Teacher competences and pupil achievement in pre-school and school

A systematic review carried out for The Ministry of Education and Research, Oslo

Technical report

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Copenhagen 2008

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is a unit at the School of Education, University of Aarhus

Title	Teacher competences and pupil achievement in pre-school and school - A systematic review carried out for The Ministry of Education and Research, Oslo
Copyright	© 2008 by Danish Clearinghouse for Educational Research
ISBN	978-87-7684-228-4
Translation into English	John Mason
Section	Technical report
Review group	Professor Jens Rasmussen, School of Education, University of Aarhus, chairman Reader Eyvind Elstad, ILS, University of Oslo Professor Anders Holm, School of Education, University of Aarhus Professor Sølvi Lillejord, Inst. for Education and Health Promotion, University of Bergen (until 17/11 2007) Senior Lecturer Eva Myrberg, Faculty of Education, University of Gothenburg
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Reference number	Project no. 95200768
Month and year of publication	April, 2008
This report is referred to as	Nordenbo, S.E., Søgaard Larsen, M, Tiftikiçi, N., Wendt, R.E., & Susan Østergaard (2008) Teacher competences and pupil learning in pre-school and school – A systematic review carried out for the Ministry of Education and Research, Oslo. In: Evidence base. Copenhagen: Danish Clearinghouse for Educational Research, School of Education, University of Aarhus.
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Foreword

This report represents the second study and the first systematic research review by the *Danish Clearinghouse for Educational Research*. The Ministry of Education and Research, Oslo (see Invitation to tender no. 200702751) commissioned the project that was completed during the period 1.09.2007 – 4.04.2008.

The present document is a *Technical report* that explains the methods used and the results of the review. The review group has participated by extracting data and as a peer review group. The technical report has been compiled by employees at the *Danish Clearinghouse for Educational Research*.

Clearinghouse wishes to express its thanks to the review group, which despite pressing work obligations in other areas made a substantial working contribution in the limited time frame available.

Clearinghouse also wishes to thank the *National Library of Education, Denmark* for its exemplary help and service in making available the many documents that the study is based upon.

Clearinghouse also wishes to thank John Mason, who has translated the technical report into English.

Clearinghouse also wishes to thank Mark Newman, EPPI-centre, Institute of Education, University of London, for constructive comments on an earlier draft version of this report.

Finally Clearinghouse wishes to thank the *Department for Policy Analysis, Lifelong Learning and International Affairs* at the *Ministry of Education and Research, Oslo* for commissioning this work and in particular Advisor Morten Rosenkvist.

Sven Erik Nordenbo

Copenhagen, 27th March 2008

Summary

What do we want to know?

Which dimensions of teachers' manifest competences can be shown, through effect studies, to contribute to pupil achievement?

Who wants to know and why?

The work has been commissioned by the *Ministry of Education and Research*, Oslo, who state in their tender that 'far and away the majority of studies about learning at school conclude that the teacher is the single factor that has the greatest influence on what the pupils learn'. The wish is, therefore, to conduct a study to explore which teacher competences can be shown through empirical research to increase pupil learning.

What did we find?

From 1998 to 2007, 70 studies were published on the influence of manifest teacher competence on pupil achievement. These present three primary findings. (1) The teacher must possess the competence to enter into a social relation in respect of the individual pupil. (2) In relation to the whole class (all pupils) the teacher must possess the competence to direct the teaching work of the class, whereby the teacher as visible leader throughout the course of the teaching gradually cedes responsibility to the pupils and the class for the development of rules and encourages the pupils to establish and maintain the rules themselves. Both of these competences are significant for the development of overall aims such as the pupils' motivation and autonomy, and they play a role in promoting academic learning. (3) In relation to the content of the teaching, the teacher must possess competence both in the teaching-learning process in a general sense and in the individual subjects taught.

What are the implications?

For practice: Teachers and teacher educators can derive inspiration from a range of practical features that this systematic review has shown to be of significance for their pupils' learning.

For policy: Politicians and policy-makers can use the three proven competences as a basis for the evaluation of the appropriateness of existing teacher training and as pointers for future teacher training programmes.

For research: It is recommended a) that empirical research is initiated into the influence of manifest competences on pupil achievement using research designs capable of accounting for such influence with the greatest weight of evidence, b) that theoretical and empirical research is instigated focusing on the development of appropriate theoretical ways of understanding the concept of competence generally and of each individually specific competence, and finally c) that empirical research should be carried out both into the individual competences presented here and into the links between them.

How did we arrive at these results?

The project has had four principal phases. First we searched all relevant sources for research that had been published during the period 1980-2007. Thereupon we went through the studies that had been found in order to ensure that only those that were relevant were included. Then we extracted relevant data out of the studies using, among other things, a software programme developed by the EPPI-centre, University of London. Finally the research mapping was carried out on the relevant studies and narrative systems formulated where possible. In the final phase the study came to cover the period from 1998 to 2007.

For further information

The study is included in the Evidence Base that the Clearinghouse for Educational Research has set up. Here a link can also be found to the basis for the research, the Concept note, that governs the research process at the Danish Clearinghouse for Educational Research, see www.dpu.dk/clearinghouse.

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1 Background

1.1 Background and problem area

On 29th May 2007 the *Ministry of Education of Education and Research* in Oslo put a systematic review with the title 'Competence and learning in pre-school and school' out to tender. On the 20th August 2007 the Ministry's Advisor at the *Department for Policy Analysis, Lifelong Learning and International Affairs*, Morten Rosenkvist, reported that the task had been allotted to the *Danish Clearinghouse for Educational Research*. Work started on 1st September 2007.

The ministry based their desire to initiate this systematic review primarily on two factors: one centred on learning theory and one on the social sciences (see Konkurransegrunnlag, p. 1). It was taken as read that people learn throughout their lives. The question is, therefore, not '*whether* children and young people learn but *what* they learn' (Skaalvik & Skaalvik 2007, p. 20). If teaching staff at kindergartens and schools are to be in a position to stimulate that learning in the direction of the aims of society, then the influence of the staff's competences on the learning of children and young people must, it was claimed, be revealed. In addition, society is nowadays changing at great speed, which creates new conditions for such learning. According to the Ministry this applies in particular to three areas, namely (a) for *pupils* in ordinary schools, especially pupils with learning or behavioural difficulties, immigrant or multi-lingual pupils and pupils with compound problems. This further involves (b) *parents* having a greater desire to see their children's upbringing and education being tailored individually, in order to (c) meet the increased demands made by the *workplace* on young people's basic skills.

One decisive factor identified by the Ministry in the attempt to meet these expectations for learning was that

> 'the great majority of studies dealing with learning in schools conclude by saying that the teacher is the single most telling factor in determining what pupils learn' (Konkurransegrunnlag, p. 1; only available in Norwegian).

In the document entitled *Konkurransegrunnlag: Kompetanse og læring* the ministry specifies the research question that it wishes to have answered. The question is as follows:

> 'Which staff competences in kindergarten and school — pre-school teachers, teachers and other adults such as assistants — influence the learning of children and young people?' (Ibid, p. 3, no. 3)

The Danish Clearinghouse for Educational Research (in the following: Clearinghouse) interpreted this formulation as being an initial suggestion for a *review question* for the present systematic review. Furthermore Clearinghouse felt that it was essential to undertake a delimitation and definition of the central concepts of the question: 'competence', 'staff', 'learning' and 'children and young people'. In what follows these

concepts will be briefly commented on in the context in which they appear in the research question:

- *'Competences in staff as a contribution to learning in children and young people'*

It is stated in the ministry's provisions,

> 'that there is a gathering of interest about which competences in staff at kindergartens and schools — pre-school teachers, teachers and other adults such as assistants — influence the learning of children and young people'.

In that context the ministry wished to acquire an overview of the empirical research that had a bearing on the significance of various areas of competence that might be relevant.

Clearinghouse has interpreted this to mean that the department wants the systematic review to focus on studies of the effect of the influence of educational staff's competences on pupil achievement. Clearinghouse proposed, therefore, that only studies that simultaneously accounted for both the relevant competences and the operationalised learning aims should be included in the review.

- *'Staff'*

Includes all adults who hold employment in ordinary kindergartens and schools in which children and young people are exposed to education.

Clearinghouse has interpreted this to mean that teachers in special needs education and other institutions for special education should be excluded.

- *'Learning in children and young people'*

should not be seen solely as the learning gains acquired by the average pupil but should also include effects on marginal groups with learning and behavioural difficulties, immigrants and multi-lingual pupils and pupils with compound problems.

Clearinghouse has interpreted this to mean that these marginalised pupil groups would have to be attending ordinary kindergartens and schools, whereas pupils in special needs classes and pupils in other special educational establishments should be excluded. The Ministry's requirement that marginalised pupil groups should also be included is interpreted as meaning that the systematic review should also determine whether particular competences can be shown to have a positive influence on special needs pupils.

In addition the ministry wished to see a comprehensive approach to:

> 'what is meant by 'children and young people's learning'. Learning gains include easily measurable indicators such as grades as well as indicators that are more difficult to measure such as social skills. The list is in no way exhaustive, and it would be desirable for the ministry to be involved in working towards a definition of how the concept 'learning in children and young people' should be operationalised' (Ibid., p. 2).

- *'Competence'*

The ministry refers to Hagen & Skule (2004), who emphasise that 'the concept of competence includes knowledge, abilities and attitudes that can contribute to solving problems or completing tasks' (p. 7). The expression 'staff competence' can, therefore,

> be seen as 'a combination of something one has (knowledge), what one does in the classroom (abilities) and which values one bases teaching on (attitudes).' (Ibid., p. 2)

Clearinghouse has pointed out that it can be an advantage to differentiate between 'formal competence' and 'manifest competence'.

'Formal competence' presupposes that an individual has completed formal education or training and acquired a certificate witnessing to the fact that this has been done satisfactorily. The acquisition of 'formal competences' through formal education or training can, for example, be a prerequisite for having the legal right to practise a particular profession.

In using the expression *'manifest competence',* Clearinghouse attempts to establish the notion that an individual does, in fact, manifest competence in exercising his/her profession regardless of how that competence has been acquired.

With reference to a study by Thomas J. Kane et al. (2007), showing that no clear link can be observed between the teachers' formal competences and the pupils' learning, the ministry was looking for

> 'a comprehensive approach to what is meant by 'staff competence'. In addition to formal qualifications, it is thought that work experience, variables of social background, classroom management, commitment and communicative abilities might constitute aspects of the concept 'staff competence'. The list is in no way exhaustive, and it would be desirable for the ministry to be involved in working to define how the concept 'staff competence' should be operationalised.' (Ibid, p. 2)

Clearinghouse agreed concerning the desirability of this comprehensive approach, but pointed out the need to include the premises used by Thomas J. Kane et al. (2007). A Scandinavian study by Eva Myrberg (2007) questions the conclusions reached by Thomas J. Kane et al., and suggests that they are only relevant in America. Myrberg has examined the influence of teacher competence on 3rd grade pupils' reading achievement in public and independent schools. Myrberg used data from Sweden's participation in PIRLS (*Progress in Reading Literacy Study,* 2001) which comprises some 10,000 pupils. Pupils in independent schools scored better on the reading tests than pupils in public schools. This effect on pupils' achievement of school type disappeared, however, once the results were adjusted to take account of the parents' education. Teacher certification for teaching in early grades proved to have a marked effect on pupils' mean reading test scores in both school types, while no significant effects of teacher experience, age, gender, in-service training or cooperation could be established. Although school type had no influence of itself, it was nevertheless a mediating factor for both parents' education and teachers' education. These effects, however, worked in

opposite directions. Myrberg's study suggests that formal competence in a Scandinavian context may have a different effect than in an American one.

The relationship between formal competences and manifest competences remains unclear in international research. It is certain that formal competences (i.e. the competences that teacher training should lead to) are also — fortunately — accompanied by manifest competences in teaching. If we knew for certain which manifest competences followed from formal education, we could compare formal competences in this study against pupil achievement. However, a separate study is required to reveal the connection between formal competences and manifest competences. Clearinghouse proposed that the requested systematic review should only address manifest competences and pupil achievement associated with it. Therefore, the current investigation solely concerns manifest competences, in other words those dimensions of competences that can actually be registered/observed in an empirical study.

Clearinghouse also refers to the fact that the Ministry of Education and Research has just recently in January 2008 had a study carried out by the *Centre for Economic Research AS, Trondheim*, of formal competence at upper secondary level compared with pupil results measured both by national tests in the 10th grade in the winter of 2004 and entrance tests for the 10th grade in spring 2005 (see Falch & Naper, 2008). The present review is therefore complementary to Falch & Naper's study.

At a meeting with the Ministry of Education and Research on 27th September 2007 representatives from the Ministry of Education and Research accepted the interpretations and delimitations formulated above.

1.2 Aims

On the basis of the previous section the aim of the present task can be specified as follows:

> *Which dimensions of teachers' manifest competences can be shown, through effect studies, to contribute to pupil achievement?*

In this way the assignment's review question can be formulated as follows:

> *Systematic research mapping:* What empirical research (primary research) has been carried out to shed light on the link between manifest competences in teaching staff in kindergartens and schools on the one hand and learning in children and young people on the other?
>
> *Systematic syntheses:* What evidence is there to show that particular manifest teaching competences improve pupil learning?

1.3 Review group

In connection with the execution of this assignment Clearinghouse established a review group comprising the following members:

Professor Jens Rasmussen, School of Education, University of Aarhus, chairperson
Reader Eyvind Elstad, Dept. of Teacher Education and School Development (ILS), University of Oslo
Professor Anders Holm, School of Education, University of Aarhus
Professor Sølvi Lillejord, Institute for Education and Health Promotion, University of Bergen (until 17/11 2007)
Eva Myrberg, Senior lecturer at the Faculty of Education, University of Gothenburg

The review group have taken part in data extraction/coding of the studies under survey and as a peer review group in relation to the report completed by Clearinghouse. There have been no conflicts of interest for any of the members of the review group in data extraction or in the peer review function related to this report.

2 Methods used in the review

2.1 Design and method

This systematic review is conducted according to principles more precisely outlined in the *Concept note* prepared by the Clearinghouse for Educational Research:

www.dpu.dk/clearinghouse.

A systematic review is characterised by using transparent and explicit methods in a series of steps that will be made clearer from this report.

The EPPI-Centre's web-based systematic review software 'EPPI-Reviewer' was used to manage the process of screening studies for selection, coding and analyzing data.

The review survey has taken place on the basis of the review group's and Clearinghouse's coding and qualitative assessment of the studies. Characteristics of the studies have been identified and in the same way thematic links have been emphasised.

2.2 Conceptual framework and definitions

From the outset the review was governed by the desire to answer the following question: Which dimensions of teachers' manifest competences can be shown, through effect studies, to contribute to pupil achievement?

During the process the time frame for the research that would be submitted for analysis was altered to: from 1998 to the present. The reason for this reduction in the quantity of research analysed was that the time allowed in the contract for the project would not permit the treatment of the surprising number of relevant studies that were found by using the original review question.

In addition the following conceptual specification was carried out:

'Teaching staff' are understood to mean: pre-school teachers, teachers and other similar adult teaching assistants, while teaching staff in special needs teaching and other institutions for special education are not included.

The competence of teaching staff is understood to mean manifest competences. Competences are given a broad interpretation, i.e. comprising knowledge, abilities and attitudes, as these are evidenced in actions in given contexts.

Children and young people's learning that is linked to dimensions of competences in the teacher does not comprise solely the learning gains acquired by the average pupil but also includes whether particular competences can be shown to have a positive influence on minority pupils or pupils with learning difficulties. Learning in children and young people is given a broad interpretation and comprises knowledge, skills and attitudes.

2.3 Searches

Both the resources and data bases to be searched and the profiles to be used in the searches were determined against the background of the aforementioned conceptual delimitations.

All searches have been carried out by Clearinghouse, but both the commissioning body and the review group have had the opportunity to discuss and correct search sites and search profiles. The opportunity has also been there from the start for the review group to suggest additional references. This opportunity was made use of.

In the same way there was discussion with the review group as to whether there were periodicals of central importance that were not indexed in the bases being searched and that should be investigated by hand. No periodicals in this category were found.

Table 2.1 below shows which bases and resources were searched and the corresponding number of hits. All hits were subsequently inserted in the software EPPI Reviewer.

Resources	Dato	Hits
ERIC (CSA)	17-09-2007	2330
FIS-Bildung	23/09/2007	470
Sociological Abstracts	26/09/2007	94
CBCA education	28/9/2007	57
AEI	28/9/2007	288
BEI	27/9/2007	387
Evidensbasen	25/09/2007	3
Dansk Pædagogisk Base	2/10/2007	276
NORBOK	9/10/2007	310
Libris	3/10/2007	622
Jykdok	4/10/2007	219
Internet search	8/10/2007	26
Psychinfo (CSA)	23/09/2007	1045
Secondary references	ongoing	11
References from review group	ongoing	14

Table 2.1: Searches conducted

The following brief characterisation of the selected resources:

ERIC, the world's largest database containing educational research, was searched in the CSA version.

FIS-Bildung is an educational database containing German-language literature.

Sociological Abstracts is the leading international sociological data base.

CBCA-education, Canadian Business and Current Affairs-education, is the Canadian database containing educational literature in French and English.

AEI, Australian Education Index is the Australian database with educational literature.

BEI, British Education Index is the British database with educational literature.

Evidensbasen is the database for systematic reviews of the Danish Clearinghouse for Educational Research.

Dansk Pædagogisk Base is the database of Denmark's Educational Library covering Danish educational literature.

NORBOK is a Norwegian book register that also includes Norwegian educational literature.

Libris contains the Swedish book catalogue that also includes Swedish educational literature.

Jykdok is the catalogue for the library responsible for educational theory in Finland containing Finnish educational literature.

Internet search: Searches were carried out in Google and Google Scholar

Psychoinfo, searched in the CSA version, is the largest and most important international database for psychology.

'Secondary references' refers to references that are referred to in primary references.

The search of the sites above was Clearinghouse's response to a duty to cover more than Anglo-American research. The review comprises Norwegian, Swedish, Danish, German, French and English sources. Furthermore, adjacent academic fields such as psychology and sociology were also examined to broaden the academic scope.

2.4 Search profiles applied

The core element in the theme under review is precise: (teacher) competence that provides desired effects in children and pupils. On the other hand the formulation of the review question maintains a breadth of disciplines. Search profiles were, therefore, so constructed as both to hit the precise core element and retain the necessary breadth of discipline. In the searches no demands have been made as to particular methodological approaches for the research in the studies searched. Searches for studies were carried out, but it must be stressed that these might well be reports of trials or development work or evaluations.

Throughout, searches have been carried out for material published in the period 1980 to 2007. The profile in ERIC, which is the most extensive, is recreated in the other databases searched but using the latter's information structure.

The search profiles used are as follows:

ERIC

((PT=(142 reports: evaluative) or PT=(143 reports: research))) and (DE=("academic achievement" or "educational attainment" or "student promotion" or "social

promotion” or “achievement” or “black achievement” or “graduation” or “high achievement” or “knowledge level” or “low achievement” or “mathematics achievement” or “overachievement” or “reading achievement” or “scholarship” or “scholarly communication” or “scholarly writing” or “science achievement” or “underachievement” or “writing achievement” or “achievement gains” or “achievement rating” or “grading” or “credit no credit grading” or “pass fail grading” or “excellence in education” or “school effectiveness” or “student characteristics” or “diversity student”)) and (DE=(“teacher influence” or “teacher behavior” or “teacher competencies” or “teacher effectiveness” or “teacher clarity” or “teacher leadership” or “teacher participation” or “teacher persistence” or “teacher response” or “teacher role”))

FIS-Bildung

Schlagworter:

LEHRERLEISTUNG LEHRERPERSOENLICHKEIT LEHRERROLLE LEHRERVERHALTEN LEHREVALUATION /ODER

UND

Schlagworter:

SCHUELEREINSTELLUNG SCHUELERLEISTUNG SCHUELERPERSOENLICHKEIT SCHUELERSELBSTBEURTEILUNG SCHUELERTAETIGKEIT SCHUELERVERHALTEN EFFEKTIVITAET SCHULERFOLG/ ODER

UND

Sprache: English oder Deutsch

Sociological Abstracts

(((DE=(“effectiveness” or “accountability” or “effects” or “efficiency”)) or (DE=(“educational attainment” or “academic achievement”))) and (DE=(“teachers” or “teacher evaluation”))) NOT (DE=(“graduate students” or “college students” or “medical students” or “college graduates”))

CBCA-Education

Only in scholarly journals

Within Subject: (Academic achievement OR Achievement OR School effectiveness OR Student characteristics)

And

Within Subject: (Teacher characteristics OR Teacher competence OR Teachers OR Teacher evaluations)

NOT

Within Subject: (University students OR University education)

AEI

IN AEI Subject headings: (Teacher role OR teacher knowledge OR teacher effectiveness OR teacher competencies OR teacher influence)

And

IN AEI Subject headings: (Academic achievement or black achievement or high achievement or knowledge level or low achievement or mathematics achievement or overachievement or reading achievement or scholarship or underachievement or outcomes of education)

NOT

IN AEI Subject headings: (Universities or university teaching or university students)

BEI

(Teacher role OR teacher knowledge OR teacher effectiveness OR teacher competen? OR teacher influence)

AND

BEI subject heading: Pupil? NOT student?

Evidensbasen

Lærerrolle ikke (læreruddannelse eller videreuddannelse af lærere)

Dansk Pædagogisk Base

(((em=lærer? eller em=pædagog) og em=undersøgelse) eller (lærereffektivitet eller lærerbedømmelse eller læreregnethed eller em=lærerrolle?)) og (dk=37.1? eller dk=37.2? eller dk=37.3?))

IKKE (em=videreuddannelse af lærere eller em=højere uddannelse eller em=universitet? Eller em=voksenuddannelse)

NORBOK

D=371.1 OR TI=((lærer? OR førskolelærer?) AND D=37?) NOT NOT TI=(lærerutdan? OR førskolelærerutdan?)

Libris

Only books

SAB:Emia land:sw NOT (vuxenutbildning OR personalutveckling OR AMNE:(lagar) OR fortbildning OR skolledare OR lagstiftning OR arbetsmarknadsprognos OR skolledning OR ledarskap OR TREE:Ep OR TREE:Et OR TREE:Ev OR TREE:Eu OR TREE:Ex)

Jykdok

Stategy 1.

(Only for English language references published in Finland)

Search Request: Builder Search = (teacher?)[in Kaikki sanat/All fields] NOT (“teacher education”)[in Kaikki sanat/All fields] NOT (universit? OR adult? OR vocational?)[in Kaikki sanat/All fields]

Excluding teaching materials

OR strategy 2:

(Only for Swedish language references published in Finland)

Search Request: Builder Search = (lärar?)[in Kaikki sanat/All fields] NOT (lärarhandledning?)[in Kaikki sanat/All fields] NOT (universitet? OR yrkesutbild? OR vux?)[in Nimeke/Title]

Excluding teaching materials

Internet search

- *Google search:*

Published last year:

allintitle: teacher impact

student OR pupil

54 hits

or

Published last year:

allintitle: teacher effect

student OR pupil

59 hits

- *Google scholar:*

For all subjects:

for 2007:

allintitel: teacher pupil OR student

111 hits

Internet results — like references from the review group and references from references — were inserted into the EPPI reviewer manually. Only relevant results were, therefore, included. 32 relevant results were found. Since 6 of these were already in the review 26 were inserted.

Psychinfo

((DE=("academic achievement" or "academic overachievement" or "academic underachievement" or "mathematics achievement" or "reading achievement" or "science achievement" or "performance" or "group performance" or "student attitudes" or "student characteristics" or "student attitudes" or "student engagement" or "student records")) and (DE=("teacher characteristics" or "preschool teachers"))) not (DE=("college students" or "college athletes" or "community college students" or "education students" or "junior college students" or "nursing students" or "rotc students" or "college teachers"))

2.5 Screening

As can be seen, searches were conducted in such a way as to ensure that the required literature would actually be found. However, not all the literature found need be relevant. All hits were, therefore, screened, i.e. sorted according to relevance as

regards the review question. Some references have been included, while others are excluded. This task was carried out by employees at Clearinghouse.

Prior to screening duplicates were removed. Due to the way in which searches were conducted, it was only to be expected that there would be duplicates, but a total of 163 duplicates is not large.

Screening took place in two phases.

2.5.1 Phase 1: Reference screening

All references obtained were loaded into EPPI reviewer and were screened for inclusion on title and abstract. The results of the screening process can be seen in Table 2.2

Reason for inclusion/ exclusion	Reason described	Number
EXCLUDE Wrong scope	Not offering information on how pupils are affected by teacher competencies, i.e. what teachers know, value and do in the classroom context	4712
EXCLUDE Only formal teacher competencies	Studies only comparing outcomes in pupils of teachers having none, some or full teacher education	175
EXCLUDE Wrong institution	Not on activities in ordinary preschool, ordinary primary or ordinary secondary school	270
EXCLUDE Wrong paper	Not a paper with data from empirical research: Editorials, commentaries, book reviews, policy documents, resources, guides, manuals, bibliographies, opinion papers, theoretical papers, philosophical papers, research-methodology papers	340
EXCLUDE Wrong research	Not offering data from original research i.e. only summarizing research done by others. (However systematic reviews can be included)	161
MARKER Insufficient information at present	The document description is not sufficient to warrant inclusion/exclusion.	0
EXCLUDE published before 1998		262
Included		73

Table 2.2: Overview of complete screening (N=5990 references)

Sorting was according to hierarchy: The first thing considered was whether it could be excluded on the first criterion, *Wrong scope*. If not, the second criterion is looked at, *Only formal teacher competences*, etc. For all references that were entered as having insufficient information, supplementary information was regularly sought in the form of abstracts or other information. The Scandinavian databases in particular were found to contain relatively small quantities of information. Here it was particularly necessary to

seek supplementary information. Exclusion only took place where there was a firm informational basis to do so.

After the phase 1 screening there were 386 references included. In relation to the tight time frame that had been agreed for this project, it was decided that it would not be possible to deal with such a large amount of material.

The matter was, therefore, discussed with the commissioning body and with the review group, who considered whether there could be a further delimitation of the content of the review question and with it an extra screening of the references. For example, the exclusion of pre-school and extra-curricular courses was considered, alongside particular school subjects and research designs. None of these measures would, however, bring with them sufficient reduction in the quantity of material that should (or could) be examined. These deliberations ended by introducing yet another criterion for exclusion — published prior to 1998. This means that this review only comprises an analysis of research published from 1998 to 2007 in this area.

2.5.2 Phase 2: Full text screening

We obtained full text copies of all references that were coded as 'include' or where a decision could not be made on title and abstract alone,

On the basis of the acquisition of the book, report or article indicated by the reference, a further screening using the same criteria was subsequently carried out.

As regards screening, it is important to emphasise that reports of evaluation or trails were not excluded. Generally speaking, the quality of the research is not a part of the basis for decision-making in terms of inclusion or exclusion.

To throw further light on the screening process, it has to be added that the following are included under *Wrong scope*: Studies that only relate to the teacher's gender or social class or ethnic background or to one or more of these in relation to gains to the pupils are not included. A teacher's gender, social class or ethnicity is a circumstance that is not considered as being a part of their teaching competence. For such factors can doubtless be shown to influence the pupil result but are not capable of being influenced by input through (teacher) training.

Studies that solely deal with the teachers' high or low expectations of the pupils are not included. Studies that relate only to the effect of the teachers' enthusiasm on their pupils are not included either. The effect of the teacher's high/low expectations of their pupils is already well documented.

Studies in which it is only one party (either the teacher or the pupil) that takes part without a controlling element contributing data are not included. This applies, for example, to studies of what pupils believe constitutes an effective teacher. Exclusion has also taken place in cases where the study compares the pupils' opinions with, for example, their academic performance. The reason for this is that inclusion would entail circularity in inferences about the effect of teacher competence on pupils.

Studies that relate solely to the effect on pupils of the use of a particular teaching technique/method are not included unless the analysis of the teaching technique/method focuses on the teacher's contribution. It is the competence of the

teacher that has to be focused on explicitly, not the use of some teaching method or other.

An overview of the result of the complete screening process can be found in Table 2.2.

2.6 Coding/data extraction from the studies

The 71 documents that were obtained (73 documents were identified) concern 70 different studies. The data extraction of the 70 studies was undertaken as a collaboration between the review group and employees at Clearinghouse.

Coding was carried out by using selected items from 'EPPI Centre data extraction and coding tool for education studies V2.0.' The coding system was created by the EPPI Centre at the Institute of Education, University of London. An example of the application of the coding system is reproduced in Appendix 2, p. 79-89.

The coding system is thought of as constituting a *tertio comparationis*, i.e. a (shared) third factor that permits comparison between two elements.

In the coding system, questions about the studies are answered in such a way that relevant data can be extracted with a view to comparison.

Structurally the system is built up in sections that are sub-divided into questions that themselves are sub-divided into opportunities for multiple choice responses. There is always the opportunity to link notes and explanatory comment to the answers that have been ticked off. From the point of view of content the system covers the study's aim, its context, its design, its method, its results and the quality of its research and reporting.

Coding is in most cases undertaken by two people independently of each other. This has made it possible to conduct direct quality assurance of the coding by comparing answers. No reliability test has, however, been conducted in this regard. In cases in which a single individual has carried out the coding quality assurance has been conducted by having the coding checked one more time. Everyone in the review group and in Clearinghouse has had access to all the coding. The process has been transparent.

It can be said of the EPPI system that it must be considered to be well-suited to research of the kind that has been carried out in this systematic review. Among the studies that were found, there is a preponderance of quantitative studies. The system can, however, also manage research that has a more qualitative approach.

For those features of this review concerned with content, a coding system has been created that is specific to the review. Structurally this is constructed in the same way as the ordinary systems of the EPPI review and covers: Teacher competence, pupil results, context of the study. An example of the application of the coding system specific to the review is reproduced in Appendix 2, p. 79-80.

It is on the basis of these 70 codings that a description of the research has been made possible.

2.7 Complete overview of the review process

Figure 2.1 on page 31 shows the route from searches to research mapping to synthesis. The figure also shows which of the subsidiary processes has been undertaken primarily by Clearinghouse (boxes with a grey background) and which of them the review group and Clearinghouse share responsibility for (the box with a white background).

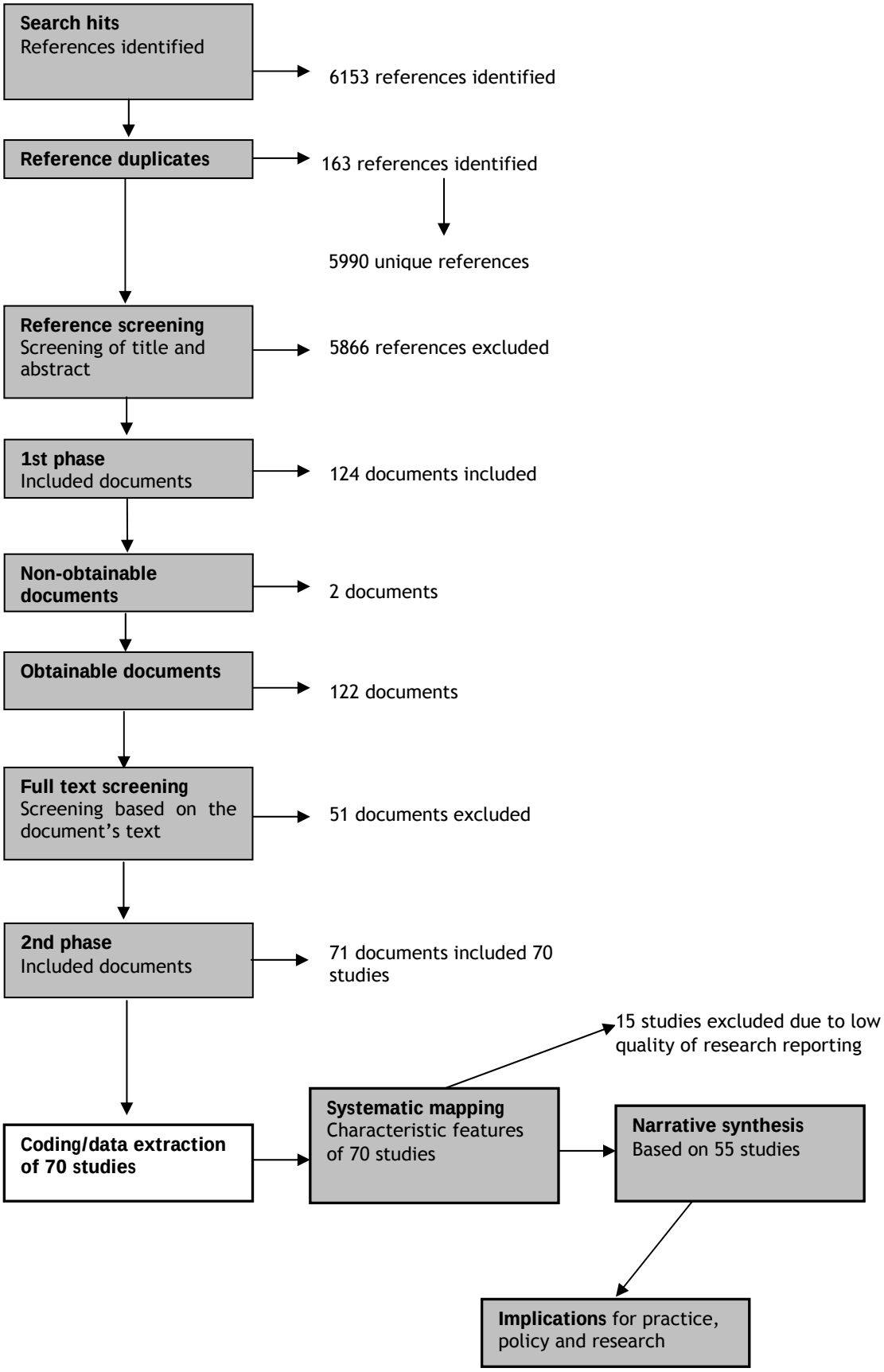

Figure 2.1: Filtering of references from searches through mapping to synthesis

3 Research mapping and research assessment

This chapter will describe the characteristics of the last ten years of research into the review question formulated on page 18. By way of introduction it looks at the general characteristics of this research such as language of publication, country where the study took place and research design. The research is then considered generally in the light of prime elements of the review: teacher competence, effect on pupils, and context. Finally an account is given of assessment of quality of the 70 studies included in the analysis.

3.1 General characteristics

As can be seen from the above presentation, mapping and screening have been conducted in a way that ensures that in principle all the research into the review's subject area has been found, regardless of language of publication and country in which the study took place. The factual distribution of the studies included as regards language is given in Table 3.1 below:

Language of publication	No. of studies
English	64
Spanish	1
Portuguese	1
German	1
Chinese	1
Danish	2

Table 3.1: Language distribution of studies (N=70 studies)

The massive dominance of English-language studies points to a general Anglo-American dominance in the field of educational research.

Clearinghouse brought in external language experts to handle the coding and assessment of studies in Chinese, Portuguese and Spanish. The remaining languages were dealt with by the review group and Clearinghouse.

As regards the studies' distribution according to the country in which they were made, the results are presented in Table 3.2.

The number of registered countries (77) is larger than the number of studies (70). This is due to the fact that some of the studies involve several countries. Even though there is still a massive Anglo-American dominance — 73% of the studies are from USA, UK, Australia, New Zealand or Canada — relevant studies have also been found from other areas of the world.

Countries	No. of studies
USA	34
Great Britain	10
Germany or German-speaking countries	4
Nordic countries	5
Other European countries	9
Australia, New Zealand, Canada	7
Other countries	7

Table 3.2: Countries where the studies were conducted (N=70 studies; more than one coding per study is possible)

Searches and screening were carried out in such a way as to ensure that differences of research method as regards the subject of the review are possible. The coded studies are distributed according to their research design as shown in Table 3.3.

Research design	No. of studies
Experiment with non-random allocation to groups	15
A group pre-post test	13
A group post-test only	5
Cohort study	12
Case-control study	2
Cross-sectional study	7
Views study	4
Ethnography	2
Systematic review	1
Other review (non-systematic)	1
Case study	8
Action research	1
Methodological studies	2
Secondary data analysis	1

Table 3.3: Research design
(N=70 studies; more than one coding per study is possible)

The number of research designs registered (74) is greater than the number of studies (70) since individual studies employ more than one design.

The distribution shows considerable breadth in the research approach to the review subject. The most common approach is the use of experiments with non-randomised distribution in groups, though only 20% of studies use this design. By far the majority of studies take a quantitative approach to the area, only 20% making use of a qualitative approach.

The distribution shows (indirectly) that in the period 1998 to 2007 no randomised controlled experiments were carried out. This in itself is noteworthy since the subject — the effect of manifest teacher competence on pupils — could from the point of view of research method be said to lay itself open to the use of this design — among others.

3.2 Review-specific characteristics

The various elements of teacher competence that lie within the scope of this review are treated in the next section, which is followed by a section dealing with the way pupil performance is registered.

3.2.1 The teachers

Table 3.4 concerns the teacher's knowledge about the subject that they teach. Cognitive subject knowledge concerns their theoretical understanding of the subject, while practical skills relate to the skills that the subject demands in practice.

Form of subject knowledge	No. of studies
Yes. Cognitive subject knowledge	16
Yes. Practical subject skills	17
No	47

Table 3.4: Does the study examine subject knowledge in teachers? (N=70 studies; more than one coding per study is possible)

There are 10 studies that examine both cognitive knowledge and practical skills. Subject knowledge, which plays a major part in discussion of teacher competence, is the subject of only 33% of studies.

Action type	No. of studies
Yes. Didactic practical skills (relating to planning)	22
Yes. Didactic cognitive skills (relating to execution)	62
No	8

Table 3.5: Does the study examine the teacher's didactics? (N=70 studies; more than one coding per study is possible)

Table 3.5 focuses on the degree to which the studies relate to teachers' didactic knowledge and skills. In the table a distinction is made between studies relating to the teachers' understanding of didactic theory and their execution of didactic practice. 89% of all studies deal with one or other or both of these aspects, which is to say the majority of the studies. If we look solely at skills linked to didactic practice, we see that this is also examined by 89% of all studies.

If we subsequently ask what the teachers' actions are aimed at doing, results can be divided into a number of sub-groups, see Table 3.6. Where the studies have had an interest in registering the way the teacher ensures that the class works in an orderly manner, starts the class on time and that the change of class takes place efficiently, this is accounted as part of the teacher's class management. Classroom management is, therefore, a matter of the teacher's organisation and structuring of activities. Where the studies register ways in which the teacher ensures that pupils behave in an appropriate manner both towards the teacher and towards each other, this is accounted as part of the teacher's management of the pupils' behaviour. Behaviour management is, therefore, concerned with the teacher's regulation of the individual pupil's

behaviour. Where the studies deal with ways the teacher strives to create a warm and supportive working atmosphere in the classroom, this is accounted as part of classroom climate. A number of studies also register which pedagogical method the teacher makes use of in the classroom.

What do the teacher's actions relate to?	No. of studies
Classroom management	37
Behaviour management	32
Classroom climate	24
Teaching method	27
Other aspects	9

Table 3.6: What do the teacher's action relate to?
(N=70 studies; more than one coding per study is possible)

As can be seen, there are many of the studies that deal with several elements of the teacher's action at once. The studies are fairly evenly distributed across the four areas mentioned.

Table 3.7 below shows the number of studies that examine the teachers' belief, attitude and emotion.

59% of all studies deal to a greater or lesser extent with this feature.

Teachers' belief about pupils are teachers' theories about how pupils function, especially their manner and capacity for learning. 34% of studies deal with this. *Teachers' thoughts about teaching* are teachers' theories about how instruction functions, especially regarding the approaches and methods that in the teacher's view are most appropriate to use in given situations. 24% of studies deal with this. Similarly, 26% of the studies treat teachers' attitude, which relates to the teacher's value judgements as to the teaching context and how they regard teacher activity. Only 13% of the studies deal with teacher emotion, which is seen as the emotional reactions to the teaching context.

Teacher belief, attitude, emotion	No. of studies
Teacher belief about pupils	23
Teacher belief about instruction	17
Teacher attitude	18
Teacher emotion	8
No, not relevant	41

Table 3.7: Teacher belief, attitude and emotion
(N=70 studies; more than one coding per study is possible)

It can be seen from Table 3.8 that only 19 (24%) of the studies examine matters related to the teacher's personality. 10% of studies deal with the teacher's fundamental value and code of ethics.

Other aspects of the teacher's personality are covered by studies with a wide variety of approaches to the personal side. Here the subject is treated as: experience of self, self-confidence, self-reflection, sensitivity.

Teacher personality	No. of studies
Values and ethics	7
Other aspects of personality	12
No, not relevant	53

Table 3.8: Teacher personality
(N=70 studies; more than one coding per study is possible)

3.2.2 The pupils

Pupil performance is measured in a variety of ways in the studies. This can be seen from Table 3.9

Standardised tests are used in 51% of the studies. A number of studies use a variety of different measurements of pupil performance. For other methods of measurement a variety of forms of observation, interview, questionnaire, video recordings etc. were registered. The impression received is, therefore, that research as a whole makes use of various approaches when pupil performance is to be measured.

Method of measurement	No. of studies
Standardised tests	36
Non-standardised tests	17
Grades or other teacher-based evaluation	7
Other methods for measurement	30

Table 3.9: Method of measurement for pupil performance (N=70 studies; more than one coding per study is possible)

Registration of the effect of teaching on the pupils can have a narrow or a broader purpose. There may be an interest in measuring the pupil's scholastic achievement in individual school subjects, in other words the pupil's acquisition of academic skills in a narrow sense such as the ability to read or to add and subtract. There might also be an interest in the non-academic effects of the school's teaching, such as whether the pupils become more interested in a subject (or in school), whether they become better at working together, whether they develop independence, whether they acquire a notion of values that society finds desirable, and so on. These could be described as non-scholastic achievement.

Pupil result	No. of studies
Scholastic achievement	59
Non-scholastic achievement	33

Table 3.10: Content of pupil results (N=70 studies; more than one coding per study is possible)

From Table 3.10 it can be seen that there are 84% of the studies that examine more closely school performance from an academic point of view. 31% of studies examine both scholastic achievement and non-scholastic achievement.

Educational level	No. of studies
Pre-school	2
Primary or secondary school	53
Upper secondary school	16
Secondary school unspecified (grade 7 to 11)	5

Table 3.11: Distribution according to educational level (N=70 studies; more than one coding per study is possible)

Table 3.11 shows the distribution of the studies according to educational level. 6 studies examine more than one educational level. There is a preponderance of studies on

primary school level, 53 studies (76%). Pre-school, on the other hand, is very poorly covered as regards the review question with only two studies.

As can be seen from Table 3.12, the studies are most often conducted within the framework of specified school subjects.

School subject	No. of studies
Primary language	29
Foreign language	5
Mathematics	36
Sciences	13
Other subject or non-specified subject	22

Table 3.12: Subject studied
(N=70 studies; more than one coding per study is possible)

A substantial proportion of the studies cover more than one subject. Primary language (41%) and mathematics (51%) are the subjects most frequently studied. Under the heading 'Other subjects' there are a large number of studies in which the subject is simply not specified, but there are also examples of studies about subjects such as gymnastics or history.

3.3 Assessment of quality

It is an indispensable part of the review process not just to find, code and analyse available studies relating to the review question but also to assess the quality of the studies to reveal the extent to which they can contribute evidence that might assist in answering the questions raised by the systematic review. The only studies capable of contributing to this are those whose research quality is at a sufficiently high level, while studies with a low research quality cannot contribute in this way.

When in what follows we speak of quality of results and reporting, however, it is important to stress that the quality referred to is that of the content of the documents that have been examined, i.e. the research reports. We can offer no judgement on the quality of the research input or the research process that lies behind this report neither in a deeper nor a broader sense.

In this section the criteria are presented that have determined the quality assessment of the 70 studies.

3.3.1 The total overall assessment

If we look at the total overall assessment of the 70 studies we get the following result, see Table 3.13.

Weight of evidence	No. of studies
High	10
Medium	45
Low	15

Table 3.13: Overall weight of evidence of the studies (N=70)

This result appears as the result of an assessment of each study individually. For its part the assessment of the individual studies has taken place by bringing into play the 23 criteria determining research quality that can be seen in Appendix 2: Coding of a study. This relates to all questions and answers under point M and N, see pp. 85-89.

It must be recalled in this connection that the review question asks for studies of effects. The multiplicity of research design that characterises research in this area is from the start hardly adequately adapted to this requirement.

The 15 studies that received a total overall 'low' evidence weight are not included in the response to the review question in the following chapter on synthesis. The fact that only 10 studies (14%) have been given an overall 'high' assessment also signals that research in this area still leaves much to be desired from the point of view of quality.

3.3.2 Quality of reporting in the studies

The quality of reporting in the studies is examined more closely by answering these questions Table 3.14.

The low number of 'yes' answers to the accessibility of original data presents a relative problem. Openness regarding the accessibility of data, limited of course by consideration for personal privacy, is an important factor in the infrastructure of the research. In addition it is striking that there are elements of selective bias in reporting in more than half the studies. The fact that only slightly more than half of the studies can be replicated using their report must also be seen as being a relative problem, since the majority of the studies are quantitative. In relation to the remainder of the questions the great majority of the studies can be said to give an adequate account.

Question	Answer: 'yes' No. of studies	Answer 'no': No. of studies
Is the context of the study adequately described?	61	9
Are the aims of the study clearly reported?	63	7
Is there an adequate description of the sample used in the study and of how the sample was identified and recruited?	53	17
Is there an adequate description of the methods used in the study to collect data?	60	10
Is there an adequate description of the methods of data analysis?	57	13
Is the study replicable from this report?	40	30
Do the authors state where the full, original data are stored?	18	52
Do the authors avoid selective reporting bias? (e.g. do they report on all variables they aimed to study, as specified in their aims/research questions?)	33	37

Table 3.14: Quality of reporting in the studies (N=70)

3.3.3 The contribution to evidence made by the studies

The remaining questions regarding research quality relate to evidence. Questions and answers on this are cited together below in Table 3.15 and Table 3.16.

Seen from a critical angle, Table 3.15 can be said to contain a relatively small amount of research (11%) that includes explicit ethical considerations. In the same way it is worth noting that users of the research have not been involved in 47% of the studies. Furthermore there are a relatively large number of studies (39%) in which the research design chosen is not regarded as being appropriate for answering the research question under investigation. Finally, there are a considerable number of cases (33%) in which the reviewer and the author of the study disagree to a greater or lesser extent about findings and results.

Question	Answer 'yes' No. of studies	Answer 'no': No. of studies
Are there ethical concerns about the way the study was done?	8	62
Were users/relatives of users appropriately involved in the design or conduct of the study?	37	33
Is there sufficient justification for why the study was done the way it was?	54	16
Was the choice of research design appropriate for addressing the research question(s) posed?	43	27
Have sufficient attempts been made to establish the repeatability or reliability of data collection methods or tools?	57	13
Have sufficient attempts been made to establish the validity or trustworthiness of data collection tools and methods?	54	16
Have sufficient attempts been made to establish the repeatability or reliability of data analysis?	54	16
Have sufficient attempts been made to establish the validity or trustworthiness of data analysis?	58	12
To what extent are the research design and methods employed able to rule out any other sources of error/bias which would lead to alternative explanations for the findings of the study?	60 (yes, or yes to some degree)	10
How generalisable are the study results?	(only text responses)	
In light of the above, do the reviewers differ from the authors over the findings or conclusions of the study?	23	47

Table 3.15: The contribution to evidence made by the studies 1 (N=70)

Question	High	Medium	Low	Not applicable
Have sufficient attempts been made to justify the conclusions drawn from the findings, so that the conclusions are trustworthy?	13	41	14	2 (findings and conclusion inseparable)
Taking account of all quality assessment issues, can the study findings be trusted in answering the study question(s)?	12	42	16	
Appropriateness of research design and analysis for addressing the question, or sub-questions, of this specific systematic review.	13	40	17	
Relevance of particular focus of the study (including conceptual focus, context, sample and measures) for addressing the question, or sub-questions, of this specific systematic review	30	30	10	

Table 3.16: The contribution to evidence made by the studies 2 (N=70)

3.3.4 The study's generalisability

The generalisability of the study is assessed only textually — not through (supported) multiple choice formats. The textual material gives the impression that there are a number of studies (33%) that, due to their limited sample, their overspecialised investigative context or design, have restricted generalisability.

3.3.5 Research quality is global

We have observed that a study which shows a high quality in one respect, typically also scores high in other aspects. Our comprehensive assessment of each study identified 55 that scored either 'medium' or 'high'.

4 Narrative syntheses

4.1 Introductory remarks

The previous chapter identified the primary studies included in the systematic synthesis process. We have already seen on page 35 that no randomised controlled experiments about the review questions relating to this study have been carried out over the past ten years. This excludes the possibility of conducting systematic synthesising in the form of meta-analyses.

A procedure called *Narrative Synthesis in Systematic Reviews* (see Popay et al., 2006) is used instead. According to this, the narrative synthesis process consists of four elements, which analytically are presented in a given order but which in the practical process of synthesis might well contain iterative movements between the various elements.

The four elements can briefly be described as follows:

The first element consists of developing a theoretical model of how the effect(s) that are the object of study come about, why they do so and for whom. There is at times talk of establishing a 'theory of change' (see Weiss, 1998, 55), who in Wholey's (1987, 78) description suggests 'the chain of causal assumption that link programme resources, activities, intermediate outcomes and ultimate goals'. The theory can be used to interpret the review's findings and can be useful in an assessment of how broad the applicability of these findings is.

The second element consists of developing a preliminary synthesis. In this phase it is necessary to organise the studies included in such a way that their direction — and if possible their strength — can be established. At the same time a pattern is sought that also relates to factors that in various ways might prove to have an influence on the effect. In this phase the task is to establish possible syntheses, while it is reserved for a later stage to determine how robust they are.

The third element is devoted to a survey of the factors that are common to the studies and can explain variations in the direction and strength of the effect studied. Also included here is a treatment of the question of why a phenomenon has or does not have an effect, and of whether particular factors play a part here that can explain how the effect in a given context is strengthened or weakened.

The fourth element is an assessment of the robustness of the synthesis. This is a complex notion which can, somewhat simplified, be said to consist of three aspects.

In the first place the robustness of a synthesis depends on *the methodological quality* of the primary studies. The trustworthiness of a synthesis will depend both on this quality and on the quantity of the evidential basis it is constructed upon. If primary studies of poor quality are uncritically included in the systematic review, the synthesis' trustworthiness will be affected.

In the second place trustworthness of the syntheses will also be affected by the *methods* used in the synthesis. Which precautions are taken to minimise bias by, for example, giving similar weighting to primary studies of uniform technical quality?

Finally one aspect deals with the degree to which the screener and the reviewer have *sufficient information* to be able to be certain in including a primary study in the synthesis. This can present a serious problem in particular as regards the investigation of effects connected to complex factors, since it is not always clear from the primary study what the conditions are that the various effects are linked to.

At the conclusion of the synthesis process these aspects should be brought together and result in an overall assessment of the strength of the evidence, which allows conclusions to be drawn on the basis of a narrative synthesis.

4.2 A theoretical model

On page 18, the purpose of this systematic review is formulated in the following way**:**

> *Which dimensions of teachers' manifest competences can be shown, through effect studies, to contribute to pupil achievement?*

There is programme theory concealed here that can be illustrated in the following way, see Figure 4.1:

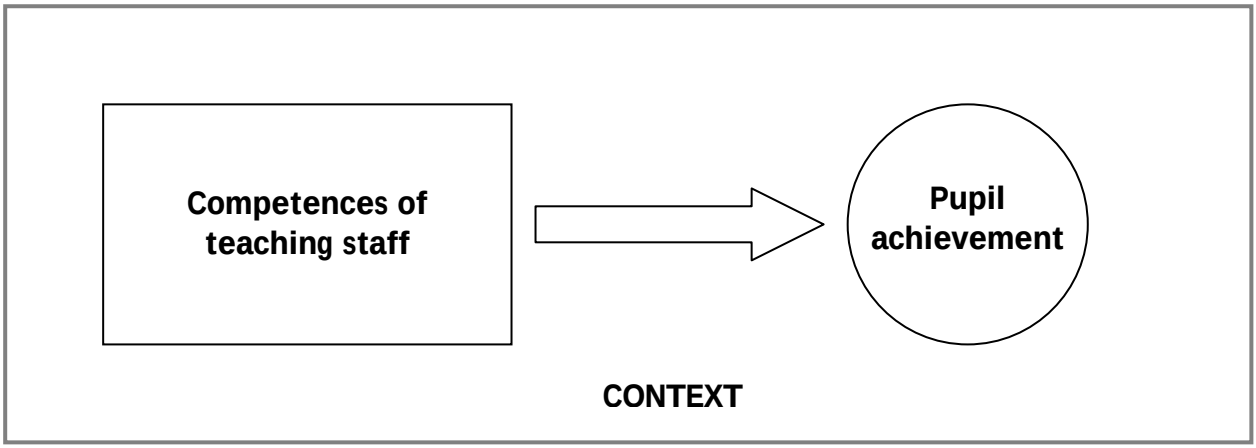

Figure 4.1: A programme theory

The programme theory is a model. It does not reproduce actual conditions in, for example, a school classroom where a teacher teaches but emphasises elements of reality that are regarded as significant. The model presents the idea that the competences that manifest themselves in the teacher's teaching can influence the pupils' achievement. And the model states that some of the competences that manifest themselves in the teacher's teaching have an effect on the pupils' learning. The model, therefore, comments on the direction of the effect but says nothing directly about how great that effect is. At the same time the model points out that the interplay between teacher competence and pupil achievement takes place in a context. The model does not, however, specify the factors that have to be taken into account in the context.

The model does not fully reflect the complex reality of a normal classroom. In the real classroom interactive relations exist between the people involved. The pupils influence the teacher, pupils influence pupils, and the teacher influences the pupils in a constant process of mutual interaction. The result of these social processes — and here all kinds of other relevant factors that come into play in a social reality are left out of account — is the unique multi-faceted social and learning environment of a particular classroom.

In the model, the multiplicity of teaching/learning context is simplified. This is the price research has to pay to be able to treat a complex reality.

It is, however, not helpful for a narrative synthesis to be undertaken solely on the basis of such a model. It will not be able to provide a sufficient account of aspects of the present primary research in the area such as have already been mapped in the research mapping in Chapter 3. With the aid of the specific systematic approach of the research mapping, see Appendix 2, page 79-80, a series of these dimensions have been captured with the assistance of a model provided by Muijs & Reynolds (2002, 7, fig.1), see Figure 4.2.

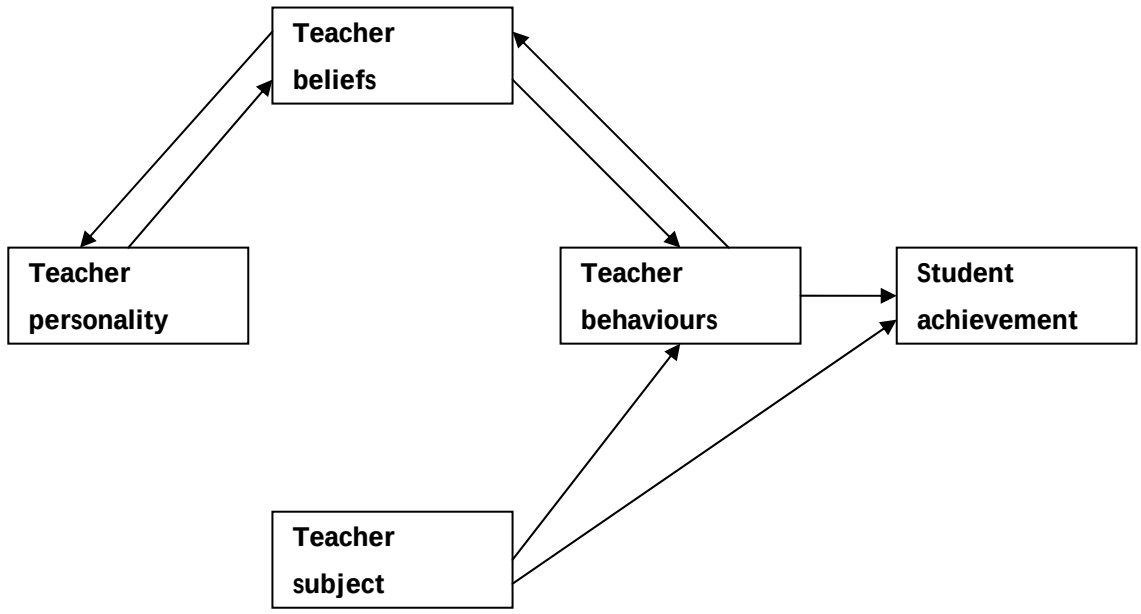

Figure 4.2: Theoretical model of the relationship between teacher characteristics and students learning.
(Source: Muijs, D & Reynolds (2002), Teachers' Beliefs and Behaviors: What Really Matters, Journal of Classroom Interaction, 37, 3-15)

The model in Figure 4.2 can be seen as an elaboration of Figure 4.1, in that the boxes 'Teacher personality', 'Teacher beliefs', 'Teacher subject' and 'Teacher behaviours' corresponds to the programme theory's left-hand box, 'Competences of teaching staff', while the boxes 'Student achievement' correspond to the programme theory's right-hand box, 'Pupil learning'.

Muijs & Reynolds' model additionally includes a theory of how teacher behaviour arises. The model suggests that the teacher's knowledge of his/her subject ('Teacher subject') and the teacher's beliefs involve factors that have a direct influence on teacher behaviour. The model further claims that the teacher's personality only influences teacher behaviour indirectly via teacher beliefs. On the other hand, and unlike the programme theory, this model does not reflect the fact that teaching takes place in a context.

4.2.1 DeSeCo's definition of the concept of competence

The programme theory, see Figure 4.3, could give the impression that a possible narrative synthesis consists solely in examining whether the competences of teaching staff can be directly linked to the pupil's achievement. The fact that we must naturally assume there to exist a plurality of possible competences that could prove to be relevant means that this approach is not a fruitful one. In addition we have to take the following factors into consideration:

In the current investigation, the focus (see p. 18) is solely on manifest competences, in other words those dimensions of competences that can actually be registered/observed in an empirical study. Due to its definition, a competence is not immediately 'observed', but we register that it manifests itself in a given situation. This understanding accords with the so-called DeSeCo definition of the concept of competence that OECD has recommend be employed.

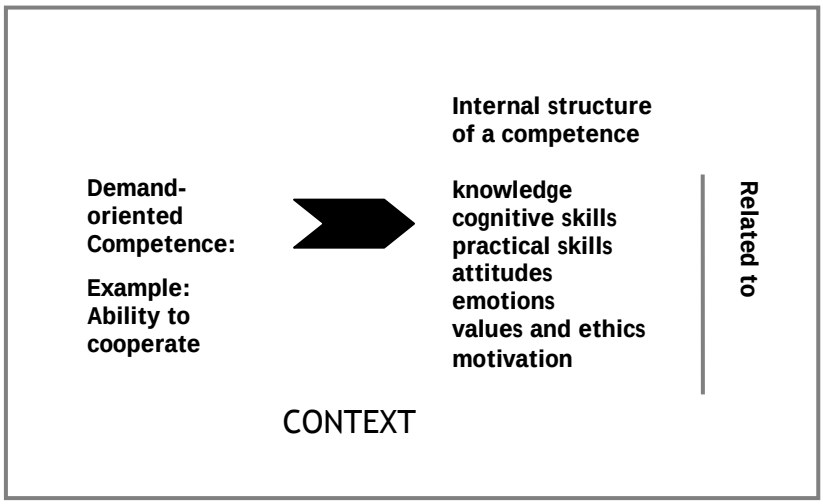

Figure 4.3: The demand defines the internal structure of a competence

The definition runs as follows:

> *A competence is defined as the ability to meet demands or carry out a task successfully, and consists of both cognitive and non-cognitive dimensions* (see DeSeCo, 2002, 8)

DeSeCo attach the following comment to this definition:

> A competence is defined as the ability to meet individual or social demands successfully, or to carry out an activity or task. This external, demand-oriented, or functional approach has the advantage of placing at the forefront the personal and social demands facing individuals. This demand-oriented definition needs to be complemented by a conceptualization of competencies as internal mental structures — in the sense of abilities, capacities or dispositions embedded in the individual. Each competence is built on a combination of interrelated cognitive and practical skills, knowledge (including tacit knowledge), motivation, value orientation, attitudes, emotions, and other social and behavioural components that together can be mobilized for effective action (Figure 4.3: The demand defines the internal structure of a competence). Although cognitive skills and the knowledge base are critical elements, it is important not to restrict attention to these components of a competence, but to include other aspects such as motivation and value orientation. (Ibid., 8-9)

DeSeCO also provides an illustration of the dimensions covered by the concrete example: 'Ability to cooperate', see Figure 4.3.

The fact that competences in actual situations manifest themselves as dimensions of competences has been included in the review-specific descriptive system of the study, see Section 7.1.

4.3 Narrative syntheses based on the theoretical model

In this section there is a discussion of the narrative systems that the systematic review suggests are relevant. This discussion will be structured according to the theoretical model presented on page 47, Figure 4.2, supplemented by the dimensions of competences introduced in the review-specific coding with reference to DeSeCo's definition of the concept of competence.

As will be seen, the review question that has been posed, see page 18, gives rise to not merely one narrative synthesis but — taking the theoretical model as a starting point — to a cluster of narrative syntheses. Of the 55 studies of 'high' or 'medium' research quality, three studies are not included in the following synthesis generations. The three studies are: Brewer (1999), Dossett (2003) and Rockoff (2003). Of these, Brewer (1999) is a secondary analysis, Dossett (2003) is a methodological study and Rockoff (2003) will be addressed in the following section, 'Teacher behaviours — student achievement'.

4.3.1 Teacher behaviours — student achievement

The first context to be considered is highlighted in Figure 4.4.

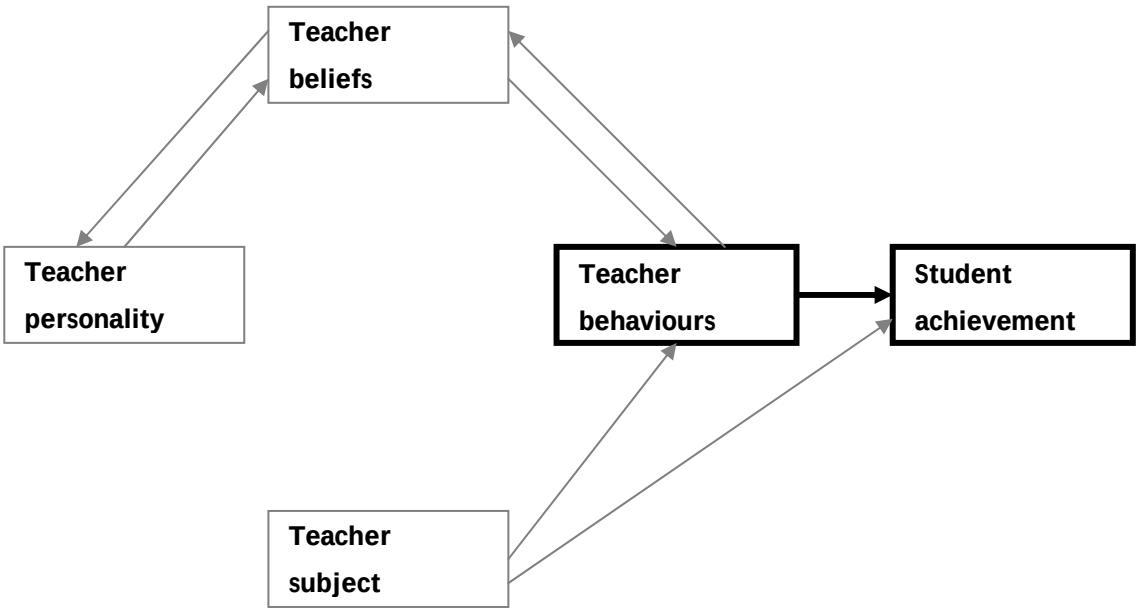

Figure 4.4: Teacher behaviours — Students achievement

A close examination of the selected studies show that:

- *Of the factors under consideration, teacher behaviour is* the *most important factor for pupil achievement, even more important than class size and the achievement gap. (It is well known that other factors, such as the pupils' socio-economic background play a key role in pupil achievement, but these factors do not form part of this systematic review.)*

The studies employ different methodological approaches and designs to confirm the above. One study of 10-12 years duration (a cohort study) monitors, among other factors, data about the pupils' social and economic backgrounds, the teacher's age and teaching experience and other individual variables such as class size and level. The study shows that significant academic advantage for the pupils can be derived solely from the teacher's performance and quality in the classroom (Rockoff 2003). Another study (a 'one-group pre-post test') provides statistical analysis of the achievement effects of a set of teacher variables such as the teacher's subject knowledge and use of teaching methods. The study shows that the teacher's behaviour has a considerable significance (Muijs & Reynolds 2000; 2002; 2003).

Other factors of significance for pupils' learning are the pupil's personality and learning style, but they are of lesser significance when set in relation to teacher behaviour (Kyriakides, 2005).

Good teacher behaviour give pupils 10-15% better test results that pupils subjected to poor teacher behaviour (Muijs & Reynolds, 2000; 2003).

- *The teacher is better able to conduct his/her teaching if the achievement gap is not overly large.*

It is important to note that when teacher behaviour improves pupil achievement, the achievement gap widens (von Secker, 2002). One consequence of this is that the more skilful a teacher is, the greater the achievement gap grows (everything else being equal). Good teachers may avoid this achievement gap while still retaining a high achievement level by means of specific teaching actions, namely by having appropriate organisation and communication of information, by giving quick individual feedback and by minimising time spent on administrative routines (Meehan, 2003).

Teacher behaviour can be divided into the following categories: 'Classroom management', 'Behaviour management', 'Classroom climate', 'Teaching method' and 'Other aspects' (see Table 3.6). The first four will be discussed further in the following. Studies in each of these four categories have been compared, both in relation to each other and in relation to the form of pupil learning associated with the five teacher categories.

Classroom management. 27 studies deal with the teacher's management of the class (Allday, 2007; Bourne, 2003; Atkinson, 2000; Blazevski, 2007; Brekelmans, 2004; Cornelius Whiite, 2007; Dumbrajs, 2007; Elliot, 2007; Heistad, 1999b; Hutto, 2001; Jess et al., 2006; Jones et al., 2000; Košir, K., 2005; Kyriakides, 2005; Meehan et al., 2003; Miller et al. 1998; Mosenthal et al., 2001; Muijs & Reynolds, 2003; Muijs & Reynolds, 2000; Muijs & Reynolds, 2002; Perry et al., 2007; Sokol, M., 2004; Solmecke, G., 1998; Tomoff et al, 2000; Wenglinsky, 2000; Wharton-McDonald et al, 1998; Yasumoto, 2001), of which seven studies were assessed as being of high quality taken as a whole.

Several studies of classroom management describe teacher behaviour in terms of the teacher's organisation and structuring of teaching. One aspect of this is the way the teacher ensures that the class works in an orderly fashion, starts the class on time and moves from one activity to another.

These studies show that, to facilitate increased pupil achievement, the teacher has to address the following:

- *Detailed planning*

The planning of teaching is central for the achievement of appropriate classroom management. If the teaching materials are ready and a minimum of time is spent on 'getting going', pupil achievement increases. For example, Meehan et al. (2003) show that the more time is spent on administrative routines compared to that spent on teaching, the less the pupils learn.

- *Clear teaching aims*

The teacher with a detail plan both of the individual lesson and of the course as a whole and who has in the process set clear and explicit aims for the teaching achieves increased pupil learning.

- *Pupil-supportive management*

Pupil-centred teaching practice with pupil-supportive behaviour contributes to pupil learning. If, for example, the pupils are involved in the structuring and selection of activities in the class, and they have the chance to take responsibility, pupils learning increases (Perry et al., 2007).

A single study (Connor et al. 2005) shows that the teacher's warmth and pupil-supportive behaviour makes a greater contribution to pupil learning than teaching experience and a high academic level. The context should, however, be mentioned here, since the study deals with teaching in the beginners' class.

- *Pupil activation and pupil motivation*

Studies of the teachers' various ways of conducting classroom management show that there is a connection between classroom management and the pupils' self-regulating behaviour in relation to the individual pupil's inner motivation. The teacher's emphasis on non-controlling teacher behaviour, in other words the pupils' right to initiate and regulate activities in the class, have a considerable effect particularly on non-academic gains for the pupils, i.e. on the development of their values and personality. One study also shows that the influence of management style on motivation and self-esteem in pupils is not restricted to specific subjects. If the teacher is as a rule dominant and unwilling to cooperate, this leads, generally speaking, to pupils developing low motivation and poor self-esteem (Brekelmanns, 2004). On the other hand it can be seen that pupils with cognitively oriented teachers achieve a greater degree of self-regulatory behaviour than pupils who are taught by teachers who concentrate classroom management on the pupils' behaviour (Košir, 2005). It is worth noting that this effect is greater in the case of boys than in that of girls.

- *Organisation of activities and learning*

A number of studies point out that planned teaching, which ensures a connection between material previously learnt and progression in learning, advances pupils' learning. This can come about, for example, through the teacher focusing the attention of the class on central aspects of the syllabus, following up on what has been learnt by, for example, going over material previously learnt, giving rapid and corrective feedback, and repeatedly emphasising essential principles (Jones, 2000; Kyriakides, 2005; Meehan, 2003). One study shows mathematics teachers often start and conclude their teaching with a form of common plenum. At the start of the lesson the effective teacher gives the class an idea of the structure and learning aims of the lesson. At the end the teacher provides an overview of the syllabus that has been taught (Jones et al., 2000).

- *Visible management*

The level of learning increases when the teacher stands out as a clear and explicit leader. This is equally true of mathematics, primary language learning and other subjects. According to the studies, this is not at variance with high pupil activation, pupil-supportive behaviour or pupil-centred activities.

One study has studied beginner reading and here, too, it is stressed that teachers who show clear leadership and give explicit instructions increase pupil learning more than teachers where this is not the case (Heilstad, 1999b).

Some of the studies examine conditions that might be favourable for the development of teacher competence in relation to good teaching actions and in this context stress the teachers' participation in teaching teams and action research (Blazevski, 2007; Dumbrajs, 2007; Yasumoto, 2001). This aspect has not, however, been specifically examined in relation to classroom management.

Behaviour management. 26 studies deal with the teacher's management of pupil behaviour (Allday & Pakurar, 2007; Assor, 1999; Blazevski, 2006; Chambers & Sugden, 2003; Chiu, 1998; Connor, et al, 2005; Cornelius-Whiite, 2007; Dawn et al., 2007; Dumbrajs, 2007; Elliot, 2007; Festbach & Feshbach, 2003; Heistad, 1999b; Hollins, 2003; Hutto, 2001; Jess et al., 2006; Jones, & Treadaway, 2000; Košir, 2005; Maloch, 2002; Meehan et al., 2003; Morais & Rocha, 2000; Muijs & Reynolds, 2000; Muijs & Reynolds, 2002; Muijs & Reynolds, 2003; Perry et al., 2007; Sokol, 2004; Wharton-McDonald et al., 1998), five of which are assessed as of high quality taken as a whole.

In the accounting for the review-specific description, it was stressed that this aspect registers the way teachers ensure that pupils behave in an appropriate manner both towards each other and the teacher and in relation to the learning that is to take place at school.

In looking through these studies, two factors show themselves to be of significance, namely the teacher's relations to the pupils and the teacher's management of rules.

- *Relations to the pupils*

The first factor relates to the way that teachers establish a psychological bond with the individual pupil. A teacher who is supportive, who is tolerant towards the pupil's own initiatives and who provides motivation increases pupils' learning, not only in school subjects but also in areas such as self-esteem, autonomy and motivation, while also reducing disruptive behaviour (Assor, 1999; Chiu, 1998; Connor, 2005; Cornelius-White, 2007; Maloch, 2002).

- *Rule management*

The second factor relates to the teacher's establishment of rules for class activities. If these rules are formulated explicitly at the start of the teaching and are thereafter gradually delegated to the pupils to draw up and maintain, the pupils' ability to regulate themselves is increased.

Behaviour management is effective when the rules are clear, defined and are enforced constructively and precisely. One study draws attention to the fact that, when this management of the rules takes place through positive encouragement and not through punishment, the pupils' ability to develop self-regulation increases. If the teacher can at the same time predict situations capable of creating undesirable behaviour and prevent them happening, this contributes to the teacher's positive encouragement of the pupil.

Seen in the light of this development, the two apparently contradictory factors — that on the one hand the teacher has to establish individual, supportive relations with individual pupils and on the other that he/she has to ensure the maintenance of the class' system of rules and thereby perform a more regulatory function — are not at loggerheads with each other.

According to one study, one way to promote this development is for the teacher to take a clear initiative when he/she wishes the pupil to demonstrate a particular form of behaviour/activity but is less concerned to set limits as regards the course and tempo of the behaviour/activity while at the same time always evincing pupil-supportive behaviour. The teacher must, however, be constantly visible in relation to the assessment and correction of behaviour/activity (Morais, 2000).

Certain studies show that effective behaviour management is also accompanied by increased pupil gains (Muijs and Reynolds, 2000; 2002; 2003; Perry, 2007). One study by Wharton-McDonald (1998) was not able to prove any significant connection between the teacher's assessment of their own practice of behaviour management and pupil achievement.

One study is concerned with teachers who pay particular attention to pupils belonging to the group at risk of not living up to the demands of school. If the teachers follow these pupils' participation and effort in the teaching situation and intervene when this participation and effort are unsatisfactory, this has a significant positive effect on the academic gains in the case of pupils from a low socio-economic and/or Afro-American background (Hutto, 2001). This study was carried out in USA.

Classroom climate. 19 studies dealt with the teacher's establishment of the psychological climate in which teaching takes place (Allday & Pakurar, 2007; Assor, 1999; Blazevski, 2007; Bourne, 2003; Chambers & Sugden, 2003; Chiu, 1998; Connor et al., 2005; Cornelius-Whiite, 2007; Dawn et al., 2007; Driessen & Sleegers, 2000; Festbach & Festbach, 2003; Goh et al., 2000; Meehan et al., 2003; Morais & Rocha, 2000; Muijs & Reynolds, 2000; Muijs & Reynolds, 2002; Muijs & Reynolds, 2003; Perry et al., 2007; Wharton-McDonald et al., 1998), of which two studies were assessed as being of a high quality when taken as a whole.

A reading of the studies shows that two theoretical viewpoints are formulated about the relation between classroom climate and pupils' learning. They differ from each other in that according to the one a good classroom climate is a contributory explanation for increased pupil learning, while the other viewpoint stresses that a good classroom climate is an indication of the fact that other conditions have been established that have an influence both on increased learning and on what the teacher, pupils, and observers experience as a good classroom climate. The latter viewpoint could be described as the 'indicator theory'.

The factors that according to the indicator theory influence a good classroom climate have already been noted under the previous two categories. Classroom and behaviour management, namely that the teacher has to work with:

- *Pupil activation and pupil motivation*
- *Pupil-supportive behaviour and*
- *Good social relations to the pupils*

If we look at the studies that recommend the creation of a positive classroom climate as a good tool for increasing pupil learning, we find that they refer to the same factors. It is, therefore, reasonable to assume that classroom climate is not in itself a factor that promotes pupil learning but that instead it should be regarded as an elliptical term that in reality refers to the effective factors already mentioned.

Teaching method. 23 studies concern themselves with the teacher's direct management of the pupils in the form of teaching methods and the didactic strategies that are put to use (Assor, 1999; Atkinson, 2000; Bonesronning, 2004; Bourne, 2003; Heistad, 1999b; Jones et al., 2000; Kimpall et al., 2004; Limbrick, 2006; Maloch, 2002; Muijs, & Reynolds, 2000; Muijs & Reynolds, 2002; Muijs & Reynolds, 2003; Pečjak & Košir, 2004; Perry et al., 2007; Roehrig & Garrow, 2007; Solmecke, 1998; Sousa & Santos, 1999;

Staub & Stern, 2002; Tomoff et al., 2000; Valli, 2007; von Secker, 2002; Webster & Fisker 2001; Wharton-McDonald et al., 1998), of which four studies were assessed as being of high quality taken as a whole.

A reading of the studies shows that — as is well known — no specific teaching method is better than others in all contexts. On the other hand this reading provided the opportunity to emphasise certain general aspects of teaching methods as a whole. Some studies make the following points:

- *Methods that rely on pupils being actively involved in and being supported by the teaching provide better pupil learning.*
- *That pupils' teaching of each other appears to increase pupil learning.*

One study about maths teaching shows that effective teachers alternate between different forms of teaching, for example between classroom teaching, individual work and group work in which pupils teach each other. Classroom teaching in which there is a high degree of pupil involvement and pupil differentiation, where the teacher invites the pupils to take their own level as a starting point for exploration rather than having mathematical problems explained, increases pupils learning (Jones et al., 2000). As a whole it was found that:

- *Teachers who can manage and employ a variety of teaching methods contribute to increased pupil learning.*
- *Teachers who encourage pupils in meta-cognition contribute to increased pupil learning.*
- *Teachers who have prepared alternative approaches and explanations for the content of the teaching contribute to increased pupil learning (Wharton-McDonald et al., 1998).*
- *Teachers who choose teaching methods based on the methods' facilitation of individualised teaching contribute more than other teachers to increased pupil learning.*
- *When the context is mathematics, whole class teaching promotes pupil learning better than group work and project work.*

Certain studies bring factors to light that should be mentioned in this context:

- *While neither the use of project or group work can be shown to lead to increased pupil learning in mathematics, teaching based on a textbook generates better test results than project and group work (Tomoff et al., 2000).*

This result is ambivalent. It can be interpreted as saying that more traditional classroom teaching leads to higher pupil achievement than teaching focusing more on pupil activation, when the context is mathematics, but it can also be read as saying that textbooks lead with greater certainty to acquisition of the skills the pupils are tested in. It might also be possible that different pupil abilities play a part here.

- *Effective teachers influence the pupils' performance through the design chosen for grading/evaluation. Teachers who practise a 'strict' form of grading — only give good grades for good performances — increase the quality of pupil learning (Bonesronning, 2004).*

- *The authority's accountability policy can have an influence on the quality of pupils' learning through the teachers' reactions to the policies being followed. If accountability policies are employed at the teacher level, they may lead to the qualities of the individual teacher's teaching being lost, resulting in poorer pupil learning — 'The system backfires'. If accountability policy is employed at the school level, this negative effect is not seen (Valli et al., 2007).*

4.3.2 Teacher subject — teachers' behaviours

The next context to be considered is highlighted in Figure 4.5.

In the research review's Table 3.4 the number of studies dealing with the teacher's knowledge and understanding of the taught subject are added up. They are divided into two categories: 'Cognitive subject knowledge' relates to the teacher's theoretical understanding of the subject taught, while 'practical subject skills' relate to the management of those skills as demanded by the subject. Studies in each of these two categories have been compared both in relation to each other and in relation to the form of pupil learning that is associated with the two teacher categories.

In Figure 4.5, two relations are drawn between the subject and teacher behaviour and pupil achievement respectively. The 'direct' arrow to pupil achievement can be interpreted as follows. It must be supposed that the nature of the subject content and the academic standard have an influence on pupil achievement. If academic demands are not organically linked to the pupil's abilities, even the best teacher behaviour will not improve the pupil's lack of ability. A prerequisite for effective teaching in a subject is, therefore, that the learning that the teacher wishes to impart is within the bounds of the pupil's learning potential.

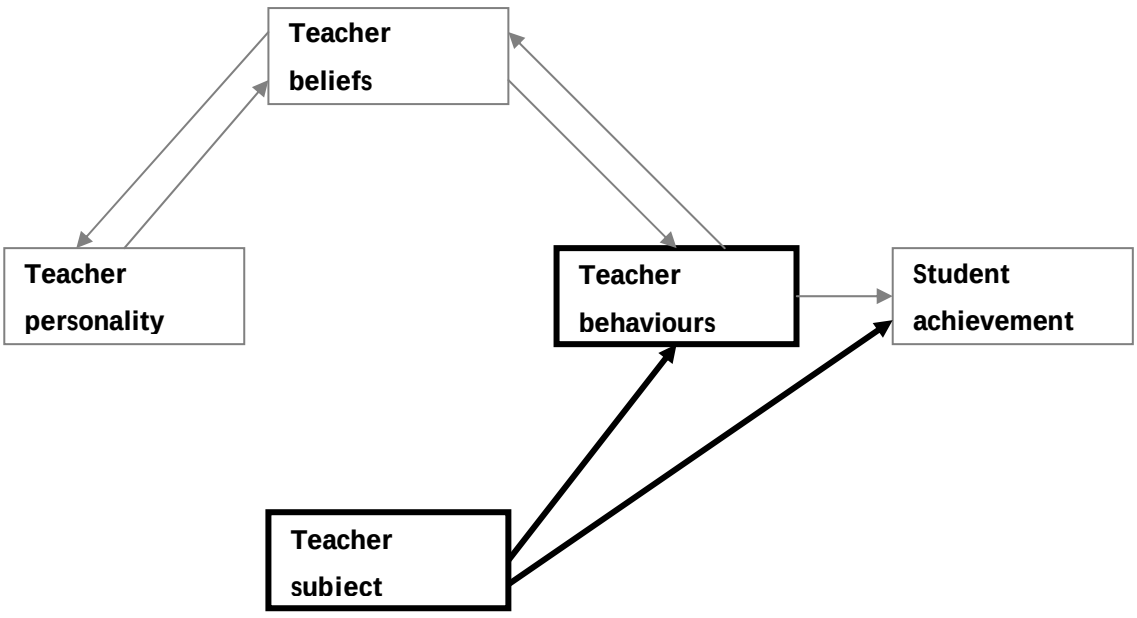

Figure 4.5: Teacher subject — teachers behaviours

In the following, we discuss the relation between teacher subject knowledge, teacher behaviours and the pupil achievement.

Cognitive subject knowledge. 12 studies concern themselves with the teacher's theoretical understanding in the subject taught (Atkinson, 2000; Connor et al., 2005; Dossett & Munoz, 2003; Dumbrajs, 2007; Feshbach & Feshbach, 2003; Hollins, 2003; Limbrick, 2006; Jones et al., 2000; Liang, 1998; Mosenthal et al., 2001; Muijs, & Reynolds, 2002; Wenglinsky, 2000), of which two studies are assessed as being of high quality taken as a whole.

The aim of the majority of these studies is to identify some of the academic features possessed by effective or successful teachers that are absent for non-effective and non-successful teachers.

This research design has an influence on which factors are observed/noted and which are not observed/noted. The basic idea of the design is that knowledge of the factors and circumstances that contribute to desired effects can be employed as guidelines for how it might be possible to work towards similar desired effects. The inference is drawn from effect to cause. This inference is at best defective and at worst misleading, since the same effect can be caused by many different factors and circumstances. It is, therefore, important to bear in mind that, in the cases examined, studies employing this design do not necessarily treat all factors and circumstances that could be considered to bring about the desired effect, which means that it is possible for effective and successful teachers to have other characteristics than those the 12 studies are concerned with.

Table 4.1 shows the distribution of the subjects dealt with by the studies.

School subject	No. of studies
Primary language	7
Mathematics	5
Sciences	2
Foreign language	1
Social studies	1
Design & technology	1

Table 4.1: Studies treating teachers' academic knowledge of their subject (N=70 studies; more than one coding per study possible)

A reading of the studies shows that:

- *Successful schools have academically able teachers who contribute to increased pupil learning*

Muijs & Reynolds (2002) emphasise that the connection is clear but weak. The influence is, however, not unambiguous, since one study (Connor et al., 2005) indicates that combinations of both academically high level and ineffective pupil learning and of non-

high academic level and effective pupil learning can arise. The context here is primary language and primary school level.

Higher academic levels are manifested in teacher behaviour, and the studies point to the fact that teachers who are academically well-qualified and who contribute to increased pupil learning:

- *Conduct de-contextualised conversation with their pupils to a greater extent*
- *Are cognitively more challenging by encouraging more abstract thinking*
- *Employ more varied teaching materials*

Finally a single study (Muijs & Reynolds, 2002) proposes an explanation for the reasons why some teachers show this desired teaching behaviour. According to this study a higher academic level in the taught subject contributes to the teacher's belief in their own academic skills as a teacher (*self-efficacy*) and thereby loosens his/her restriction to the subject in a teaching situation. This unfettered approach to the subject opens up opportunities for the teacher to cross the boundaries of the subject, to undertake mental leaps from the springboard of the subject and to use many different forms of teaching material. This tallies with the finding from other studies that greater academic knowledge is a requirement for being able to present, explain and illustrate a subject area in a variety of different ways.

Practical subject skills. 13 studies concern themselves with the teacher's handling of the skills required by the practice of the subject (Elliot, 2007; Feshbach & Feshbach, 2003; Heistad, 1999b; Hollins, 2003; Jones et al., 2000; Liang, 1998; Limbrick, 2006; Maloch, 2002; Muijs & Reynolds, 2000; Muijs & Reynolds, 2002; Pečjak & Košir, 2004; Wenglinsky, 2000; Wharton-McDonald et al., 1998), of which three studies are assessed as being of high quality taken as a whole.

Table 4.2 shows the distribution of the subjects dealt with by the studies.

School subject	No. of studies
Primary language	9
Mathematics	4
Sciences	1
Foreign language	1
Social studies	1

Table 4.2: Studies treating teachers' practical subject skills (N=70 studies; more than one coding per study possible)

As in the previous category here, too, the aims of the majority of the studies are to identify some of the characteristics that are displayed by effective or successful teachers in the practice of their subject and are not displayed by non-effective or non-successful teachers — a design that was been shown above as being inadequate. In

addition, these studies often end up dealing to a substantial degree with aspects of the didactics of the subject, a matter that is not here an object of investigation.

A reading of these studies shows that, as regards primary language teaching:

- *That teachers who have been confronted critically but constructively with their own ideas about the subject contribute with increased pupil learning*
- *That explicit reading instruction in small groups promotes pupils' reading skills*
- *That the teacher's love of literature does not function as a model for establishing pupil motivation for the reading of literature*

A reading of these studies shows, as regards mathematics teaching:

- *That teachers who use problem-oriented teaching rather than rote learning of algorithmic techniques promote pupil learning*
- *That teachers with a secure conceptual grasp of the subject increase pupil learning*

A reading of the studies for the sciences, foreign languages and social studies shows

- *That teachers who demonstrate abstract thinking in their teaching promote pupil learning*

4.3.3 Teacher beliefs — teachers behaviours

The third context to be considered is highlighted in Figure 4.6.

The research mapping (Table 3.7) lists the number of studies that concern themselves with teacher belief, teacher attitude and teacher emotion. The table is divided up into the following categories: 'Teacher belief about pupils', 'teacher belief about teaching', 'teacher attitude', and 'teacher emotion'. Teacher belief about pupils presents teachers' theories about how pupils function, especially about their ways of learning and their ability to learn. 'Teacher belief about teaching' are teachers' theories about how instruction functions, especially regarding the approaches and teaching methods that the teacher finds most appropriate to any given teaching situation. 'Teacher attitude' relates both to the teacher's value judgements about the teaching context and to their attitude to teacher activity. 'Teacher emotion' looks at the teacher's emotional reactions to the teaching context.

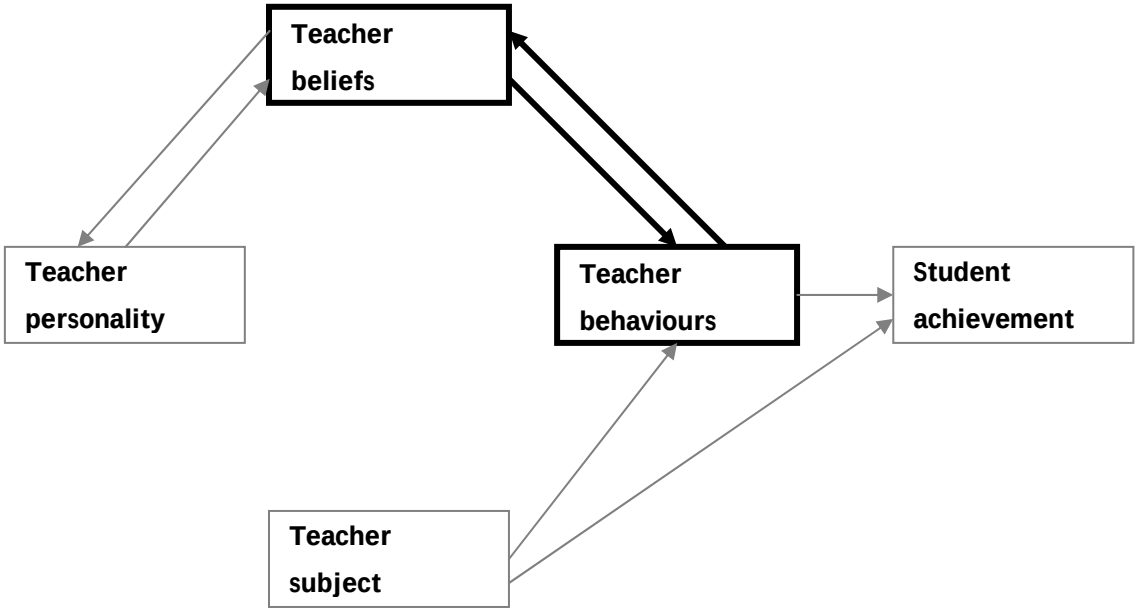

Figure 4.6: Teacher beliefs — teacher behaviours

Teacher belief about pupils. 16 studies concern themselves with the thoughts and perceptions teachers have about their pupils, their way of functioning in a teaching situation and their potential for learning (Bourne, 2003; Chambers & Sugden, 2003; Cornelius-Whiite, 2007; Dawn et al., 2007; Dumbrajs, 2007; Elliot, 2007; Heistad, 1999b; Hollins, 2003; Jones et al., 2000; Maloch, 2002; Muijs & Reynolds, 2002; Roehrig & Garrow, 2007; Solmecke, 1998; Staub & Stern, 2002; Whartorn-McDonald et al., 1998; Wright, 2006), of which four studies have been assessed as being of high quality taken as a whole.

A reading of the studies shows that:

- *The teacher's perception of the pupils' potential for learning has an influence on pupil achievement. If a teacher believes that all pupils can learn, this leads to greater pupil achievement than if the teacher has the perception that some pupils can learn while others cannot (Solmecke, 1998; Whartorn-McDonald et al., 1998; Wright, 2006)*
- *The teacher's perception of whether pupils learn in an individual manner or not has an influence on pupil achievement. Teachers who believe that their pupils learn individually, that is that every pupil learns in their own way and that they as teachers have a responsibility to organise their teaching accordingly, increase pupil achievement when compared with teachers who believe that all pupils learn in the same fashion and teach accordingly (Dumbrajs, 2007; Elliot, 2007)*

Teachers can have their view of how pupils function and of their potential altered by:

- *Participation in teacher teams in which the teachers are encouraged to reflect on their own practice (Hollins, 2003).*

Teacher belief about teaching. 13 studies concerned themselves with the thoughts and perceptions teachers have about teaching, its organisation and opportunities (Atkinson,

2000; Bourne, 2003; Chambers & Sudgen, 2003; Cornelius-Whiite, 2007; Dumbrajs, 2007; Elliot, 2007; Heistad, 1999b; Hollins, 2003; Jones et al., 2000; Roehrig & Garrow, 2007; Staub & Stern, 2002; Valli et al., 2007; Wharton-McDonald et al, 1998), of which three studies were assessed as being of high quality taken as a whole.

A reading of the studies shows that:

- *Teachers who have an investigative approach to the object of teaching, and teachers who have a cognitive and constructivist view of learning, increase pupil learning. This is true for all subjects (Jones et al., 2000; Roehrig & Garrow, 2007; Staub & Stern, 2002)*

In work that is not included in this systematic review, Askew et al.(1997) have proposed a distinction between three ways in which teachers can think about teaching in mathematics. 'Connectionist' teachers believe that the understanding of number involves skill and effectiveness and the abilities to select a suitable method for problem solving and calculation and to link different parts of the curriculum with each other. For this reason connectionist teachers stress the importance of pupils using number in new problems that are closely related to everyday reality. 'Transmission-oriented' teachers regard the mastering of a series of standard methods and routines for calculation as being essential and believe that pupils should learn these methods and routines prior to working with problems formulated textually. Finally there are 'discovery-oriented' teachers who believe that all methods and calculations are equally acceptable as long as the pupils reach the correct answer, regardless of how effective the method might be. They emphasise that pupils should create their own methods. Through the use of these concepts Muijs & Reynolds (2002) have shown:

- *That discovery-oriented teaching in mathematics, where pupils have to discover their own methods and procedures, has a negative correlation with pupil achievement.*
- *That transmission-oriented teaching in mathematics, where pupils first and foremost have to master a series of methods and routines for calculation, cannot be shown to be correlated to pupil achievement.*
- *That connectionist-oriented teaching, where the content of the teaching is related to in many different contexts, has a positive correlation to pupil achievement.*

Teacher attitude. 14 studies concern themselves with teachers' attitudes in relation to teaching (Assor, 1999; Atkinson, 2000; Blazevski, 2007; Bourne, 2003; Chambers & Sudgen, 2003; Connor et al., 2005; Cornelius-Whiite, 2007; Dawn et al., 2007; Hollins, 2003; Jones et al., 2000; Limbrick, 2006; de Sousa & Santos, 1999; Wenlinsky, 2000; Wharton-McDonald et al., 1998), of which three studies have been assessed as being of high quality taken as a whole.

A reading of the studies shows that teacher attitudes have not been the focus of studies that deal with the relation between teacher competence and pupil learning but that they are nevertheless touched upon as a subsidiary aspect. Two viewpoints are to be found here:

In the first place teacher attitudes have been investigated in relation to the development of attitudes in the pupils. One study shows that:

- *Teachers who show tolerance towards pupils' critical opinions and respect and show interest in their ideas promote the development of corresponding attitudes in the pupils (Assor, 1999)*

In the second place there has been an attempt to investigate how teacher attitudes can be developed or altered through teacher collaboration. It is suggested, moreover, that alteration in teacher attitude in a positive direction leads to an increase in pupil learning. In this way it is shown:

- *That teacher development through teams can alter teacher attitudes. When teachers alter their attitude towards pupils, from negative to positive and from non-development-oriented to development-oriented, the behaviour and learning of pupils changes in a positive direction (Hollins 2003).*
- *That teachers who have a positive attitude to the purposes and aims of teaching promote pupil learning (Wharton-McDonald et al., 1998).*

Teacher emotions. Six studies touch upon the teachers' emotional reactions to the teaching context (Assor, 1999; Chambers & Sudgen, 2003; Connor et al., 2005; Cornelius-Whiite, 2007; Dumbrajs, 2007; Limbrick, 2006), none of which was assessed as being of high quality seen as a whole.

A reading of the studies shows that this is a subject that is only touched on peripherally in the six studies. Nevertheless it is suggested that:

- *Teachers who signal warmth, respect, trust, empathy and a positive relation to pupils promote pupil learning (Assor, 1999; Connor et al., 2005; Cornelius-Whiite, 2007; Limbrick, 2006)*

4.3.4 Teacher personality — teacher beliefs

The fourth context to be considered is highlighted in Figure 4.7.

Table 3.8 lists the number of studies that concern various aspects of the teacher's personality. The table is divided up into the following categories. 'Values and ethics', 'Other aspects of personality' and 'No, not relevant', of which the first two will be discussed in what follows.

Values and ethics. Six studies concern themselves with the teacher's values and ethics (Assor, 1999; Bonesronning, 2004; Bourne, 2003; Feshbach & Feshbach, 2003; Wharton-McDonald et al., 1998; Wright, 2006), none of which was assessed as being of high quality taken as a whole.

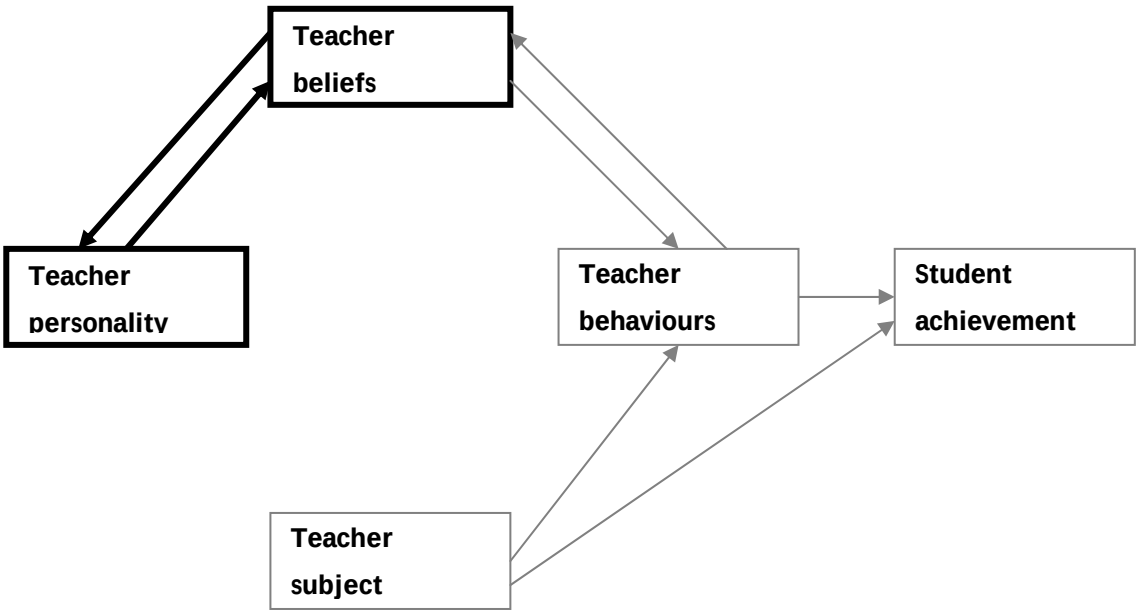

Figure 4.7: Teacher personality — teacher beliefs

A reading of the studies shows that they deal with a variety of subjects such as the importance of respect and tolerance, the teacher's appreciation of better pupil performance, the teacher's recognition of middle-class values, training in the development of empathy, teacher awareness of the aim and value of the teaching. No common elements can be found in the studies that would permit the creation of a narrative synthesis. Generally speaking, measurement of teacher personality is thinly represented among the studies surveyed. This might suggest that this aspect of teachers has been regarded as being of lesser significance.

Other aspects of personality. Nine studies concern themselves with different aspects of the teacher's personality and their impact on teacher belief (Blazevski, 2007; Connor et al., 2005; Dumbrajs, 2007; Elliot, 2007; Miller et al., 1998; Muijs & Reynolds, 2002; Rego & Pereira, 2004; Sokol, 2004; Wright, 2006), none of which was assessed as being of high quality taken as a whole.

A reading of the studies shows that they can be divided into two groups, the first of which deals with personal experience, sensitivity and responsiveness, persistence and self-confidence, while the other is concerned with the teacher's potential for developing reflexivity and 'for growing as a person'.

In the first group the following subjects are touched upon:

One study (Connor, 2005) shows the connection between the level of sensitivity and responsiveness in the teacher and its positive effect on pupil learning. Sokol (2004) shows that persistence in the teacher increases pupil learning. Rego & Periera (2004) show that teachers who are characterised by an attitude of citizenship promote pupil learning. Blazevski (2007) differentiates between the teacher's professional and personal self-confidence. The study concludes that teachers who have professional self-confidence as teacher of mathematics and who (possibly for that reason) create a secure classroom climate by placing reduced emphasis on the significance of grades and the

fear of mistakes, promote pupil learning. Teachers who have considerable personal self-confidence and who (possibly for that reason) create a climate in the classroom that lays focus on academic performance, reduce pupil learning.

In the second group the following subjects are touched upon: Elliot (2007) shows that action research is an effective means for intensifying the teacher's reflexivity in relation to their own teaching practice. Dumbrais (2007) emphasises teamwork as a chance for the teacher to 'grow as a person' in collaboration with other teachers.

No common elements can be found in the studies that would permit the creation of a narrative synthesis.

4.4 Direction and strength of the effects studied

The third element of the narrative synthesis consists of a survey of the factors that are common to the studies and that can explain variations in the direction and strength of the effect studied. Also included here is a treatment of the question of why a phenomenon has or does not have an effect, and of whether particular factors play a part here that can explain how the effect in a given context is strengthened or weakened.

In programme theory, see section 4.2, the hypothesis has already been formulated that the direction of the effect goes from the competences of teaching staff towards pupil learning. At the same time it is noted that this effect takes place in a context. In the following these two aspects, i.e. direction and strength, and their contextual relations will each be treated individually.

4.4.1 Direction and strength of effect

As has already been emphasised on page **Error! Bookmark not defined.**, a competence is not immediately 'observed', but we register that it manifests itself in a given situation. This is the factor that has been taken into consideration by using Muijs & Reynolds' model, see Figure 4.2, and the DeSeCo definition, see page 48.

A given competence manifests itself to the observing eye in the teacher's actual actions in relation to teaching and in the characteristics a given teacher 'has' or 'possesses' and which from a research point of view are registered through, for example, comparison with other teachers, through interview and questionnaire studies that reveal teacher belief, and possibly through tests of the teacher's academic level in the subject taught and of his/her personality. Finally background factors such as the teacher's gender, age, socio-economic background and ethnicity might be of relevance, but, as is clear from Section 0, such factors by and large play no role in the surveyed studies treated by the narrative synthesis.

None of the studies surveyed above employed a design in which a competence — which must always be assumed theoretically to be 'carried' by a member of the teaching staff — was 'made use of' in an intervention on a trial group without this also being applied to the control group.

Most of the studies find a correlation between teacher behaviour and characteristics and pupil achievement and deduce the direction of effect from this correlation.

Only one case provides any grounds for reconsideration. In their discussion of the significance of the teacher's theoretical understanding of their subject for pupil learning, see page 57, Muijs & Reynolds (2002) stress that the significance is clear but weak, while Connor et al. (2005) indicate that the combinations of a) academically high level and ineffective pupil learning, and of b) non-high academic level and effective pupil learning can arise. The context here is native language and primary school level. An explanation for the apparent contradiction between the two findings could be that the academic demands made by teaching in the native language at primary school are at a level that are not taken into account in the study by Connor et al. The difference between the effective and non-effective teacher in this study can, therefore, be due to other factors not registered in the study. It is, however, worth underlining that Connor et al. (2005) do not take issue with the direction of the effect but only place a question mark around whether 'academically high level' is a factor with any significance for increased pupil learning at the primary school level.

Only in one case, the study by Muijs & Reynolds (2005) discussed above, is the strength of the effect touched upon. It states that the significance is clear, but weak.

4.4.2 The contextual connection

In the research mapping Section 3.1 and 3.2 possible contexts have been noted that could be considered to have significance for an assessment of the direction and strength of the effect. Table 3.2, Table 3.11, and Table 3.12 respectively show the studies' distribution by country, the teaching levels they have used as a basis and the subjects that have been examined. Added to these are the contexts that have been brought to light by the reading of the mapped studies. It has already been mentioned that factors relating to background such as the teacher's gender, age, socio-economic background and ethnicity by and large play no part in the mapped studies.

A reading of the narrative syntheses discussed in Section 0 shows that the mapped studies:

- *do not refer to the fact that the country in which the study took place is regarded as a factor that might contradict the direction or the strength of the effect. In one case it is, however, noted that it is unclear whether the results can lead to generalisation. The study in question was one carried out in the USA (Hutto , 2001)*

If we look next at the education level, teaching for beginners is mentioned as a context in relation to primary language teaching in reading.

- *Small groups and explicit instruction promote learning in reading (Connor et al., 2005; Heilstad, 1999b)*

Mathematics as a subject seems to be a specially placed contextual factor, in that stress is placed on whole class teaching and explicit management. Taken as a whole the studies on mathematics say that:

- *Visible and clear management and whole class teaching (plenum) are better than project or group work; and that varied forms of teaching, problem-oriented teaching rather than rote learning of algorithmic techniques, teachers with a*

conceptual grasp of the subject and a connectionist-oriented view of teaching promote pupil learning (Jones et al., 2000; Muijs & Reynolds, 2002; Rockoff, (2003); Tomoff et al., 2000)

Finally it should be mentioned that the achievement gap of the class is a contextual factor:

- *The teacher is better able to conduct his/her teaching if the achievement gap is not overly large (von Secker, 2002).*

4.5 The robustness of the narrative syntheses

In the fourth element of the narrative synthesis there is an attempt to assess the robustness of the syntheses that have been established. As mentioned earlier, three aspects are involved here: the primary study's methodological quality; the methods used in the narrative synthesis; and the degree of information about the primary studies that have permitted their inclusion in the systematic review. In the following these three aspects will be discussed individually.

It is, however, important to be aware that in Section 3.3 a total quality assessment of the studies surveyed has already been undertaken with special reference to the studies' reporting quality, contribution to evidence and generalisability.

4.5.1 The primary studies' methodological quality

The first aspect concerns the primary studies' methodological quality. Table 3.3: Research design, page 35, registers the design used by the studies surveyed. In this research mapping, studies are included with 'high', 'medium' and 'low' weight of evidence, see Table 3.13. As has been said above, the overall weight of evidence of the individual study is described on the basis of a total assessment of the credibility of the research and its conclusions, the relevance of the aims of the study and the appropriateness of the research design and its analysis to answering the review question. It must be said, therefore, that the overall weight of evidence of the studies can well be higher or lower than the individual aspects in the assessment. If we remove studies with 'low' weight of evidence from the overview of designs used, we get the following distribution of research designs used for the studies included in the narrative syntheses, see Table 4.3.

Research designs used in the narrative syntheses	No. of studies
Experiment with non-random allocation to groups	12
One group pre-post test	10
One group post-test only	2
Cohort study	12
Case-control study	2
Cross-sectional study	7
Views study	3
Ethnography	1
Systematic review	1
Case study	3
Action research	1
Methodological studies	2
Secondary data analysis	1

Table 4.3: Distribution of research designs used in the narrative syntheses (N=55 studies; more than one coding per study possible)

The assessments in Section 3.3.3 are relevant in relation to this first aspect regarding the methodological quality of the studies. In addition there are the following considerations:

Based on Peticrew & Roberts (2003; 2006, 60) Rieper & Foss Hansen (2007, 79, fig. 7.1) have constructed a typology of evidence on the connection between the research question and the research design. This typology shows that, when the review question concerns effect studies, the greatest weight of evidence is assigned to randomised, controlled experiments followed by cohort studies and quasi-experimental studies (represented by the three first categories in Table 4.3). Once the duplicate marking has been corrected in Table 4.3, it can be established that of the surveyed studies there are none representing randomised, controlled experiments. There are 12 cohort studies and 24 with a quasi-experimental design. That is to say that out of a total of 52 studies a total of 36 can be said to have medium weight of evidence in their research design, corresponding to 69 %.

4.5.2 Method for generating syntheses and weight of evidence

If we go on to look at the method used for the generation of syntheses and the weight of evidence that the individual groupings present, we get the following result, see Table 4.4.

The execution of a narrative synthesis took as its starting point those studies that were assessed as having a 'high' weight of evidence. After that studies with a 'medium' weight of evidence were related to these — as far as that was possible. As can be seen

from the figures, however, the dimension 'Teacher behaviours — Student achievement' presents the greatest weight of evidence, followed by the dimension 'Teacher beliefs — teacher behaviours', followed by 'Teacher subject — teacher behaviours'. Notice that there has been no attempt to create narrative syntheses in the dimension 'Teacher personality — teacher beliefs' or for the aspect 'Teacher emotions' in the dimension 'Teacher beliefs — teacher behaviours'.

Dimension	Aspect	No. of 'high' studies	No. of 'medium' studies	Total	Relative % weight
Teacher behaviour —Student achievement	Classroom management	7	20	27	26 %
	Behaviour management	4	22	26	15 %
	Classroom climate	2	17	19	11 %
	Teaching method	4	19	23	17 %
Teacher subject— Teacher behaviours	Cognitive subject knowledge	2	10	12	17 %
	Practical subject skills	3	10	13	23 %
Teacher beliefs— Teacher behaviours	Teacher belief about pupils	4	12	16	25 %
	Teacher belief about instruction	3	10	13	23 %
	Teacher attitude	3	11	14	21 %
	Teacher emotion		6	6	-
Teacher personality — Teacher beliefs	Values and ethics		6	6	-
	Other aspects of personality		9	9	-

Table 4.4: Distribution between 'high' and 'medium' weight of evidence in the narrative syntheses (N=55 studies; more than one coding per study possible) The final column 'Relative % weight' reproduces the percentage of studies with 'high' weight of evidence in relation to the total number of studies included for the elucidation of a given aspect)

4.5.3 The robustness of the study

If, finally, we look at the third aspect relating to the robustness of the study, we find that it relates to the degree of information about the primary studies that has permitted their inclusion in the systematic review.

In Chapter 2 there is a detailed account of the conceptual delimitation, searches and search profiles, screening and principles of inclusion/exclusion, and of the extraction of data from the studies surveyed for the current systematic review.

4.5.4 Overall assessment

The factors enumerated here do not permit any numerical calculation of the robustness of the narrative syntheses. An estimate has to be effected.

We have already seen on page 45 that no randomised controlled experiments about the review questions relating to this study have been carried out over the past ten years.

Narrative syntheses made of the last ten years research in the area suggest, however, that more general features and tendencies can be demonstrated in this research.

On the one hand it is striking that the studies that have been carried out provide a fairly uniform picture, which will be outlined in the subsequent Section 4.6, a picture that coalesces around four main points, supplemented with a series of explications and elaborations.

On the other hand we must keep in mind that a mapping of research from 1998 to 2007 in a given area can also be interpreted as a reflection of the opinions or expectations among researchers, policy-makers and educationalists in the field. From that point of view the research mapping provides a picture of what researchers, policy-makers and educationalists found important and of the frameworks and answers they regarded as fruitful.

4.6 Concluding remarks

4.6.1 About competences

It has already been said a number of times that, by definition, a competence is not immediately 'observed', but we observe that it manifests itself in a given situation. These are the dimensions of competences that the narrative syntheses in Section 0 are based on. By focusing on *manifest competences*, empirical research can only observe teacher behaviour and characteristics in the form of competence dimensions that are of significance for pupil achievement.

The observed competence dimensions are joined into 'competences' that are attributed to the teacher. Thereby, we create an inference to a theoretical construct, which DeSeCo defines as 'a conceptualization of competencies as internal mental structures — in the sense of abilities, capacities or dispositions embedded in the individual', cf. Section 4.2.1. Furthermore, each 'competence' that is established is built up as a combination of 'cognitive and practical skills, knowledge (including tacit knowledge), motivation, value orientation, attitudes, emotions, and other social and behavioural components that together can be mobilized for effective action' (ibid.).

There are three theoretical factors that are worth holding onto in any attempt to make use of the result of the narrative syntheses conducted in Section 0 as a basis for positing teacher competences of significance for pupil learning:

- *No final conclusion exists to the number of competences revealed through empirical research. New competences can always be created on the basis of theoretical or practical need*
- *Any given competence is not an assembly of a finalised or unchangeable number of competence dimensions. As a theoretical construction, the 'content' of a competence can always be altered or elaborated*

- *The combination of competence dimensions into a given competence gives no indication of how the competence can be learned, developed or imparted. There is an independent empirical research task involved in revealing how given competences are learnt, developed or imparted.*

4.6.2 From competence dimension to competence

In Figure 4.8 a theoretical model is presented for the relation between the competence dimensions that have been captured analytically with the help of Muijs &Reynolds' model, see Figure 4.2, and possible competences that the competence dimensions can be seen as manifestations of.

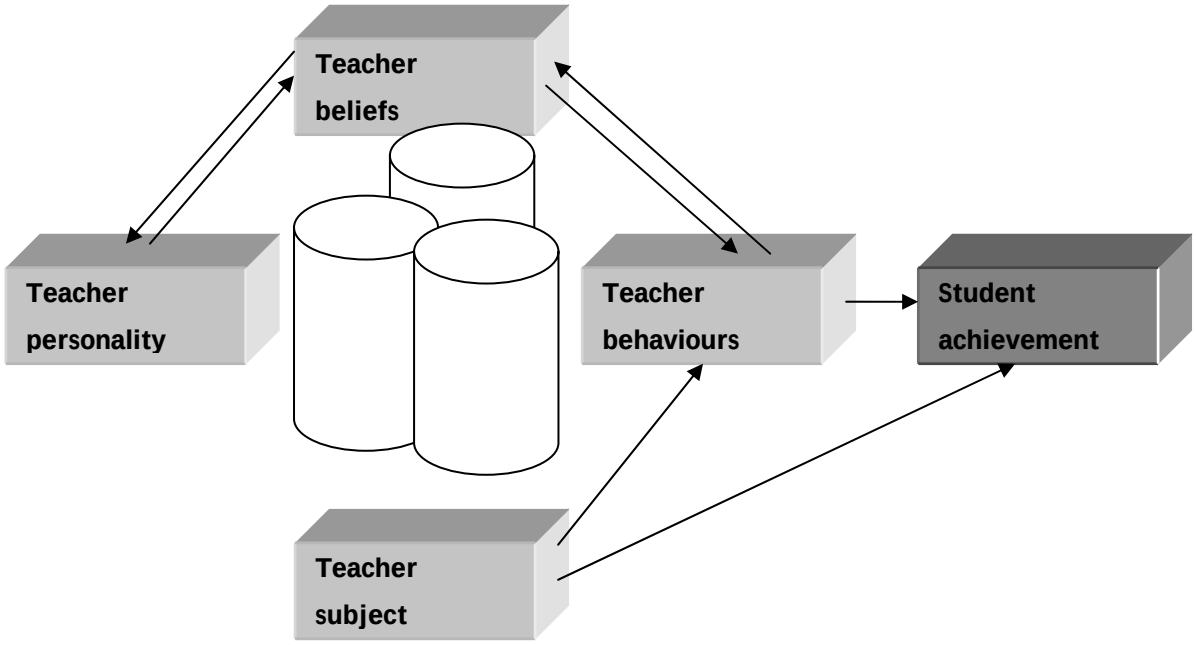

Figure 4.8: Relation between competences and competence dimensions

The figure attempts to describe the way competences — represented by cylinders —

as 'inner psychic structures' lie behind those aspects of the competence dimensions — represented by four pale boxes — that are registered in the empirical studies in each of the four dimensions.

A reading of the narrative syntheses 'cross-sectionally', in other words a reading of the syntheses included in Section 0, indicates three focal points. In what follows these will be interpreted as different competences that can be called:

- *Relational competence*
- *Rule management competence*
- *Didactic competence*

Each of these competences will now be briefly summarised with the aid of the results of the narrative analyses:

Relational competence: The narrative syntheses indicate that the teacher's positive social interaction with the pupils is based on a significant relational competence that can promote pupil learning. Such a teacher demonstrates pupil-supportive leadership with pupil activation and pupil motivation, in which the pupil has a chance to practise self-management and in which variations in pupil capabilities are taken into account. This promotes an increase both in academic gains and in non-academic gains in the form of, for example, greater motivation and autonomy. The good relations between teacher and pupil are based on the teacher showing respect, tolerance, empathy and interest towards the pupils. The teachers' view of pupils is that they all have the potential to learn and that they have an individual learning style.

Rule management competence: The narrative syntheses indicate that rule management competence based on a general establishment of rules for the work of the class promotes pupil learning. Behavioural rules are formulated explicitly at the start of the teaching and the formulation and maintenance of rules are gradually devolved to the pupils. The teacher involves the pupils in the structuring and choice of activities in the classroom. The teacher ensures that the class works in an orderly fashion, starts the lesson on time, and moves appropriately from one activity to another. The teacher undertakes detailed planning with a view to spending most time on teaching and least time on administrative routines. Effective teaching, which ensures cohesion with previously learnt material and in which there is a progression, promotes pupil achievement. This requires the teacher to focus the attention of the class on central aspects of the syllabus, following up on what has been learnt by, for example, going over material previously learnt, giving rapid and corrective feedback, and repeatedly emphasising essential principles.

Didactic competence: The narrative syntheses indicate that the teacher's teaching actions are based on a didactic competence. A prerequisite for this competence is a high academic level. A high level of subject knowledge contributes to teachers having confidence in their own abilities and effectiveness in the subject, to them being less bound to the subject in their teaching, and to them being able to employ a variety of forms of material and approach. In their teaching this is manifested in among other things the teacher being more cognitively challenging and encouraging meta-cognition and de-contextualised conversation. If in addition the teacher is able to establish clear teaching aims, both for the individual lesson and for the course as a whole, and to carry out detailed teaching plans and organisation of activities, this will have a positive influence on pupil achievement. Mastery and use of a variety of teaching methods and materials alongside a cognitive, connectionist approach to teaching also promotes pupil learning.

Certain aspects of the didactic competence are subject-specific in character. This aspect has, however, only been a focus in a small number of studies and primarily in mathematics. Here it can be seen that problem-oriented teaching rather then rote-learning alongside a firm conceptual grasp of the subject promotes pupil learning. Furthermore, whole class teaching promotes pupil learning in this context better than group or project work.

5 Conclusions/recommendations

5.1 The results of the systematic review

In this systematic review the following review question is answered:

> *Which dimensions of teachers' manifest competences can be shown, through effect studies, to contribute to pupil achievement?*

The answer is given partly by conducting a research mapping and a narrative synthesis on the basis of the last 10 years' empirical pedagogical research.

The answer is that the following three competences contribute to learning in children and young people:

- *Relational competence*
- *Rule management competence*
- *Didactic competence*

In the report's Sections 0 and 4.6.2 an account is given of the details of this answer. The following rider can be added about the strength of this assertion:

- The answer is based on the best evidence available from pedagogical and educational research in the period 1998-2007
- The answer is based upon a research mapping and a research assessment of that research
- The answer has been arrived at by undertaking narrative analyses generated on the basis of a data extraction carried out by a review group and Clearinghouse.

The answer invites the following comments:

- The answer is of interest both in terms of what it directs attention towards and in terms of what it does not direct attention towards. It does not highlight factors that are not already familiar. But it indicates that it is precisely these competences — and not others — that are central, according to our best evidence.
- The answer points to certain very basic competences that can essentially be interpreted in relation to the didactic triangle. (1) The teacher must possess the competence to enter into a social relation, the qualities of which are discussed in Chapter 4, with the individual pupil. (2) In relation to the whole class (all pupils), the teacher must possess the competence to lead the activity of the class, whereby the teacher as visible leader throughout the course of the teaching gradually devolves responsibility to the pupils and to the class for the development of rules and encourages the pupils themselves to establish and maintain the rules. Both of these competences are significant for the development of overall aims such as the pupils' motivation and autonomy, and they play a role by promoting scholastic learning. (3) In relation to the content of the teaching, the teacher must possess competence both in the didactic sphere in a general sense and in specific academic subjects.

- The answer suggests that teacher training should focus on the development of these three basic competences and that all other details of teacher training should be able to be associated organically with one or more of these competences.
- The answer indicates that above and beyond the teacher's academic knowledge of his/her subjects, social competence, competence in managing work in the classroom and didactic competence are significant prerequisites for the teacher's successful contribution to pupil learning.

5.2 Recommendation for practice, policy and research

In conclusion consideration should be given to the recommendations for practice, policy and research that derive from the results of the systematic review carried out here.

5.2.1 Practice

It makes no sense to recommend to teachers that they 'possess' the three competences presented here. By definition, competences are inner psychic structures that you either 'have' or 'do not have' and that have to be activated in given social contexts that call for a solution. To recommend that these competences should be 'acquired' or 'developed' is more of a task to be dealt with at policy level.

The three competences advanced here include, however, a large number of dimensions and aspects of competences that are discussed in detail in Section 0. A range of these dimensions and aspects comprise specified teaching situations in which concrete approaches and relational features are shown to be significant. The result of the narrative syntheses can provide inspiration for appropriate teaching action for teachers who find themselves in similar teaching situations.

We can, therefore, recommend that teachers take account of a range of practical features that this systematic review has shown to be of significance for their pupils' learning.

5.2.2 Policy

For decision-makers and planners of educational policy, politicians and officials the results of the present systematic review can help to select which elements should be ensured by a course of training for teaching. According to the best available evidence, the systematic review indicates that the three competences mentioned above should be allotted a central role. This is, however, on the understanding that the effects that the given competences can be seen to promote are also those that are deemed desirable.

At the same time it should be emphasised that the result of the systematic review only answers the question as to which competences can be shown to be central for pupil achievement. The systematic review has not looked into and gives no answer to questions addressing how the competences can be acquired, learnt or developed. To identify this is a separate independent empirical assignment.

We can, therefore, recommend that politicians and officials wishing to promote these aims for pupil learning can, as a result of what the systematic review has demonstrated, use the three proposed competences as a basis for evaluating the appropriateness of existing teacher training courses and as bearings for future teacher training courses.

5.2.3 Research

The present systematic review has surveyed the last ten years of empirical research into the relation between manifest competences and pupils' learning.

The research mapping and research assessment have shown that over this period pedagogical and educational research have shown interest in this issue but that there is still a long way to go. On several occasions it has been noted that randomised controlled studies are entirely absent. And generally speaking it would be an advantage if there existed a larger number of studies conducted on the basis of those research designs that could provide the greatest evidence for the effect of the teaching competences under review.

While the registration of pupil achievement in the studies under survey is presented with reasonable quality, the assessment is that the registration of competence dimensions and of the way they form part of the theoretically constructed generation of competences require a greater theoretical elucidation. There is no generally accepted, clear terminological consensus in the area that can ensure that studies conducted can be compared with each other.

Finally the results of the systematic review indicate that primary research should be carried out to shed light on the three competences advanced here and on the relations between them. It is to be expected that carefully focused research can contribute to uncovering the inner relations and details of these competences and to providing a more specific understanding of the ways and the areas in which they influence promotion of pupil learning in the desired direction.

It is, therefore, recommended a) that empirical research is set in motion on the links between manifest competences and pupil achievement using research designs capable of accounting for such links with the greatest weight of evidence, b) that theoretical and empirical research is instigated focusing on the development of appropriate theoretical ways of understanding the concept of competence and, alternatively, of each individual competence and, finally, c) that empirical research should be carried out both into the individual competences presented here and into the links between them.

6 Appendix 1: The systematic review and particular questions posed by the Ministry of Education and Research

In the document entitled *Konkurransegrunnlag: Kompetanse og læring* (2007) the Ministry of Education and Research raises some specific issues about teacher competences in relation to particular groups and particular areas. In the following we deal with ways in which the systematic review undertaken can provide answers to these. Account is only taken of the 55 studies of 'high' or 'medium' research quality, in other words the studies included in the narrative syntheses.

The review primarily addresses children with no special needs, who attend primary-level educational institutions.

Staff groups: In the systematic review only one study is included that also treats the kindergarten level (Hollins, 2003). The study deals with the effect of reflective teacher teams at both the kindergarten and school level. It recommends the establishment of teacher teams that work with reflection on their own practice.

One study deals with the influence of assistants on pupil learning (Chiu, 1998). No distinction is made, however, in the study between the behaviour and the input of teachers and assistants. No conclusions can, therefore, be drawn that relate specifically to assistants.

Ethnic minorities and multi-lingual pupils: The systematic review includes six studies that deal with ethnic *minorities and multi-lingual pupils* (Brekelmans et al., 2004; Dawn et al., 2007; Driessen & Sleegers, 2000; Hutto, 2001; Limbrick, 2006; Von Secker, 2002).

Hutto (2001) is described above on page 80 and shows that teacher intervention consisting of a particular attention to the pupils' participation in teaching accompanied by intervention in the event of unsatisfactory effort has a significant positive influence on pupils with a poor socio-economic and/or Afro-American background. Dawn et al. (2007) deal with Afro-American pupils with behavioural problems with a risk of being referred to special needs teaching. In relation to this study, relational competence in the teacher is presented as the factor that plays a significant role in the event of the pupil being excluded from the class. Positive relation between teacher and pupil leads to fewer exclusions. Limbrick (2006) points out that teachers' participation in reflective teacher teams has a positive effect both on the teacher's view of the pupils' potential and on their own teaching. The subject of the study was low-performing pupils from Maori and Pacifica groups, who represent minorities in New Zealand society. Driessen & Sleegers (2004) deal with minority pupils in Holland, whose academic scores are lower than the rest of the class. Here the teacher's pupil-differentiated teaching in basic mathematical skills has positive significance for pupil learning. Von Secker (2002) demonstrates a connection between increased pupil learning in various minority groups and the teacher's use of a pupil-centred and inquiry-based teaching style. Brekelmans et al. (2004) deal with the teacher's relational competence in relation to pupil gains in English as a foreign language for foreign pupils. The study was carried out in Holland. The study stresses the positive relation between teacher and pupil as having the greatest influence on pupil learning.

Pupils with learning or behavioural difficulties: The systematic review includes two studies that deal with pupils with learning or behavioural difficulties (Allday, 2007; Chambers & Sugden, 2003).

Allday (2007) is concerned with the difficulties in concentration experienced by pupils with behavioural difficulties. The study shows that when the teacher greets these pupils on entering the class (shakes hands) and refers directly to them in the course of the teaching, the pupils are activated in the subject and disturb ordinary teaching less in the first 10 minutes of the teaching than before the intervention was made. Chambers & Sugden (2003) show that the teacher's intervention directed towards pupils with developmental coordination disorder (DCD) has a positive effect.

Non-academic learning aims: 33 studies deal with learning that in relation to the conditions of the *Konkurransegrunnlag* can be regarded as 'indicators that are more difficult to measure such as social skills'. The studies deal with the effect of teaching actions primarily on the autonomy, self-determination and commitment of the pupils. These aspects are treated in the analysis of the effects of the teacher's teaching and are included in relation and rule management competences, see 4.3.1.

One study deals with the effect of teacher behaviour on the pupils' social skills (Dumbrajs, 2007). In the study it can be seen that group work has a positive effect on the development of social skills. There is, however, no precise measurement of the effect.

7 Appendix 2: An example of a coding

Item: Muijs, D., & Reynolds, D. (2000). School effectiveness and teacher effectiveness in mathematics: Some preliminary findings from the evaluation of the mathematics enhancement program (primary). *School Effectiveness and School Improvement*, 11(3), 273-303.

7.1 DEC 2 Review specific keyword guideline

Section A: Teacher competence

A.1 Are indications of subject knowledge involved?	Practical subject skills *Mathematical Language*
A.2 Are teacher behaviour involved?	Didactic practical skills
A.3 Is classroom management involved?	Yes
A.4 Is behaviour management involved?	Yes
A.5 Is classroom climate involved?	Yes
A.6 Are other aspects of teacher behaviour involved?	Yes (please describe) *Direct Teaching* *Individual Practice* *Interactive Teaching* *constructivist Methods* *Varied Teaching* *Time on Task* *Percent Whole Class Interactive* *Percentage small Group work* *Percentage whole Class lecture* *Percentage Transitions*
A.7 Are indications of teacher beliefs, attitudes or emotions involved?	No, not applicable
A.8 Are indications of teacher personality involved?	No, not applicable

Section B: Pupil results

B.1 Where do pupil results come from?	*Standardised tests*
B.2 What is the content of pupil results?	*Scholastic achievement*

Section C: Context of the study

C.1 Which school subjects are involved?	*Math*
C.2 What is the level of education?	*Primary or lower secondary school*
C.3 In which country was the study conducted?	*UK*

7.2 EPPI-Centre data extraction and coding tool for education studies V2.0

Section A: Administrative details

A.2 Date of the review	Details *23th of January 2008*
A.3 Please enter the details of each paper which reports on this item/study and which is used to complete this data extraction.	Paper (1) *School Effectiveness and School Improvement (Sep 2000) Vol. 11, No. 3, p. 273-303* Unique Identifier: *884157* Authors: *Muijs, Daniel; Reynolds, David* Title: *School Effectiveness and Teacher Effectiveness in Mathematics: Some Preliminary Findings from the Evaluation of the Mathematics Enhancement Program (Primary).*

A.4 Main paper. Please classify one of the above papers as the 'main' report of the study and enter its unique identifier here.	Unique Identifier: *884157*
A.5 Please enter the details of each paper which reports on this study but is NOT being used to complete this data extraction.	
A.6 If the study has a broad focus and this data extraction focuses on just one component of the study, please specify this here.	Not applicable (whole study is focus of data extraction)
A.7 Identification of report (or reports)	*Electronic database*
A.8 Status	Published *ISSN 0924-3453*
A.9 Language (please specify)	Details of Language of report *English*

Section B: Study Aims and Rationale

B.8 What are the study research questions and/or hypotheses?	Explicitly stated (please specify) *Hypothesis 1.:* *"As for the debate on whole class interactive teaching, whenever it is found that spending more time teaching the whole class together is effective, the question arises of why this should be the case. We propose here that the so-called 'black box' between teaching the whole class and gain scores is in fact filled by the effective teaching behaviors, whole-class teaching thus allowing teachers to teach (effectively). It is this hypothesis that will be explored in this study." (p. 279)* *Hypothesis 2.:* *"In this study we will propose a model in which the separate teacher behaviors form a number of scales: classroom management, behavior management, direct teaching, interactive teaching, individual practice, classroom climate, varied teaching, constructivist methods and*

	mathematical language. It is hypothesized that these scales will be influenced by the percentage of time spent in whole-class teaching, as this type of teaching is expected to create the conditions for effective teaching to occur...” (Ibid)

Section C: Study Policy or Practice Focus

C.4 In which country or countries was the study carried out?	Explicitly stated (please specify) *In the UK*

Section F: Results and conclusions

F.2 What are the results of the study as reported by the authors?	Details *In relation to hypothesis 1.:* *These analyses did not find much evidence for a direct effect of classroom organization (whole class interactive) or time on task on pupil gains. This does not necessarily invalidate the aforementioned hypothesis. Some tentative evidence for such a relationship may be garnered form the correlations between these variables and pupil gain scores. This leads to hypothesis 2.* *In relation to hypothesis 2.:* *Classroom organization (whole-class interactive teaching) was hypothesized to affect effective teaching behaviors, and thus exert an indirect influence on pupil gain scores. This because it was hypothesized that spending more time teaching the whole class would allow teachers to display more effective teaching behaviors than allowing pupils to work on their own for a larger part of the lesson. To test whether the theoretical model, in which whole-class teaching effects effective teaching behaviors and time on task, which in turn affect pupil gain scores, it was decided to use structural equation modeling.* *Findings in relation to hypothesis 2.:* *As can be seen in Table 9, the model fits in years 3 and 5, and the similar fit indices for the two subsamples suggests this model is quite stable in these years. Chi-square remained significant for the year 1 models, however, suggesting that the*

	hypothesis is less well supported in this year. This confirms the weaker relationship between teaching factors and progress in mathematics in year 1 found in the analyses mentioned above. Most paths suggested in the theoretical model also reached significance, the only one failing to do so in a number of models being that from time on task to non-behavioral teaching, which was not significant in year 5, and the path from non-behavioral teaching to test scores which was not significant in any of the models. It also has to be remarked that the loadings of the non-behavioral scales on that factor were weak in a number of models. Some other differences were found between the years in the strength of the significant paths in the models: the effect of whole-class teaching on teaching behaviors and time on task was strongest in year 1, and the effect of effective teaching on test scores was strongest in year 3 and weakest in year 1. The path from whole-class interactive teaching to time on task was not significant in year 1. Overall these differences suggest that year 1 differs somewhat from the older years. However, despite these differences the overall similarity of the models is striking. As would be expected, especially in light of the short period that has elapsed between testing, test scores are quite stable over time. However, over and above the effect of test stability, differences in pupils' progress clearly do occur, and they would seem to be affected by teacher effectiveness, the path from which to July test results is significant in all cases. Effective teaching behaviors are in turn influenced by both time on task and classroom organization, and classroom organization (the percentage of time spent on whole class interactive teaching) in turn strongly influences time on task. The only paths that failed to reach significance in a number of cases were the ones involving non-behaviorist methods. Both the influence of non-behaviorist methods on achievement and the influence of time on task on non-behaviorist methods were not strongly supported by these models. (p. 291-298)
F.3 What do the author(s) conclude about the findings of the study?	Details *- This study clearly points to the importance of the effective teaching behaviors as outlined in the teacher effectiveness research to successful mathematics teaching in the UK. It has become*

	clear, that while individual behaviors may only explain a very small percentage of variance in pupil gains over time, taken together they are significant. This study also lends support to the view that these behaviors do indeed occur together in effective teachers, thus forming a cluster of effective teaching behaviors. The relationship of pupil gains to classroom organization would seem to be an indirect one. It would seem that, rather than directly affecting pupil progress, whole-class teaching creates the conditions for effective teaching to occur, a result that could explain the fact that the amount of time spent teaching the whole class, while found to be effective in a number of American studies, was only found to be significant in 3 out of 29. *The centrality of the teacher in pupils' learning processes is clear, however. Any approach designed to let pupils learn on their own, with the teacher acting merely as a 'facilitator' is likely to fall short of the cognitive demands of primary age children.* *As is clear from the items included in the scales, it would be wrong to describe this whole-class interactive teaching style as a 'chalk and talk' drill-and-practice approach. The importance of engaging with students at a cognitively higher as well as lower level is clear from the inclusion of items such as asking open questions, allowing multiple answers etc. As such, this teaching style by no means precludes attention to higher-level learning goals. An explanation for the value of these behaviors and related* *classroom observation factors can be found in the need for pupils at this age for a good deal of explicit cognitive structuring (Stillings et al., 1995).* *- A possible worry about this method of teaching is the finding in this study that boys made significantly more gains than girls did on many occasions. While it is not clear from this study whether this is a result of* *the teaching style, there is a danger that boys might dominate interaction with the teacher in an interactive classroom. This is clearly an issue that needs addressing, and teachers should be pointed to the need to involve girls in any interaction in the classroom. (p. 300)*

Section G: Study Method

G.3 What is the method used in the study?	*Cohort study*

Section M: Quality of study — reporting

M.1 Is the context of the study adequately described?	Yes (please specify) *The pertinence of the study and the concepts used in the study are carefully described.*
M.2 Are the aims of the study clearly reported?	Yes (please specify) *The aims of the study are clearly reported*
M.3 Is there an adequate description of the sample used in the study and how the sample was identified and recruited?	Yes (please specify) *The data is gathered from mathematics teaching in primary school. The sample consists of 2,128 pupils and 78 teachers.* *Furthermore, Data on 16 primary schools in two local education authorities involved in the Gatsby project, along with three control schools in another local education authority, are included in this analysis.*
M.4 Is there an adequate description of the methods used in the study to collect data?	Yes (please specify) *Observations of classrooms:* *All teachers in years 1, 3 and 5 were observed during math lessons, making a total of 24 teachers in year 1, 26 in year 3 and 28 in year 5. An observation schedule developed for the project, the Mathematics Enhancement Classroom Observation Record (Schaffer, Muijs, Kitson, & Reynolds, 1998), was used in the classroom. During lessons observers counted the number of pupils on/off task every 5 minutes, and wrote down what was going on during the lesson in a detailed fashion. This included classroom organization, which was coded as either whole class interactive teaching (the teacher is teaching the whole class in an interactive way), individual seatwork (pupils are working on their own, for example doing an exercise on a worksheet or in a workbook), small group work (pupils are working collaboratively on a task, in pairs or larger groups), and lecturing the whole class (the teacher is teaching the whole class in a non-interactive way, lecturing pupils and not engaging them through questioning or discussion). The amount of time in minutes spent in each of these types of classroom organization could then be calculated for each lesson. After each lesson*

	the occurrence and quality of 65 teacher behaviors was rated on a scale from 1-5, coded as follows: 1 = behavior rarely observed, 2 = behavior occasionally observed, 3 = behavior often observed, 4 = behavior frequently observed, 5 = behavior consistently observed and na = not applicable. It is the rating of behaviors, classroom organization and time on task measures that form the basis of the study. These behaviors were hypothesized to form nine subscales: classroom management, behavior management, direct teaching, individual practice, interactive teaching, varied teaching, mathematical language, classroom climate and constructivist methods (a number of items which were culled from constructively oriented theory and research - mentioned on page 274 - 278 in the report — were included to reflect this position. These include encouraging pupils to use their own problem solving strategies and connecting different areas of maths to each other and other curriculum areas). *Data from pupils´ test:* *All pupils were tested using the National Foundation for Educational Research's Numeracy tests, which were administered twice, in March and in July of 1998. These tests consist of two sections for each year, one written and one mental, and are designed to accord with the English National Curriculum in mathematics.* *Other data* *Data on free school meal eligibility, English comprehension, special needs status and gender were also collected from the school.*
M.5 Is there an adequate description of the methods of data analysis?	Yes (please specify) *Yes, the descriptions seem adequately*
M.6 Is the study replicable from this report?	Yes (please specify) *Yes, it is replicable*
M.7 Do the authors state where the full, original data are stored?	No (please specify) *Nothing is mentioned*
M.8 Do the authors avoid selective reporting bias? (e.g. do they report on all variables they aimed to study, as specified in their aims/research questions?)	Yes (please specify) *No bias are mentioned in relation to the classroom observation, although these observations seem a bit complicate: First, the observers during the lesson have to note in relation to classroom organizations. Then, after*

	the lesson the observers have to rate "teacher behavior" in class.

Section N: Quality of the study — Weight of evidence

N.1 Are there ethical concerns about the way the study was done?	No (please specify) *Nothing is mentioned*
N.2 Were users / relatives of users appropriately involved in the design or conduct of the study?	No (please specify) *Nothing is mentioned*
N.3 Is there sufficient justification for why the study was done the way it was?	Yes (please specify) *Yes, there seem sufficient justifications*
N.4 Was the choice of research design appropriate for addressing the research question(s) posed?	Yes, completely (please specify) *Yes, it seems appropriate.*
N.5 Have sufficient attempts been made to establish the repeatability or reliability of data collection methods or tools?	Yes, good (please specify) *Inter-observer reliability had earlier been established by all observers observing the same four lessons as .81 (sig. < .001) using Cohen's Kappa.* *All pupils were tested using the National Foundation for Educational Research's Numeracy tests, which were administered twice, in March and in July of 1998. These tests consist of two sections for each year, one written and one mental, and are designed to accord with the English National Curriculum in mathematics. The scores of the tests had a reliability based on Cronbach's Alpha of over .8 in all years in this study.*
N.6 Have sufficient attempts been made to establish the validity or trustworthiness of data collection tools and methods?	Yes, some attempt (please specify) *The classroom-observations seem a bit complicated: First, the observers during the lesson have to note in relation to classroom organizations. Then, after the lesson the observers have to rate "teacher behavior" in class. The question is, what problems in relation to validity occurs when observers attempts to focus on two topics in one time.*
N.7 Have sufficient attempts been made to establish the repeatability or	Yes (please specify)

reliability of data analysis?	I*n relation to the nine subscales: classroom management, behavior management, direct teaching, individual practice, interactive teaching, varied teaching, mathematical language, classroom climate and constructivist methods Internal consistency of the scale scores (measured using Cronbach's Alpha) was over .8 for all scales.*
N.8 Have sufficient attempts been made to establish the validity or trustworthiness of data analysis?	Yes, good (please specify) *Yes, sufficient attempts are made*
N.9 To what extent are the research design and methods employed able to rule out any other sources of error/bias which would lead to alternative explanations for the findings of the study?	Not at all (please specify) *The findings of the study seem reasonable*
N.10 How generalisable are the study results?	Details *The authors mention the following:* *"The tests used in this study (while reflecting the English National Curriculum) and the short-term nature of this study, mean that we have studied typical basic skills achievement gains only. It is not clear from this study whether these effective teaching behaviors are also, or as strongly, related to longer-term and more cognitive outcomes, such as independent learning goals or metacognitive development. It is possible, and indeed* *likely, that other teaching methods are needed alongside the whole-class interactive approach found to be effective in this study to attain these goals."*
N.11 In light of the above, do the reviewers differ from the authors over the findings or conclusions of the study?	Not applicable (no difference in conclusions) *The conclusion and findings of the study seem reasonable*
N.12 Have sufficient attempts been made to justify the conclusions drawn from the findings, so that the conclusions are trustworthy?	High trustworthiness
N.13 Weight of evidence A: Taking account of all quality assessment issues,	High trustworthiness

can the study findings be trusted in answering the study question(s)?	
N.14 Weight of evidence B: Appropriateness of research design and analysis for addressing the question, or sub-questions, of this specific systematic review.	High
N.15 Weight of evidence C: Relevance of particular focus of the study (including conceptual focus, context, sample and measures) for addressing the question, or sub-questions, of this specific systematic review	Medium
N.16 Weight of evidence D: Overall weight of evidence	Medium

8 Complete overview of the studies surveyed

Two references, indicated with *, were not available in time for them to be subject to a coding. Two references, marked with †, represent a single study.

Abbott, J. A., & McCarthey, S. J. (2001). Classroom influences on first-grade students' oral narratives. *Journal of Literacy Research*, 33(3), 389-421.

Allday, R. A., & Pakurar, K. (2007). Effects of teacher greetings on student on-task behavior. *Journal of Applied Behavior Analysis*, 40, pp. 317-320.

Ansgård Laursen, H. (1999). Et key-turning point. København: Danmarks Lærerhøjskole.

Anusavice, S. H., & Behar-Horenstein, L. S. (2005). Looking into classrooms: Student achievement, student absenteeism, teacher efficacy, and teacher instruction of highly mobile students in specialized and traditional school settings. *Curriculum and Teaching*, 20(1), 15-39.

Assor, A. (1999). Value accessibility and teacher's ability to encourage independent and critical thought in students. *Social Psychology of Education*, 2(3-4), pp. 315-338.

Atkinson, E. S. (2000). An investigation into the relationship between teacher motivation and pupil motivation. *Educational Psychology*, 20(1), pp. 45-57.

Ayres, P., Sawyer, W., & Dinham, S. (2001). Effective teaching and student independence at grade 12. ERIC: ED453189.

Blazevski, J. L. (2006). Teacher efficacy for supporting student motivation. Michigan: University of Michigan.

Bonesronning, H. (2004). Do the teachers' grading practices affect student achievement? *Education Economics*, 12(2), 151-167.

Bourne, J. (2003). Vertical discourse: The role of the teacher in the transmission and acquisition of decontextualised language. *European Educational Research Journal*, 2(4), p496-521.

Bramald, R., & Higgins, S. (1999). Mathematics, ict and effective teaching. Adelaide: Mathematic Research Group of Australasia.

Brekelmans, M., Wubbels, T., & Brok Perry, J. d. (2004). Interpersonal teacher behaviour and student outcomes. *School Effectiveness and School Improvement*, 15(3-4), pp. 407-442.

Brewer, D. J., Anderson, D. J., & Goldhaber, D. (1999). A three-way error components analysis of educational productivity. *Education Economics*, 7(3), pp. 199-208.

Chambers Mary, E., & Sugden David, A. (2003). Intervention in children with developmental coordination disorder: The role of parents and teachers. *British Journal of Educational Psychology*, 73(4), p545-561.

Chaudhuri, K. (2004). A study of interpersonal sensitivity in the context of teacher — pupil interaction in the class-room. *Social Science International*, 20(2), pp. 116-124.

Chiu, M. M. (1998). Teachers effects on student motivation during group work: Activity and intervention level analyses.ERIC: ED428043.

Connor, C. M., Son, S.-H., Hindman, A. H., & Morrison, F. J. (2005). Teacher qualifications, classroom practices, family characteristics, and preschool experience: Complex effects on first graders' vocabulary and early reading outcomes. *Journal of School Psychology*, 43(4), 343-375 p.

Cornelius-Whiite, J. (2007). Learner-centered teacher-student relationships are effective: A meta-analysis. *Review of educational research*, 77(1), 113-143 pp.

Dawn M. Decker, D. M., Dona, D. P., & Christenson, S. L. (2007). Behaviorally at-risk african american students:The importance of student–teacher relationships for student outcomes. *Journal of School Psychology*, 45(1), 83-109 pp.

de Sousa, L. C., & Santos, L. (1999). A relação entre estilos pedagógicos e desempenho escolar em portugal. / the relationship between educational styles and elementary school performance in portugal. *Psicologia: Reflexão e Crítica*, 12(2), pp.331-342.

Dossett, D., & Munoz, M. A. (2003). Classroom accountability: A value-added methodology. ERIC: ED478202.

Driessen, G., & Sleegers, P. (2000). Consistency of teaching approach and student achievement: An empirical test. *School Effectiveness and School Improvement*, 11(1), 57-79.

Dumbrajs, S. (2007). A learning community: Teachers and students engaged in developing their own learning and understanding. Joensuu: Joensuun yliopisto.

Egelund, N., & Broch, T. (2002). Elevers interesse for naturfag og teknik: Et elevperspektiv på undervisningen. København: Danmarks Pædagogiske Universitet.

Elliot, C. (2007). Action research: Authentic learning transforms student and teacher success. *Journal of Authentic Learning*, 4(1), 34-42 pp.

Feshbach, N. D., & Feshbach, S. (2003). Empathy in education: An elixer but no panacea. *International Journal of Learning,* v.10, pp. 2763-2769.

Goh, S. C., & Fraser, B. J. (2000). Teacher interpersonal behavior and elementary students' outcomes. *Journal of Research in Childhood Education*, 14(2), 216-231.

†Heistad, D. (1999a). Teachers who beat the odds: Value-added reading instruction in Minneapolis 2nd grade classrooms. ERIC: ED438501..

†Heistad, D. J. (1999b). Stability and correlates of teacher effects in grade two reading achievement. Duluth: University of Minnesota.

Hollins, E. R. (2003). Developing a self-sustaining learning community. *International Journal of Learning,* 10, 2629-2645.

Hugo, M. (2007). Liv och lärande i gymnasieskolan: En studie om elevers och lärares erfarenheter i en liten grupp på gymnasieskolans individuella program. Jönköping: Jönköping University Press.

Hutto, R. D. (2001). Teacher evaluation and development and student performance. Austin: University of Texas.

Jess, M., Abbott, A., Bognar, J., & I., S. M. (2006). A preliminary study to investigate the influence of different teaching styles on pupils' goal orientations in physical education. *European Physical Education Review*, 12(1), p51-74.

Johnson, C. C., Kahle, J. B., & Fargo, J. D. (2007). Effective teaching results in increased science achievement for all students. *Science Education*, 91(3), 371-383.

Jones, S., Tanner, H., & Treadaway, M. (2000). Raising standards in mathematics through effective classroom practice. *Teaching Mathematics and Its Applications*, 19(3), 125-134.

Kalu, I., & Ali, A. N. (2004). Classroom interaction patterns, teacher and student characteristics and students' learning outcomes in physics. *Journal of Classroom Interaction*, 39(2), pp. 24-31.

Khisty, L. L. (2002). Pedagogic discourse and equity in mathematics: When teachers' talk matters. *Mathematics Education Research Journal*, 14(3), 154-168.

Kimball, S. M., White, B., Milanowski, A. T., & Borman, G. (2004). Examining the relationship between teacher evaluation and student assessment results in washoe county. *Peabody Journal of Education,* 79(4), 54-78.

Košir, K. (2005). The influence of teacher's classroom management style on pupils' self-regulative behavior. *Studia Psychologica*, vol 47(2), pp. 119-144.

Kyriakides, L. (2005). Extending the comprehensive model of educational effectiveness by an empirical investigation. *School Effectiveness and School Improvement*, 16(2), p103-152.

*Lamat-Nawari, S. (2001). Teacher efficacy and self-regulation of learning: A study of teachers and students in the malaysian schools. Queensland: Queensland University of Technology.

Lamb, S., & Fullarton, S. (2000). Classroom and teacher effects in mathematics achievement: Results from timss. Perth WA: Mathematic education research group of Australasia.

Leonard, J. (1999). From passivity to proactivity: A white female's development of participation and attitude in middle school mathematics. ERIC: ED440950.

Liang, N., & Yin, F. (1998). A study of the relation between students' cognitive styles and teachers' teaching strategies. *Psychological Science (China)*, vol 21(2), pp. 115-118, 121.

Limbrick, L. (2006). Teachers learning about teaching writing: Professional development focussed on examining children's writing achievement. Paper presented at the British Educational Research Association Annual Conference, Warwick.

Maloch, B. (2002). Scaffolding student talk: One teacher's role in literature discussion groups. *Reading Research Quarterly*, 37(1), 94-112 p.

Meehan, M. L., Cowley, K. S., Schumacher, D., Hauser, B., & Croom, N. D. M. (2003). Classroom environment, instructional resources, and teaching differences in high-performing kentucky schools with achievement gaps. ERIC: ED478672.

Miller, J. W., McKenna, B. A., & McKenna, M. C. (1998). A comparison of alternatively and traditionally prepared teachers. *Journal of Teacher Education*, 49(3), 165-176.

Morais, A. M., & Rocha, C. (2000). Development of social competences in the primary school—study of specific pedagogic practices. *British Educational Research Journal*, 26(1), 91-119.

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Muijs, D., & Reynolds, D. (2000). School effectiveness and teacher effectiveness in mathematics: Some preliminary findings from the evaluation of the mathematics enhancement program (primary). *School Effectiveness and School Improvement*, 11(3), 273-303.

Muijs, D., & Reynolds, D. (2002). Teachers' beliefs and behaviors: What really matters? *Journal of Classroom Interaction,* vol 37(2), pp. 3-15.

Muijs, R. D., & Reynolds, D. (2003). Student background and teacher effects on achievement and attainment in mathematics: A longitudinal study. *Educational Research and Evaluation*, 9(3), p289-314.

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Perry, K. E., Donohue, K. M., & Weinstein, R. S. (2007). Teaching practices and the promotion of achievement and adjustment in first grade. *Journal of School Psychology*, 45(3), 269-292.

Quandahl, J. E. (2001). The instructional practices of kindergarten teachers: Effects on student achievement. Houston: University of Houston.

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*Rego, A., Pereira, H., & Fernandes, C. (2005). Motivação e desempenho académico dos estudantes: Analisando o papel dos comportamentos de cidadania docente. / students' motivation and academic achievement: Analyzing the importance of the citizenship behaviors of teachers. *Psicologia Educação Cultura*, vol 9(1), pp. 131-150.

Richardson, C. (2005). Shadowing helen. Teacher: *The National Education Magazine*(165), 36-42.

Rockoff, J. E. (2003). The impact of individual teachers on student achievement: Evidence from panel data. ERIC: ED883994.

Roehrig, G., & Garrow, S. (2007). The impact of teacher classroom practices on student achievement during the implementation of a reform-based chemistry curriculum. *International Journal of Science Education*, pp.1-23.

Salema, M. H. M. B. (2001). Teaching and learning to think: Impact on at-risk students. *Korean Journal of Thinking & Problem Solving*, vol 11(2), pp. 61-88.

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Tomoff, J., Thompson, M., & Behrens, J. (2000). Measuring nctm-recommended practices and student achievement with timss. ERIC: ED884176.

Valli, L., Croninger, R. G., & Walters, K. (2007). Who (else) is the teacher? Cautionary notes on teacher accountability systems. *American Journal of Education*, 113(4), 635-662.

Von Secker, C. (2002). Effects of inquiry-based teacher practices on science excellence and equity. *Journal of Educational Research*, 95(3), 151-160.

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Wharton-McDonald, R., Pressley, M., & Hampston, J. M. (1998). Literacy instruction in nine first-grade classrooms: Teacher characteristics and student achievement. *Elementary School Journal*, 99(2), 101-128.

Wright, J. D. (2006). Exploring the relationships among dispositions associated with teacher effectiveness and indicators of student learning: A perceptual psychology theory approach. Carrollton, Georgia: University of West Georgia.

Yasumoto, J. Y., Uekawa, K., & Bidwell, C. E. (2001). The collegial focus and high school students' achievement. *Sociology of Education*, 74(3), 181-209.

9 Complete overview of published reviews

Listed here is a complete overview of reviews, both systematic and (principally) unsystematic, that are concerned with the theme of this systematic review. Systematic reviews are indicated with *. The complete overview of primary studies included in the review is reproduced in Chapter 8, while references included in the textual commentary of the systematic review are listed in Chapter 10.

Abrami, P. C., Leventhal, L., & Perry, R. P. (1982). Educational seduction. *Review of Educational Research, 52*(3), 446-464p.

Aitkin, M., & et al. (1981). Teaching styles and pupil progress: A re-analysis. *British Journal of Educational Psychology, 51*(2), 170-186.

Allington, R. L., & Johnston, P. H. (2000). What do we know about effective fourth-grade teachers and their classrooms? Cela research report.

Allmänhet, V. (2004). Lärares syn på vetenskap intervjuundersökning 2004: Vetenskap & Allmänhet.

American Institutes for Research, W., DC. (2004). Partnerships for reform: Changing teacher preparation through the title ii health partnership program. Interim report. Executive summary. Ppss-2003-8: American Institutes for Research, Washington, DC.; SRI International, Arlington, VA.PB: Publisher ED Pubs.

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Anderson, R. D., & et al. (1982). Science meta-analysis project: Volume ii. Final report. 447 p. ERIC: ED223476

Apthorp, H. S. (2004). Research on mathematics pedagogy for american indian students: Phase iii. Connecting practices with outcomes. ERIC: ED484540

Arfwedson, G. (1994). Nyare forskning om lärare: Presentation och kritisk analys av huvudlinjer i de senaste decenniernas engelskspråkiga lärarforskning. Stockholm: HLS.

Arnold, K.-H. (2006). Handbuch unterricht. Bad Heilbrunn: Klinkhardt

Assistance, N. C. f. E. E. a. R. (2006). National assessment of title i: Interim report. Executive summary: Institute of Education Sciences (ED), Washington, DC.PB: Publisher ED Pubs.

Astin, A. W. (1985). Achieving educational excellence. San Francisco u.a.: Jossey-Bass

Barnes, J. (1987). Teaching experience. In *The international encyclopedia of teaching and teacher education* (pp. 608-612 pp). Oxford: Pergamon.

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Brophy, J. (1980). Recent research on teaching. ERIC: ED204280

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Brumfit, C., & Mitchell, R. (1989). Research in the language classroom. *English language teaching documents* / Pergamon Institute of English (Oxford). 133

Buckingham, J. (2003). Reflections on class size and teacher quality. St Leonards, NSW: Centre for Independent Studies.

*Cajkler, W. (2006). Working with adults a systematic literature review on the perceptions of ways in which support staff work to support pupils' social and academic engagement in primary classrooms (1988-2003). London: EPPI-Centre.

Campbell, J., Kyriakides, L., & Muijs, D. (2004). Assessing teacher effectiveness. Developing a differentiated model. London: RoutledgeFalmer.

Capie, W., & Tobin, K. G. (1981). Pupil engagement in learning tasks: A fertile area for research in science teaching. *Journal of Research in Science Teaching, 18*(5), 409-417.

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Chen, A. Y. (1990). What can we learn from 'expert' teachers? In 'The changing face of professional education': collected papers of the Australian Association for Research in Education annual conference 1990 edited by M Bezzina and J Butcher, pages 172-181. North Ryde NSW: Australian Association for Research in Education

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