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### State of the art - teacher effectiveness and professional learning

Daniel Muijs<sup>a</sup>, Leonidas Kyriakides<sup>b</sup>, Greetje van der Werf<sup>c</sup>, Bert Creemers<sup>c</sup>, Helen Timperley<sup>d</sup> & Lorna Earl<sup>d</sup>

<sup>a</sup> University of Southampton, Southampton, UK

<sup>b</sup> University of Cyprus, Nicosia, Cyprus

<sup>c</sup> University of Groningen, Groningen, The Netherlands

<sup>d</sup> University of Auckland, Auckland, New Zealand

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## State of the art – teacher effectiveness and professional learning

Daniel Muijs<sup>a\*</sup>, Leonidas Kyriakides<sup>b</sup>, Greetje van der Werf<sup>c</sup>, Bert Creemers<sup>c</sup>,  
Helen Timperley<sup>d</sup> and Lorna Earl<sup>d</sup>

<sup>a</sup>*University of Southampton, Southampton, UK;* <sup>b</sup>*University of Cyprus, Nicosia, Cyprus;* <sup>c</sup>*University of Groningen, Groningen, The Netherlands;* <sup>d</sup>*University of Auckland, Auckland, New Zealand*

One of the key findings from decades of educational effectiveness research is the importance of the classroom level as a predictor of pupil outcomes. In this review, we therefore look at synthesising our best evidence from research on effective teaching, and its corollary, teacher development. In the 1st section, we will look at key findings from 35 years of research on effective teaching using a process-product research that has led to the identification of a range of behaviours which are positively related to student achievement. A key limitation of this research, however, is its focus on basic skills in English and maths. Therefore, in the 2nd section we review research on “new learning” and teaching for metacognitive and thinking skills. While in these 2 sections we have discussed key findings from research on teaching, including emerging knowledge on metacognition, it is important to continue to take into account ongoing developments in theories of learning. In the 3rd section of this paper, we develop the argument that a major contributing factor to this situation is that “state-of-the-art” understandings about processes and conditions that promote student learning are typically not used to construct appropriate learning environments for their teachers.

**Keywords:** teaching; teacher effectiveness; learning; cognitive science; teacher education

### Introduction

One of the key findings from decades of educational effectiveness research (EER) is the importance of the classroom level as a predictor of pupil outcomes. Research has consistently shown not only that the classroom level can explain more of the variance in pupil outcomes than the school level but also that a large proportion of this classroom-level variance can be explained by what teachers do in the classroom (Muijs & Reynolds, 2011). As a result of these findings, classroom practice has become firmly integrated into theoretical and empirical models of educational effectiveness (e.g., Creemers & Kyriakides, 2008). School effectiveness has made strong links to the older field of teacher effectiveness and has used many of the methods associated with that field, such as classroom observation using standardized observation instruments, adding to these different methods such as surveys and qualitative exploration, and newer understandings of learning and teaching. One element that has traditionally been less developed in EER is that of teacher professional development. This omission is somewhat peculiar in the light of the importance of professional development in models of effective school improvement, and the clear implication is that, if teacher behaviours are key to educational effectiveness, we need to pay attention to ways in which we can change practice as well as looking at what effective practice is.

This paper therefore aims to summarize key findings and developments in the area of teacher effectiveness, including recent developments in metacognition. In light of what we have said above, the paper will also discuss recent work on professional development.

Of course, it is not possible to present a full and comprehensive overview of all these areas in a paper of limited length such as this. Rather, we have presented what we feel are the key findings and developments in the field as a basis for discussion, and further research and development in our field. We hope it will serve this purpose.

The structure of this paper aims to take us from the most established elements of teacher effectiveness in EER to newer and emerging elements. In the first part, we will look at extant research on teacher effectiveness. The second part will discuss key findings on metacognition and “new learning”. In the third part, we will look at professional development.

### **The teacher effectiveness research base**

Following the breakthrough of behavioural learning theory in psychology in the 1950s and 1960s, researchers in education sought to apply some of the methods and insights of these theories to teaching practise. While the experimental designs that had characterized behaviourist psychology were not deemed suitable to study classroom practice, many other elements of behaviourist theory and methodology were adopted. One key aspect was the rejection of “mentalism”, the study of mental conditions which could not be objectively accessed, in favour of the study of measurable behaviours, while the other was an emphasis on finding those behaviours that could act as reinforcers of student behaviours and attainment (Borich, 1996; Muijs, 2012). During the last 35 years, researchers have therefore turned to teacher behaviours as predictors of student achievement in order to build up a knowledge base on effective teaching, while over time incorporating newer learning theories into their models. This research has led to the identification of a range of behaviours that are positively related to student achievement (e.g., Brophy & Good, 1986; Creemers, 1994; Doyle, 1986; Galton, 1987; Muijs & Reynolds, 2000). Key findings of these studies are discussed below.

### ***Opportunity to learn and time on task***

The most consistently replicated findings of teacher effectiveness studies conducted in different countries link student achievement to the quantity and pacing of instruction. Amount learnt is related to opportunity to learn, and achievement is maximized when teachers prioritize academic instruction and allocate available time to curriculum-related activities (Stallings, 1985).

The concept of opportunity to learn is a measure of curriculum content. Researchers have traditionally measured this by looking at whether or not the items covered by whatever test is being used to measure student progress have actually been taught to students, for example, by asking teachers to state whether they have covered the content measured by the item during the school year. This is closely connected to matters such as the length of the school day and school year, the amount of time allocated to the subject studied, and the curriculum. However, it is also influenced by time on task, the amount of time that students are actively engaged in learning during the lesson, as opposed to engaging in social activities or other non-educational pastimes (Brophy & Good, 1986). In their study of teacher effectiveness in the UK, Muijs and Reynolds (2003) found these two factors to be among the most strongly related to student outcomes.

Effective teachers are therefore expected to organize and manage the classroom environment as an efficient learning environment to maximize engagement rates (Creemers & Reezigt, 1996; Kyriakides, 2008). Teacher effectiveness research has consistently found that the way that the classroom is managed is important to avoiding misbehaviour and therefore to maximising time on task. Student misbehaviour is most likely to occur during the start of the lesson, at the end of the lesson, during downtime (which should be limited as much as possible), and during transitions. In all four cases, it is important to establish clear procedures for student behaviour. More generally, spending some time on establishing clear rules and procedures at the beginning of the year can save teachers a lot of time later in the year. The teacher should limit the number of rules and procedures used, however, and rules must be rigorously enforced, otherwise they will soon be ignored by students. The reasons for enforcing particular rules need to be explained to students, and students should be engaged in the process of making rules. Having a quick pace will stop students becoming disengaged and bored, and will thus further help avoid student misbehaviour (Brophy, 1981; Creemers, 1994; Evertson & Emmer, 1982; Muijs & Reynolds, 2011). However, it would be wrong to associate higher levels of time on task and opportunity to learn with a teacher-centred and authoritarian approach. On the contrary, Opdenakker and Van Damme (2006) found a positive relationship between opportunity to learn mathematics and a student-centred teaching approach in one recent study.

### ***Instruction and interaction***

The findings summarized above deal with factors associated with the *quantity* of academic activity. The variables presented below concern the *form* and *quality* of lessons and may be divided into those that involve giving information (structuring), asking questions (soliciting), and providing feedback (reacting).

With regard to the structuring factor, Rosenshine and Stevens (1986) point out that achievement is maximized when teachers not only actively present material but also structure it by:

- (1) beginning with overviews and/or review of objectives;
- (2) outlining the content to be covered and signalling transitions between lesson parts;
- (3) calling attention to main ideas;
- (4) reviewing main ideas at the end.

Summary reviews are also important since they integrate and reinforce the learning of major points. These structuring elements not only facilitate memorizing of the information but also allow students to understand it as an integrated whole, with recognition of the relationships between parts (Creemers & Kyriakides, 2008). Moreover, achievement is higher when information is presented with a degree of redundancy, particularly in the form of repeating and reviewing general views and key concepts. Clarity of presentation is also a consistent correlate of student achievement (Scheerens & Bosker, 1997; Seidel & Shavelson, 2007). Effective teachers are able to communicate clearly and directly with their students without digression, without speaking above students' levels of comprehension or using speech patterns that impair the clarity of what is being taught (Smith & Land, 1981; Walberg, 1986).

As far as the actual teaching process is concerned, research into classroom discourse reveals that, although there is a great deal of teacher talk in the classes of effective

teachers, most of it is academic rather than managerial or procedural, and much of it involves asking questions and giving feedback rather than extended lecturing (Cazden, 1986; Kyriakides & Creemers, 2008). Muijs and Reynolds (2000) state that the focus on teachers actively presenting materials should not be seen as an indication that a traditional lecturing and drill approach is an effective teaching approach. Effective teachers ask many questions and attempt to involve students in class discussion. Questioning by the teacher of the students, but also by students of the teacher and each other, can be used to check students' understanding, to "scaffold" students' learning, to help them clarify and verbalize their thinking, and to help them develop a sense of mastery (Brophy, 1992; Gagne, Yecovich, & Yecovich 1993; Mortimore, Sammons, Stoll, Lewis, & Ecob, 1988; Rosenshine & Furst, 1973; S. Veenman, 1992).

Effective questioning is one of the most widely studied aspects of teaching, and therefore a solid body of knowledge exists on which strategies are most effective. Questions need to be asked at the beginning of the lesson when the topic of the last lesson in that subject is being reviewed, after every short presentation, and during the summary at the end of the lesson. Teachers must provide substantive feedback to students resulting either from student questions or from answers to teacher questions. Most questions should elicit correct or at least substantive answers. Correct answers need to be acknowledged in a positive but businesslike fashion. When a student answers a question partially correctly, the teacher needs to prompt that student to find the remaining part of the answer before moving on to the next student. When a student answers a question incorrectly, the teacher needs to point out swiftly that the answer was wrong. If the student has answered incorrectly due to inattention or carelessness, the teacher must swiftly move on to the next student. If the answer is incorrect due to lack of knowledge, the teacher needs to try and prompt the student to answer correctly. Teachers need to make sure that girls and shy students, who may be less assertive, get the chance to answer questions (Askew & William, 1995; Brophy & Good, 1986; Evertson, Anderson, Anderson, & Brophy, 1980; Kyriakides & Creemers, 2009; Muijs & Reynolds, 2011).

The cognitive level of questions needs to be varied depending on the skills to be mastered. The best strategy would appear to be the use of a mixture of low-level and higher level questions, increasing the latter as the level of the subject matter taught gets higher. There should also be a mix of product questions (calling for a single response from students) and process questions (calling for explanations from the students), and effective teachers have been found to ask more process questions than ineffective teachers (Askew & William, 1995; Brophy & Good, 1986; Evertson et al., 1980; Muijs & Reynolds, 2000). Students should be encouraged to ask questions, which should be redirected to the class before being answered by the teacher. Relevant student comments should be incorporated into the lesson (Borich, 1996; Brophy & Good, 1986).

Although we have noted above that teachers need to spend a significant amount of time instructing the class, this does not mean that all seatwork is negative. Individual seatwork or small group tasks are a vital component of an effective lesson, as they allow students to review and practise what they have learnt during instruction (Creemers & Kyriakides, 2006). To be effective, however, tasks must be explained clearly to students, and the teacher must actively monitor the class and go round the classroom to help students, rather than sitting at her/his desk waiting for students to come to her/him. The teacher needs to be approachable to students during seatwork (Borich, 1996; Brophy & Good, 1986).

### *Classroom climate*

Classroom climate is a significant teacher factor, which has been found to be related to student attainment in a range of studies, albeit with only modest effect sizes (Muijs & Reynolds, 2000). Many researchers distinguish climate and culture, with the climate usually seen as associated with the behaviour of the stakeholders, whereas culture is seen as measuring the values and norms of the organization (Heck & Marcoulides, 1996; Hoy, Tarter, & Bliss, 1990). The classroom effects research tradition initially focused on climate factors, defined as managerial techniques (e.g., Doyle, 1986). Effectiveness studies conducted during the last 2 decades (e.g., Košir, 2005; Rohrbeck, Ginsburg-Block, Fantuzzo, & Miller, 2003; Slavin, 1983; Slavin & Cooper, 1999) reveal the importance of investigating teachers' contribution in creating a learning environment in their classroom by taking into account the following elements of the classroom environment:

- teacher–student interaction;
- student–student interaction;
- students' treatment by the teacher;
- competition and collaboration between students; and
- classroom disorder. (Creemers & Kyriakides, 2008; Kyriakides & Christoforou, 2011)

The first two elements are important components of measuring classroom climate, as classroom environment research has shown (Cazden, 1986; Den Brok, Brekelmans, & Wubbels, 2004; Fraser, 1991). The other three elements refer to the attempt of teachers to create a business-like and supportive environment for learning, especially since research on teacher effectiveness reveals that the classroom environment should not only be business-like but needs to be supportive for students (Walberg, 1986). Thus, effective teachers expect all students to be able to succeed, and their positive expectations are transmitted to their students.

### *Teacher expectations*

The latter point leads us to one of the most important factors both in classroom climate and in school and teacher effectiveness more generally: the teacher's expectations of her/his pupils. From the late 1960s onwards, research has found that teachers' expectations of their pupils can become a self-fulfilling prophecy. Pupils that teachers expect to do well tend to achieve better, while pupils who are expected to do badly tend to fulfil their teachers' expectations as well. School effectiveness research has paid a lot of attention to this factor, which has been found to be consistently significant, though again with generally modest to moderate effect sizes (Mortimore et al., 1988; Reynolds, Sammons, Stoll, Barber, & Hillman, 1996; Rutter, Maughan, Mortimore, & Ouston, 1979).

Of course, one could argue that the relationship between teachers' expectations of their pupils' achievement and pupils' actual outcomes is merely the result of teachers having accurate perceptions of their pupils' ability. However, teachers form expectations of pupils even before they have any evidence for their performance, and these expectations have been found to be related to pupils' ethnic, gender, and background characteristics. Thus, teachers tend to have lower expectations of working class pupils than of middle class pupils, they tend to have lower expectations of pupils from ethnic minorities,

and in the past they tended to have lower expectations of girls, although there is some evidence that this has changed to the extent that gender expectations in many cases may have become reversed (Jussim & Eccles, 1992; Muijs & Reynolds, 2011).

These expectations can affect pupils in a variety of (often subtle) ways. Teachers communicate their expectations of certain pupils to them through verbalizations, by paying closer attention to high expectancy pupils and spending more time with them, by failing to give feedback to responses from low-expectancy pupils, by criticizing low-expectancy pupils more often and praising them less often, by not waiting as long for the answer of low-expectancy pupils, by calling on them less to answer questions, by asking them only lower order questions, giving them more seatwork and low-level academic tasks, and by leaving them out of some learning activities (Brophy & Good, 1986). These expectations are then internalized by the pupils and the peer group, who start to behave in the way expected of them by the teacher. Combatting low expectations is challenging, but strategies such as alerting teachers to successes of pupils from disadvantaged backgrounds, mixed-ability grouping, and relying on objective measures of attainment rather than supposition have been posited as helpful in overcoming negative expectations, as has a view of ability focused on malleability rather than fixed levels of ability and an emphasis on the role of effort rather than ability in achievement (Chen & Pajares, 2010; Liu & Wang, 2008).

### *Differential teacher effectiveness*

The traditional process-product teacher effectiveness research has focused on generic teaching factors as they are related to cognitive student outcomes, and more particularly to attainment in standardized tests. While having produced much useful data and information in this regard, the field has been criticized for this overly homogenized approach, and calls have been launched for increased attention to differential teacher effectiveness (Campbell, Kyriakides, Muijs, & Robinson 2003).

The evidence here is, however, somewhat mixed. In an overview of research in four domains: subject and curriculum area, student socioeconomic status (SES) and ability, student personal characteristics, and teacher roles, some evidence was found for differential effectiveness according to curriculum area. Differences have been found between subjects such as English and maths, although it has to be pointed out that these differences were built upon strong generic similarities. The evidence on differential teaching goals was more mixed. Specific teaching methods did appear appropriate for teaching higher order thinking skills, but in other areas, such as self-esteem, no strong evidence existed. Evidence was stronger in the area of differential effectiveness with respect to student background. There was some firm evidence of differences with regard to both effective teaching practice and curriculum appropriateness depending on student background, though again these were often matters of degree (e.g., extent of structure and praise) rather than pointing to a complete disjuncture between teaching methods or curricula (Muijs, Campbell, Kyriakides, & Robinson 2005).

The area of learning styles and multiple intelligences, while much touted in recent years, did not seem underpinned by any evidence of effectiveness. Finally, while it seems intuitively to be expected that the characteristics teachers need to exhibit to be effective pastoral carers or leaders will differ from those of effective classroom teachers, there was a lack of strong empirically underpinned research on what characteristics make teachers effective in the pastoral area. Evidence was stronger in the area of leadership roles, as at least characteristics of effective leaders have been studied (Muijs et al., 2005).



### ***Meta-analyses of effective teaching***

While teacher effectiveness research has long benefitted from synthesis of findings in literature reviews (see Borich, 1996; Muijs et al., 2011; Muijs & Reynolds, 2011; for examples), a recent development in the field has seen the use of meta-analysis as a key method for synthesizing findings, and this has been found to be of great relevance to the field of teacher effectiveness. Meta-analysis is a quantitative approach that combines results from different studies to come to an aggregate conclusion. Overall estimates of effect sizes are calculated based on an initial systematic review of the evidence.

A number of meta-analyses have looked specifically at teacher effectiveness variables, often within a broader educational effectiveness framework.

Scheerens and Bosker (1997) conducted a detailed meta-analysis of educational effectiveness research, grouping variables into categories based on process-product teacher effectiveness and school effectiveness frameworks. They found variables related to reinforcement of content and feedback to students to have the strongest impact on student outcomes, with modest to strong effects, while cooperative learning, differentiation and adaptive instruction, and time on task had moderate effects. Structured teaching, opportunity to learn, and use of homework had weak but significant effects.

In their meta-analysis, Seidel and Shavelson (2007) employed an alternative cognitive model of teaching and learning to reanalyse studies that had previously been categorized using a process-product teacher effectiveness framework. Three types of outcomes were studied: cognitive, motivational-affective, and learning processes. The execution of domain-specific learning activities had the strongest impact on cognitive outcomes, with a moderate effect size. For motivational-affective outcomes, highest effect sizes were associated with domain-specific activities, social experiences, time for learning, and regulation and monitoring. For learning processes, domain-specific learning activities, time for learning, and social experiences showed the highest effect sizes.

Marzano and colleagues conducted a meta-analysis of over 300 in-school interventions based on the teacher effectiveness research base. They found that the interventions had an overall effect size of .42, with the effects being stronger in primary schools and weaker in middle and high schools. The group studied 15 instructional strategies and found the effect sizes largest for building vocabulary, identifying similarities and differences, interactive games, nonlinguistic representations, note taking, student discussion/chunking, tracking student progress and scoring scales, and weakest for summarising (Haystead & Marzano, 2009).

Kyriakides, Creemers, Antoniou, and Demetriou (2010) employed the dynamic model of educational effectiveness (see below) as the framework for their meta-analysis of school- and classroom-level factors affecting student outcomes. Factors related to teaching showed significant albeit only moderate relationships with student outcomes, with factors included in the dynamic model supported, while those that were not included were not significant.

The most influential set of recent meta-analyses relevant to teacher effectiveness research were probably those conducted by John Hattie, culminating in his book *Visible Learning* (Hattie, 2009), which synthesised over 800 different meta-analyses to come to an overarching meta-analysis of educational interventions. Hattie's findings, like those of the meta-analyses discussed above, generally concur with the main body of educational effectiveness research in finding that classroom practice is the strongest determinant of student outcomes. The same is true of the factors identified as having the strongest effect sizes. Many of these confirm previous teacher effectiveness findings, such as the

importance of feedback, classroom behaviour, teacher clarity, teacher–student relationships, cooperative learning, direct instruction, mastery learning, classroom management, peer tutoring, worked examples, and concept mapping (Hattie, 2009). The newer metacognitive education methods (see below) also emerge in Hattie’s analyses, with both problem-solving skills and metacognitive strategies emerging as important. Many other strong effect sizes come from interventions targeting specific pupil groups or subject areas, such as repeated reading programmes, phonics instruction, and outdoor/adventure programmes. However, some of Hattie’s findings point to lacunae in our understanding of effective teaching, especially the importance of student self-reported grades and formative evaluation, which suggest that assessment and student self-reflection may have been underplayed in our previous research.

Of course, there are some critiques to be made of this study and meta-analytic methods in general, just as there are of traditional teacher effectiveness studies. One is the inherent difficulty of combining studies in a field where clarity and agreement over concepts and the application and measurement thereof is very often missing. This problem is confounded in combining results from separate meta-analyses, as different researchers will use different inclusion and quality criteria in collating their own meta-analyses. A further issue is that the methodology of meta-analysis only allows for the calculation of correlations indicative of direct effects. This is problematic in that this method underestimates the extent to which factors interact and the extent to which more peripheral factors (such as school organisation) may create the conditions in which teachers are able to be effective. To dismiss such elements, as Hattie (2009) does, on the basis of there not being strong correlations with outcome measures misunderstands the structure of schools and schooling. As well as these general comments, there are also some specific critiques of Hattie’s work. First, the reported effect sizes are extremely high and not in line with other meta-analyses of teacher effectiveness studies such as those conducted by Seidel and Shavelson (2007), Scheerens and Bosker (1997), and Kyriakides, Christoforou, and Charalambous (2013). This is problematic, especially as there is a lack of information on the processes used. Furthermore, the methodologies of the individual meta-analyses which were combined are in many cases deficient, failing, for example, to employ suitable multilevel methods. Nevertheless, both in their confirmation of teacher effectiveness research findings and in their addition to them, the meta-analytic findings are important.

### **Teacher effectiveness research and new learning outcomes**

There are, of course, some key limitations to teacher effectiveness research as described above. The vast majority of this research discussed has focused on basic skills in English and mathematics, and the field has been accused of ignoring other subjects and outcomes. In this section, we will, therefore, look at the developing research and practice base in two key areas: self-regulated learning and noncognitive outcomes.

#### ***Self-regulated learning***

One of the most important new aims of education is self-regulated learning (SRL), because today’s society requires students to be able to learn in a self-regulated way during and after schooling and throughout their entire working life (Council of the European Union, 2002). However, although self-regulated learning has been a major topic of educational research for several decades (Winne, 2005), it is still an issue that is understudied in the field of teacher effectiveness research.

The concept of self-regulated learning is linked to the development of constructivist learning theories, which are based on the premise that students should take responsibility for their own learning and should play an active role in the learning process (Zimmerman, 2001). Since that period, many theories about SRL have been developed, from cognitive strategy oriented in the 1970s, metacognitive oriented in the 1990s, to motivational and volitional oriented in the more recent period (Boekaerts & Corno, 2005; Paris & Paris, 2001). Recently, self-regulation has been conceptualized as comprising three areas of psychological functioning: cognition, metacognition, and motivation/affect. Cognition refers to the cognitive information-processing strategies that are applied to task performance, for example, attention, rehearsal, and elaboration. Metacognition refers to strategies to control and regulate cognition. Motivation and affect includes all motivational beliefs about oneself related to a task, for example, self-efficacy beliefs, interest, or emotional reactions to oneself and the task (Boekaerts, 1999). Each of these components of SRL is necessary, but not sufficient for learning (Butler & Winne, 1995). According to Schraw, Crippen, and Hartley (2006), the role of metacognition is the most important, “because it enables individuals to monitor their current knowledge and skills levels, plan and allocate limited learning resources with optimal efficiency, and evaluate their current learning state” (p. 116). Metacognition is also referred to as “thinking about thinking” or higher order thinking involving active control over the cognitive processes that are engaged in learning (Newell, 1990). Generally, it is conceptualized as consisting of different components. The most common distinction in components is that between metacognitive knowledge and metacognitive skills (see also Veenman, Van Hout-Wolters, & Afflerbach, 2006). Schraw et al. (2006) call the two main components the knowledge of cognition and the regulation of cognition. Knowledge of cognition refers to individuals’ knowledge about their own cognition. It includes three subcomponents:

- (1) declarative knowledge: knowledge about oneself as a learner and about the factors that influences one’s performance;
- (2) procedural knowledge: knowledge about strategies and procedures;
- (3) conditional knowledge, including knowledge of why and when to use a particular strategy.

Regulation of cognition includes at least three main components: planning, monitoring, and evaluation. Planning relates to goal setting, activating relevant prior knowledge, selecting appropriate strategies, and the allocation of resources. Monitoring includes the self-testing activities that are necessary to control learning. Evaluation refers to appraising the outcomes and the (regulatory) processes of one’s learning.

Various studies have established that SRL, and in particular metacognition, has a significant impact on students’ academic performance, on top of ability or prior achievement (e.g., Hacker, Dunlosky, & Graesser, 2009; Ponitz et al., 2008; Pressley & Harris, 2006). Veenman, Wilhelm, and Beishuizen (2004) and Veenman and Spaans (2005) found that metacognitive skills and intelligence are moderately correlated. On average, intelligence uniquely accounts for 10% of variance in learning, metacognitive skills uniquely accounts for 17% of the variance, whereas both predictors together share another 20% of variance in learning for students of different ages and background, for different types of tasks, and for different domains. The implication, according to Veenman et al. (2006), is that an adequate level of metacognition may compensate for students’ cognitive limitations. Metacognition therefore is a potentially important factor in student learning outcomes as well as being seen as an outcome in itself. The key question for teacher

effectiveness research is then whether there are teacher behaviours that are related to the acquisition of these skills.

### ***Development of metacognition: the role of teaching***

While metacognition has generated a lot of interest and research in education, the educational effectiveness paradigm has not yet permeated into this field. With the exception of the study by Leutwyler and Maag Merki (2009) in secondary education, there are no empirical field studies that show whether schools or teachers differ with respect to the degree to which they foster students' metacognitive knowledge and skills, and which factors at the school and teacher level are responsible for any differences. Most of the studies in the field of metacognition and instruction deal with specifically designed programmes for enhancing students' self-regulated learning, including metacognition. The results of recent meta-analyses of these intervention studies have provided clear evidence that training students in SRL and, in particular, metacognition increases their academic achievement, with effect sizes higher than .50 (Dignath & Buettner, 2008; Dignath, Buettner, & Langfeldt, 2008; Hattie, 2009; Hattie, Biggs, & Purdie, 1996).

We can therefore conclude from these studies that metacognitive training can improve students' academic outcomes, both in primary and in secondary education. Additionally, Dignath and Buettner (2008) and Dignath et al. (2008) found that metacognitive training improves students' metacognitive strategy use, with effect sizes of .72 and .88 for primary and secondary education, respectively. However, from their meta-analyses it remains unclear whether the same interventions produced substantial effect sizes for both academic achievement and metacognitive strategy use. Hattie et al. (1996) found that study skills interventions did not strongly affect students' study skills (effect size .16) but that they did affect their academic performance and motivation (effect sizes .57 and .48, respectively). The results of meta-analyses are therefore somewhat inconclusive as to whether metacognitive instruction indeed improves students' metacognition, which in turn affects their academic performance. This is due to the fact that in general intervention studies tend either to address only product measures (i.e., the effects on learning outcomes) or only process measures (i.e., the effects on metacognition). Presently, it is still impossible to establish causal relations between metacognitive instruction, (changes in) metacognitive knowledge and skills, and learning outcomes (Veenman et al., 2006). Nevertheless, the meta-analyses do give us an indication of which kind of – generic – metacognitive interventions are the most promising for improving students' academic achievement and, possibly or by implication, their metacognitive knowledge and skills. However, the results of the meta-analyses showed that the effects of the interventions were much smaller when they were implemented by teachers in actual classrooms than when they were implemented by researchers. Therefore, we have to be cautious on the extent to which teachers could actually implement these interventions in educational practice.

### ***Effective metacognitive interventions***

Three fundamental principles for successful metacognition instruction emerge from the literature (Veenman et al., 2006). The first is embedding metacognitive instruction in content matter to ensure connectivity. The effectiveness of this principle was empirically supported by Hattie et al.'s (1996) meta-analysis. They found that training programmes on metacognitive knowledge, skills, and strategies that were situated in context, using tasks within the same domain as the target content, and promoting a high degree of learner

activity and metacognitive awareness were the most effective, not only for academic performance but for strategy use and affect and motivation as well.

The second principle is informing learners about the usefulness of metacognitive activities to make them exert the initial effort. Veenman, Kerseboom, and Imthorn (2000) make a distinction between students suffering from either an availability deficiency or a production deficiency of metacognition. Students with an availability deficiency do not possess sufficient metacognitive knowledge and skills, and metacognition instruction has to start at a very basic level. Students with a production deficiency possess the knowledge and skills already, but fail to use them. In the latter case, teaching could be limited to cueing metacognitive activities during task performance. Hattie et al. (1996) found that the effects of study skills training were higher for primary school students than for adolescents. This finding makes sense, because older students already possess certain skills, which are difficult to change into more appropriate ones, or which they are habituated to not using. In the meta-analysis by Dignath et al. (2008), the most effective interventions were those in which instruction on metacognitive strategies was combined with metacognitive reflection. Instruction on metacognitive strategies does not improve strategy use and learning outcomes per se. Supplementary components, like feedback about strategy use and providing knowledge about strategies and the benefit of using them, are needed to make self-regulated learning effective. Moreover, these are essential to maintaining self-regulated learning over time.

The third principle is therefore that prolonged training is needed to guarantee maintenance of metacognitive activities. Butler and Winne (1995), Hattie and Timperley (2007), and Hattie (2009) emphasize the importance of feedback in self-regulated learning. The kind of feedback given must be at the appropriate level, which is at the self-regulation level, including self-monitoring, directing, and regulation of action. According to Hattie et al. (1996),

strategy training should be seen as a balanced system in which individuals' abilities, insights and sense of responsibility are brought into use, so that strategies that are appropriate to the task at hand can be used. The students will need to know what those strategies are, of course, and also the conditional knowledge that empowers them: the how, when, and why of their use. (p. 131)

The implication is that effective strategy training becomes embedded in the teaching context itself (Hattie, 1996, p. 131). However, little is known thus far about the role of the teacher as a model or about their skills in providing students with feedback at the self-regulatory and metacognitive level. Several studies found that many teachers in fact lack sufficient knowledge about metacognition (Veenman, 2006; Waeytens, Lens, & Vandenberghe, 2002). Altogether, these findings pave the way for including metacognitive instruction factors in teacher effectiveness theory, research, and professional development, and suggest the addition of metacognition as potentially either an outcome or mediating variables in theoretical models of teacher and educational effectiveness, and the need to train teachers to apply metacognitive instruction. However, the findings reviewed above also point to a continuing need for more research on ways teachers can effectively embed metacognitive strategies in classroom instruction.

### *Noncognitive outcomes of education*

Another area of growing interest is that of the study of noncognitive outcomes of education. The goals of education have increasingly been defined in a holistic way,

including the development of the whole child. This has led to increasing research on areas such as well-being, self-concept, motivation, and engagement, with a view towards uncovering teacher effects on these broader outcomes.

One of the most widely studied noncognitive outcomes, and one with the most established and reliable measures, is self-concept, most commonly defined as “a person’s perceptions of him/herself, formed through experience with the environment, interactions with significant others and attributions of his/her own behavior” (Shavelson, Hubner, & Stanton, 1976, p. 371). Self-concept is a multidimensional construct, with different researchers defining different areas of self-concept, such as self-concept of peer relations, self-concept of appearance, and so forth. In terms of schooling and education, the domains most studied and also the only ones with any consistent relationship to schooling are academic self-concept domains, such as self-concept in particular subject areas or school subjects in general. Academic self-concept has been found to be related to academic achievement in a wide range of studies and has in some studies (but by no means all) been shown to be directly affected by teacher behaviours (Muijs & Reynolds, 2011). Most commonly, a caring environment with clear boundaries, high expectations, effective behaviour management, giving pupils responsibility, and contingent praise are cited as teacher behaviours related to increased academic self-concept, though relationships are generally weak to modest (Coopersmith 1967; Podesta, 2001; Trautwein, Lüdtke, Köller, & Baumert, 2006). One of the reasons for the generally weak relationships with teacher behaviours is that academic self-concept is significantly related to pupils’ frame of reference, meaning that pupils compare themselves to their immediate peers. This has the paradoxical effect that a stronger pupil in a high-performing classroom may have lower self-concept than a weaker pupil in a low-performing classroom (Marsh & Craven, 2006).

Another outcome of growing interest to the field is student well-being. Opdenakker and Van Damme (2000), using data from the longitudinal LOSO study in Flanders, found a significant but weak classroom-level effect on student well-being. Higher levels of well-being were related to teaching staff co-operation in relation to teaching methods and pupil counselling and the existence of an orderly learning environment, while a high focus on discipline and subject-matter acquisition had a positive effect on the well-being of high achievement-motivated pupils, and a negative effect on the well-being of low achievement-motivated pupils. Smyth (1999) and Konu, Lintonen, and Alvio (2002) similarly reported small but significant school and classroom effects in Irish and Finnish samples.

Motivation and engagement have a longer history in educational effectiveness research, and formed a part of theoretical school effectiveness models such as Creemers’ (1994) comprehensive model of educational effectiveness. As an outcome of classroom processes, they have received and continue to receive significant attention. The study of classroom-level effects on student motivation has an even longer history in educational psychology, and tends to confirm much of the research on classroom climate in terms of the importance of developing goal structures at classroom level that encourage mastery rather than performance goals in the individual student (Maruyama & Elliott, 2012; Urdan & Schoenfelder, 2006). Classroom climate and teaching style are also related to engagement, in that a learner-centred teaching style has a positive effect on the instructional support teachers give to their classes and on the quality of the relationship between teacher and class, which in turn leads to a better integration of the students in the class group (Opdenakker & Van Damme, 2006).

Teacher effectiveness frameworks are currently being used to study an increasing range of student outcomes, including recently bullying (Kyriakides et al., 2013) and

participation (Noyes, 2013), though work in many of these areas is at an early stage. While it was not possible to include all possible noncognitive outcomes in this review (e.g., locus of control, happiness), we can draw some overall conclusions with regard to teacher effects on noncognitive outcomes.

First, teacher effects on noncognitive outcomes are consistently smaller than teacher effects on cognitive outcomes. In many (but not all) studies, they reach significance, but usually with weak to modest effect sizes. Factors outside of the school appear to be a greater influence in most cases (Knuver & Brandsma, 1993; Van Landeghem, Van Damme, Opdenakker, De Fraine, & Onghena, 2002).

Second, those teacher effects that exist largely concur with teacher behaviours that we know are effective for cognitive outcomes. There is no evidence for the sometimes posited contradiction between effectiveness in cognitive and noncognitive areas.

Third, in many cases studies of noncognitive outcomes suffer from a lack of consistency in defining the key constructs and in reliably and validly measuring these. The exceptions here are self-concept, where a common definition and instrumentation has been developed, and well-being, which has benefitted from some methodologically high quality studies (e.g., Opdenakker & Van Damme, 2000). Overall, however, this is an area for further development in the field.

### **Integrating teacher effectiveness research into theoretical models of educational effectiveness**

A traditional criticism of teacher effectiveness research has been a lack of theoretical integration and relatedness to other parts of the education system. However, while this was true of the earlier studies, over the past decades several theoretical models have integrated teacher effectiveness factors with findings from school effectiveness research to develop theoretical models. These typically follow the input-process-output models that predominate in school effectiveness research, but emphasize classroom factor as key process variables, and embed these in a multilevel framework incorporating direct and indirect effects (Bosker & Scheerens, 1994). Scheerens and Creemers (1989) developed a model of educational effectiveness that incorporated different levels of effectiveness: educational effectiveness, here defined essentially as the policy level; school effectiveness (the school level); instructional effectiveness, which incorporated most of the findings from teacher effectiveness research to date; and input factors, relating primarily to student ability and social background. This model formed the basis for Creemers' (1994) comprehensive model of educational effectiveness, which was similarly based on a multilevel input-process-output model, but which more strongly stressed the relationship between effectiveness at the different levels, and in particular *consistency* of effectiveness characteristics between and within levels, *cohesion*, meaning that all members of staff should show characteristics of effective teaching, and *control*, meaning that policy and goal attainment in the school should be evaluated. A further development of this model is the dynamic model of educational effectiveness (Creemers & Kyriakides, 2006). This model allows for the integration of both the traditional teacher effectiveness factors and the new knowledge on self-regulated learning and metacognition.

Like its predecessor models, the dynamic model takes into account the fact that effectiveness studies conducted in several countries reveal that the influences on student achievement are multilevel (Teddle & Reynolds, 2000), and therefore encompasses four levels: student, classroom, school, and system. There is, however, a strong emphasis on teaching and learning and on analysing the roles of teacher and student in this model.

Based on the main findings of teacher effectiveness research mentioned above, the dynamic model refers to factors that describe teachers' instructional role and are associated with student outcomes. These factors refer to observable instructional behaviour of teachers in the classroom rather than to factors that may explain such behaviour (e.g., teacher beliefs and knowledge and interpersonal competencies). The eight factors included in the model are: orientation, structuring, questioning, teaching-modelling, applications, management of time, teacher role in making the classroom a learning environment, and classroom assessment, which are used as a framework to study the various individual behaviours identified in teacher effectiveness research. These eight factors, which are briefly described in Table 1, were found to be associated with student outcomes (e.g., Brophy & Good, 1986; Darling-Hammond, 2000; Muijs & Reynolds, 2000; Rosenshine & Stevens, 1986; Scheerens & Bosker, 1997). They do not, however, refer to only a single approach of teaching, such as structured or direct teaching (Joyce, Weil, & Calhoun, 2000), or to approaches associated with constructivism (Schoenfeld, 1998). An integrated approach in defining quality of teaching is adopted (Elboj & Niemelä, 2010) that does not only refer to skills associated with direct teaching and mastery learning such as structuring and questioning but also to orientation and teaching modelling, which are in line with

Table 1. The main elements of each teacher factor included in the dynamic model.

Factors	Main elements
(1) Orientation	(a) Providing the objectives for which a specific task/lesson/series of lessons take(s) place (b) Challenging students to identify the reason why an activity is taking place in the lesson.
(2) Structuring	(a) Beginning with overviews and/or review of objectives (b) Outlining the content to be covered and signalling transitions between lesson parts (c) Drawing attention to and reviewing main ideas.
(3) Questioning	(a) Raising different types of questions (i.e., process and product) at appropriate difficulty level (b) Giving time for students to respond (c) Dealing with student responses.
(4) Teaching modelling	(a) Encouraging students to use problem-solving strategies presented by the teacher or other classmates (b) Inviting students to develop strategies (c) Promoting the idea of modelling.
(5) Application	(a) Using seatwork or small-group tasks in order to provide needed practice and application opportunities (b) Using application tasks as starting points for the next step of teaching and learning.
(6) The classroom as a learning environment	(a) Establishing on-task behaviour through the interactions they promote (i.e., teacher–student and student–student interactions) (b) Dealing with classroom disorder and student competition through establishing rules, persuading students to respect them and using the rules.
(7) Management of time	(a) Organizing the classroom environment (b) Maximizing engagement rates.
(8) Assessment	(a) Using appropriate techniques to collect data on student knowledge and skills (b) Analysing data in order to identify student needs and report the results to students and parents. (c) Teachers evaluating their own practices.



theories of teaching associated with constructivism and promoting the development of metacognitive skills. Collaborative learning (Slavin, 1983; Slavin & Cooper, 1999) is included under the overarching factor of “contribution of teacher to the establishment of classroom learning environment” (see Table 1).

The dynamic model is based on the assumption that each effectiveness factor can be defined and measured using five dimensions: frequency, focus, stage, quality, and differentiation. These dimensions help describe the functioning of each factor more clearly. Specifically, frequency is a quantitative measure of the functioning of each factor, whereas the other four dimensions examine qualitative characteristics of the functioning of each factor. Actions of teachers associated with each factor can be understood from different perspectives and not only by looking at the number of times that specific behaviours occur in teaching. Support for the model comes from three longitudinal studies which have shown that the proposed framework can be used to describe the functioning of each teacher factor (Antoniou, 2009; Kyriakides & Creemers, 2008, 2009).

The dynamic model stresses the interrelated nature of these factors and their dimensions and the importance of grouping specific factors. This allows the complex nature of effective teaching to be highlighted, but may also allow specific strategies for teacher improvement to emerge. In order to investigate the significance of the teacher level in the dynamic model and especially its potential to improve teaching practices and student attainment, the concept of grouping factors (i.e., factors which operate at the same level and are related to each other) was further explored by analysing the data of the longitudinal studies mentioned above. With the use of the Rasch model, it was found that the teaching skills included in the dynamic model can be grouped into five stages that are distinctive and move gradually from skills associated with direct teaching to skills concerned with new teaching approaches (see Kyriakides, Creemers, & Antoniou, 2009). The first three levels are mainly related to the direct and active teaching approach, moving from the basic requirements concerning quantitative characteristics of teaching routines to the more advanced requirements concerning the appropriate use of these skills as they are measured by the qualitative characteristics of these factors. These skills gradually also move from the use of teacher-centred approaches to the active involvement of students in teaching and learning. The last two levels are more demanding, since teachers are expected to differentiate their instruction (Level 4) and demonstrate their ability to use new teaching approaches aimed at developing metacognitive skills (Level 5). Furthermore, taking student outcomes as criteria, teachers who demonstrate competencies in relation to higher levels were found to be more effective than those working at the lower levels. This association is found for achievement in different subjects and for both cognitive and affective outcomes.

### **Professional learning**

While there is a long history linking teacher effectiveness research to school effectiveness and educational effectiveness more generally, an area that has traditionally been somewhat neglected in the field is that of the professional learning of the teachers who are expected to become more effective in teaching their students. The dynamic model studies, mentioned above, suggest that teacher development goes through a number of stages, from those associated with direct instruction to those more associated with developing metacognition. The studies also suggested that teachers who were able to reach the latter stages were able to obtain better attainment outcomes in their students. This clearly points to the need for professional development of teachers to enable them to reach the upper stages of

competence. While there is often an assumption that teacher professional learning and development is required to meet these challenges, at the same time there is a widespread perception that many approaches do not result in better outcomes for students (Hanushek, 2008).

In this section of the paper, we develop the argument that a major contributing factor to this situation is that “state-of-the-art” understandings about processes and conditions that promote student learning are typically not used to construct appropriate learning environments for their teachers. A developing body of evidence demonstrates that these processes and conditions have many common features (Bransford, Brown, & Cocking, 2000), including those identified in earlier sections of this paper. Making connections, developing metacognitive awareness, and taking control of one’s own learning through self-regulation are important to promoting learning of both students and those who teach them.

A second argument we develop in relation to the limited impact of much professional development on outcomes for students is that it is typically divorced from the specifics of how to teach particular groups of students in a particular context with greater effect, and may be too general in nature and insufficiently specific and detailed (Hattie, 2009).

#### *A synthesis of the evidence: effective professional learning and development*

A recent synthesis of the international evidence on approaches to professional learning and development that resulted in positive outcomes for students’ engagement, learning, and well-being (Timperley, Wilson, Barrar, & Fung, 2008) reinforced the importance of addressing these two issues of developing learning approaches consistent with how people learn and focusing on specific strategies. The empirical work included in the synthesis came from North America, Europe (including the UK), and Australia. The theoretical framework used to analyse the empirical studies comprised 84 different characteristics of professional development environments to determine which had the greatest impact on teaching effectiveness in terms of improving outcomes for students. The conclusions to the synthesis identified that those approaches with the greatest impact were focused on meeting particular challenges or solving specific problems with respect to student engagement, learning, and well-being. Success was determined by the progress made towards solving the identified challenges or problems, not by the extent to which teachers had changed their practice. While the learning of new professional knowledge and skills was embedded within this context, teachers were able to go beyond it through developing deep understandings in ways consistent with the principles of how people learn (Bransford et al., 2000). These conclusions were brought together in a cyclical process of inquiry and building new knowledge that is illustrated in Figure 1 and described in greater detail below.

The cycle begins with an analysis of student engagement, learning, or well-being in relation to the goals held for them. Goal-setting and analysing the discrepancy between goals and the current situation are central to understanding what is desired and what is required. The first goal focus, therefore, relates to students. This initial analysis may be at a generic level, such as a broad curriculum area, or may begin with a detailed analysis of students’ conceptions and misconceptions within more specific domains. The beginning point depends on the specificity with which teachers already know their students. Part of the process for those unable to be specific is to learn how to collect the relevant evidence and to develop the necessary understandings to become so.



Figure 1. Teacher enquiry and knowledge-building cycle to promote important outcomes for students.

If teachers are to become self-regulated learners and take responsibility for their own learning in the same way that earlier sections of this paper propose for students, then teachers must set learning goals for themselves as well as their students. Thus, the second part of the cycle asks teachers to identify what knowledge and skills they already have, and what new areas of understanding they need to meet the goals they have identified for their students. What is it that they already know that the students respond to well, and in what areas do they need new knowledge and skills? This kind of analysis usually requires evidence of teachers' existing competencies and the assistance of someone with specific expertise in the particular area of inquiry. In this way, teachers are assisted to develop greater metacognitive awareness of their learning processes and become self-regulated in their approaches to their own learning.

The third dimension of the cycle of deepening professional knowledge and refining skills is where traditional approaches to professional development usually begin. The problem with this dimension as a starting point is that the need to know something new is identified by someone external to the group of teachers (e.g., a policy official or a researcher) without the participating teachers necessarily understanding the reason why it is important to know it or being committed to doing so. Under these circumstances, the goals belong to others who are taking responsibility for promoting the professional learning. Teachers then choose whether to engage or to resist.

A number of principles and processes identified in earlier parts of this paper in relation to student learning are equally important in this phase of the inquiry and knowledge-building cycle for teachers. For example, learning in human beings, whether in children or adults, occurs by making patterns that connect existing knowledge to new knowledge (Askew, Rhodes, Brown, William & Johnson, 1997). It makes sense, therefore, that when

building new professional knowledge and refining skills, teachers are assisted to make these connections so they can understand what is the same and what is different about the kind of thinking and practice being promoted. Indeed, the work of Hammerness et al. (2005) in the US has identified that, when teachers are not helped to make these connections, they interpret new ideas within existing frameworks and so make only superficial changes to practice when much deeper changes are required. These authors refer to the problem as one of “over-assimilation”.

Feedback is also as important for teachers as for those they teach. Feedback on the effectiveness of processes to reach particular goals or to promote self-regulated learning has greater impact than other kinds of feedback (Hattie & Timperley, 2007). For teachers, one of the most powerful sources of feedback comes from how students respond to the changes they make to their practice, so the next two dimensions of the cycle involve engaging students in new learning experiences and checking impact on the original challenge or problem.

Although the cycle is described sequentially, in reality it involves a more iterative process as teachers learn new knowledge and refine existing skills, try things out in practice, work out what is working and not working for students, revisit conceptions and misconceptions, and try again. Monitoring progress and revisiting what needs to be learned is central to self-regulated learning (Butler & Winne, 1995). The arrow in the cycle draws attention to the ongoing process of systematically inquiring into what is effective for students and what is not, with further cycles engaged as progress is made on solving existing problems or meeting new challenges as they emerge.

This approach to professional learning and development has implications for both what it means to be professional and the role of school and system leaders. While it is teachers who make the difference, it is rare for them to undertake and sustain this kind of ongoing inquiry without the assistance of others. These two issues of professionalism and systems support are taken up in the following sections.

### ***Teachers as adaptive experts in systems with high adaptive capacity***

The arguments and evidence presented about promoting professional learning in ways that have positive impacts on outcomes for students challenge traditional ideas about what it means to be professional. Traditional conceptualizations have been situated within frameworks of development, from novice to expert, as teachers become more fluent and effective within the routines of practice (Dall’Alba & Sandberg, 2006). Becoming a skilled professional involves progressively learning a set of knowledge and skills relevant to that profession (e.g., Dreyfus & Dreyfus, 1986), with an emphasis on procedural efficiency (Hatano & Oura, 2003).

The problem with such a conceptualization is that professional learning and expertise is situated within existing cognitive frameworks. Solving old problems with new approaches, such as embedding metacognitive instruction in classrooms, often means stepping outside of these frameworks and requires teachers to think and act differently. The cycle of inquiry and knowledge-building has at its core the notion of teachers as adaptive experts, alert to situations where previous routines are not working well and seeking different kinds of solutions. This conceptualization of professionalism and development as one of adaptive expertise is gaining considerable currency among the research and professional community (Bransford, Darling-Hammond, & LePage, 2005; Hammerness et al., 2005; Hatano & Oura, 2003).

Integrating new ideas about teaching effectiveness presented in earlier parts of this paper into the daily practice of schools requires more than individual teachers understanding how they need to think and act differently. It also requires that schools become places for deliberate and systematic professional learning, where leaders are constantly vigilant about the impact of school organization, leadership, and teaching on students' engagement, learning, and well-being. Schools organized for learning in this way are usually referred to as having high adaptive capacity (Staber & Sydow, 2002).

### ***Shifts in thinking***

A number of shifts in thinking are required at all levels of the system to reduce current disappointment in professional development as a mechanism to improve teacher effectiveness in relation to realizing outcomes for students (Timperley, 2011). The first shift concerns the move from focusing on professional development involving delivery of some kind of information to teachers to focusing on professional learning using approaches consistent with the principles of how people learn (Bransford et al., 2000).

Related to this first shift is a second about the need for collaborative inquiry based on the principles of self-regulated learning. Effective professional learning happens when teachers together frame their own learning by identifying goals for both themselves and their students; creating partnerships with those with expertise such as researchers to ensure their learning is focused and likely to achieve the desired goals and is based on established research on what works; working together to investigate, challenge, and extend their current views; and then generating information about the progress they are making so that they can monitor and adjust their learning, and evaluate the impact thereof. Ongoing collaborative inquiry and learning becomes central to teachers' images of being professional and through this process becoming self-regulated learners.

The third shift relates to the centrality of students to the process, rather than a focus on mastering decontextualized "effective" teaching practices. While knowledge of such practices is very important, student learning and well-being cannot be seen as by-products of effective teaching and professional learning, but rather as the reason to engage, the basis for understanding what needs to change, and the criteria for deciding whether those changes have been effective. It is therefore of primary importance to evaluate the impact of professional learning and development in a rigorous and reliable way, for example, by using Guskey's (2001) evaluation framework, with its focus on the ultimate primacy of student outcomes.

A final shift directs attention to those who support teacher learning within schools or outside of them. Teachers cannot meet new challenges in teaching and learning alone, so everyone who has a place in the chain of influence from policy to practice needs to ensure that the right conditions for professional learning are in place. Creating a more effective profession involves a process of learning both up and down the system layers and involves looking at effective teaching processes within the context of a broader educational system, as suggested in the dynamic model.

### ***Implications for effectiveness research***

While effectiveness researchers aim to influence practice, and thus to use the results of teacher effectiveness research to improve teaching in classrooms and schools, professional development aimed at this often does not make a difference to student outcomes (Timperley, 2011). However, when professional development becomes professional

learning, new learning on the part of teachers can make a substantial difference in student outcomes, but it is not easy. Making significant changes in practice requires intensive and challenging professional learning experiences. These not only extend teachers' repertoire of strategies and approaches but also engage them in activities and dialogue to allow them to examine their existing beliefs in order to identify the difference between the beliefs they hold and the beliefs underpinning the new ideas.

### **Concluding remarks**

In this paper, we have attempted to give an overview of the current state of the art in teacher effectiveness research as well as of some of the latest developments in research on teaching, learning, metacognition, and professional development, with a view to sparking debate and thought about the future of research and practice in teacher effectiveness.

As we can see from the above, the field can build on a long and strong tradition of research that has shown considerable stability and validity over time and contexts, as exemplified in the traditional teacher effectiveness research base. However, it is also clear that the field of educational effectiveness and improvement would be remiss in sitting back and relying solely on this established research base to inform its theories and practices. The call for new outcomes of learning, aimed at self-regulated and lifelong learning as well as the basic skills which were the original focus of teacher effectiveness research, is becoming increasingly heard and, while more research is needed, is also becoming increasingly integrated in theoretical models, such as the dynamic model of educational effectiveness mentioned above, and in research instruments, such as the International System for Teacher Observation and Feedback (ISTOF) observation instrument (Teddle, Creemers, Kyriakides, Muijs, & Fen, 2006). Significant development is taking place in the development of integrated models, such as the dynamic model of educational effectiveness, that aim to incorporate research and practice while focusing on a range of outcomes, including metacognition. This search for integration has clear advantages in the light of the complexities of the processes involved. Similarly, work on noncognitive outcomes is progressing, though here it remains the case that teacher effects are generally weaker than they are in cognitive outcomes, which puts a natural ceiling on what teacher effectiveness research can achieve in these areas.

However, areas that require further attention and integration in educational effectiveness and improvement are the recent findings of the cognitive sciences, use of ICT in teaching, and research on effective ways of developing professional learning of teachers.

Both cognitive science and ICT are evolving rapidly, and educational and corporate advocates are developing and often rapidly disseminating new teaching methods supposedly derived from new scientific or technological insights, such as the "flipped" or "reversed" classroom, currently gaining a lot of popularity in the US (Tucker, 2012), notwithstanding a lack of evidence on the effectiveness of such practices. The development of new studies of teacher effectiveness, in which new methods are applied to the classroom and rigorously evaluated, would therefore form a useful new area of work for researchers in the field. The term "rigorous" is stressed here, as too often enthusiasts can take on new ideas without recognizing the possibility that no effects may be shown, and may lack an awareness of the need to create robust evaluation methods. One example of how this might work is the use of small-scale experiments within a single school context that can then be expanded and tested in more diverse settings before any systematic roll-out is attempted. Control and experimental groups are formed and the outcomes compared in school (Muijs, 2011). Small-scale experimental work like this will allow innovations to

be introduced and tested within a school context before trying them out in other schools. In contrast to the model of national roll-outs, this model allows each school to test innovations within its own context and with its own staff, putting educational innovations simultaneously on a sounder and more contextual footing. Designs whereby factors such as ability and social background are controlled for can easily be built into these models. In this way, we can genuinely assess at the outset the equity impact of educational innovations, rather than waiting until national roll-outs or relying on often politicized opinions to inform this process, and include effectiveness as a key element of innovation. Taking a more experimental approach towards innovation might also help alleviate the problem of waste endemic in education, as money is spent on large-scale programmes that have no serious scientific basis and no evidence of impact on students.

The new findings on professional development, meanwhile, clearly point to the need for more sophisticated models of professional learning that make use of the available knowledge base of EER and emphasize both the importance of specific teaching factors and the grouping of factors when addressing the complex nature of effectiveness. This implies that improvement of teacher effectiveness cannot be focused solely on the acquisition of isolated skills or competencies (Gilberts & Lignugaris-Kraft, 1997), nor on reflection across the whole teaching process to help teachers obtain “greater fulfilment as a practitioner of the art” (of teaching) (Clarke & Hollingsworth, 2002, p. 948). Reflection is more effective when teachers’ priorities for improvement are taken into account, and when they are encouraged to develop action plans that address their professional needs (Antoniou & Kyriakides, 2011), as the evidence on professional development shows.

Moreover, co-construction of learning and improvement with practitioners and schools, using the learning cycle and insights from the review presented here, needs to be incorporated into our improvement models if we are to make a greater difference than has too often been the case in the past.

We see this paper as an invitation to dialogue and as a further move in developing the field by building cumulatively on existing knowledge and theory, rather than constantly attempting to reinvent the wheel. Only by doing this, we will be able to develop a realistic understanding of teaching and take our place at the table as a mature field of social scientific enquiry.

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