 3: 365–79.
- Kyriakides, L. 2005a. Extending the comprehensive model of educational effectiveness by an empirical investigation. *School Effectiveness and School Improvement* 16, no. 2: 103–52.
- Kyriakides, L. 2005b. Evaluating school policy on parents working with their children in class. *The Journal of Educational Research* 98, no. 5: 281–98.
- Kyriakides, L. 2008. Testing the validity of the comprehensive model of educational effectiveness: A step towards the development of a dynamic model of effectiveness. *School Effectiveness and School Improvement* 19, no. 4: 429–46.
- Kyriakides, L., R.J. Campbell, and A. Gagatsis. 2000. The significance of the classroom effect in primary schools: An application of Creemers' comprehensive model of educational effectiveness. *School Effectiveness and School Improvement* 11, no. 4: 501–29.
- Kyriakides, L., C. Charalambous, G. Philippou, and R.J. Campbell. 2006. Illuminating reform evaluation studies through incorporating teacher effectiveness research: A case study in mathematics. *School Effectiveness and School Improvement* 17, no. 1: 3–32.
- Kyriakides, L., and B.P.M. Creemers. 2008a. Using a multidimensional approach to measure the impact of classroom level factors upon student achievement: A study testing the validity of the dynamic model. *School Effectiveness and School Improvement* 19, no. 2: 183–306.
- Kyriakides, L., and B.P.M. Creemers. 2008b. A longitudinal study on the stability over time of school and teacher effects on student learning outcomes. *Oxford Review of Education* 34, no. 5: 521–45.

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- Kyriakides, L., and B.P.M. Creemers. 2009. The effects of teacher factors on different outcomes: Two studies testing the validity of the dynamic model. *Effective Education* 1, no. 1: 61–85.
- Kyriakides, L., B.P.M. Creemers, and P. Antoniou. 2009. Teacher behaviour and student outcomes: Suggestions for research on teacher training and professional development. *Teaching and Teacher Education* 25, no. 1: 12–23.
- Kyriakides, L., B.P.M. Creemers, P. Antoniou, and D. Demetriou. In press. A synthesis of studies searching for school factors: Implications for theory and research. *British Educational Research Journal*.
- Kyriakides, L., B.P.M. Creemers, and A. Charalambous. 2008. Effective schools in facing and preventing bullying. Paper presented at the EARLI SIG 18 Conference, in Frankfurt Main, Germany.
- Kyriakides, L., and N. Tsangaridou. 2008. Towards the development of generic and differentiated models of educational effectiveness: A study on school and teacher effectiveness in physical education. *British Educational Research Journal* 34, no. 6: 807–83.
- Levine, D.U., and L.W. Lezotte. 1990. *Unusually effective schools: A review and analysis of research and practice*. Madison: National Center for Effective Schools Research and Development.
- MacBeath, J., and P. Mortimore. 2001. *Improving school effectiveness*. Buckingham: Open University Press.
- Mintzberg, H. 1979. *The structuring of organizations*. Englewood Cliffs, NJ: Prentice-Hall.
- Monk, D.H. 1994. Subject matter preparation of secondary mathematics and science teachers and student achievement. *Economics of Education Review* 13, no. 2: 125–45.
- Mortimore, P., P. Sammons, L. Stoll, D. Lewis, and R. Ecob. 1988. *School matters: The junior years*. Somerset: Open Books.
- Muijs, D., R.J. Campbell, L. Kyriakides, and W. Robinson. 2005. Making the case for differentiated teacher effectiveness: An overview of research in four key areas. *School Effectiveness and School Improvement* 16, no. 1: 51–70.
- Reezigt, G.J., H. Guldmond, and B.P.M. Creemers. 1999. Empirical validity for a comprehensive model on educational effectiveness. *School Effectiveness and School Improvement* 10, no. 2: 193–216.
- Reynolds, D., and L. Stoll. 1996. Merging school effectiveness and school improvement: The knowledge base. In *Making good schools: Linking school effectiveness and school improvement*, eds. D. Reynolds, R. Bollen, B. Creemers, D. Hopkins, L. Stoll, and N. Lagerweij, 94–112. London: Routledge.
- Sammons, P., T. Mujtaba, L. Earl, and Q. Gu. 2007. Participation in network learning community programmes and standards of pupil achievement: Does it make a difference? *School Leadership and Management* 27, no. 3: 213–38.
- Scheerens, J. 1992. *Effective schooling: Research, theory and practice*. London: Cassell.
- Schunk, D.H. 1991. Self-efficacy and academic motivation. *Educational Psychologist* 26, no. 3: 207–31.
- Scriven, M. 1994. Duties of the teacher. *Journal of Personnel Evaluation in Education* 8: 151–84.
- Slater, R.O., and C. Teddlie. 1992. Toward a theory of school effectiveness and leadership. *School Effectiveness and School Improvement* 3, no. 4: 247–57.
- Slavin, R.E. 2002. Evidence-based education policies: Transforming educational practice and research. *Educational Researcher* 31, no. 7: 15–21.
- Soar, R.S., and R.M. Soar. 1979. Emotional climate and management. In *Research on teaching concepts: Findings and implications*, eds. P. Peterson, and H. Walberg. Berkeley, CA: McCutchan.
- Stevenson, H.W., C. Chen, and S.Y. Lee. 1993. Mathematics achievement of Chinese, Japanese and American children: Ten years later. *Science* 259: 53–8.
- Stringfield, S.C., and R.E. Slavin. 1992. A hierarchical longitudinal model for elementary school effects. In *Evaluation of educational effectiveness*, eds. B.P.M. Creemers, and G.J. Reezigt, 35–69. Groningen: ICO.
- Teddlie, C., and D. Reynolds. 2000. *The international handbook of school effectiveness research*. London: Falmer Press.
- Wiggins, G., and J. McTighe. 1998. *Understanding by design*. Alexandria, VA: ASCD.