

# Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?



by Professor Geeta Kingdon  
Dr Monazza Aslam  
Shenila Rawal  
Sushmita Das

February 2013

This material has been funded by the Department for International Development. The views expressed do not necessarily reflect the views of the Department for International Development. The authors are part of the Institute of Education and ASER Centre; and were supported by the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre).

The EPPI-Centre reference number for this report is 2103.

This report should be cited as:

Kingdon K, Aslam M, Rawal S, Das S (2013) Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes? London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London

ISBN: 978-1-907345-47-0

© Copyright

Authors of the systematic reviews on the EPPI-Centre website (<http://eppi.ioe.ac.uk/>) hold the copyright for the text of their reviews. The EPPI-Centre owns the copyright for all material on the website it has developed, including the contents of the databases, manuals, and keywording and data extraction systems. The centre and authors give permission for users of the site to display and print the contents of the site for their own non-commercial use, providing that the materials are not modified, copyright and other proprietary notices contained in the materials are retained, and the source of the material is cited clearly following the citation details provided. Otherwise users are not permitted to duplicate, reproduce, re-publish, distribute, or store material from this website without express written permission.

# Contents

List of abbreviations	iii
Abstract	1
Executive summary	2
1. Background	6
1.1 Aims and rationale for current review	6
1.2 Definitional and conceptual issues	8
1.3 Theoretical framework	10
1.4 Authors, funders and other users of the review	15
2. Methods used in the review	16
2.1 User involvement	16
2.2 Identifying and describing studies	16
2.3 In-depth review	23
3. In-depth review: describing the studies and results	27
3.1 Studies included from searching and screening	27
3.2 Describing the studies according to research question	33
3.3 Key findings of studies included in the in-depth review	55
3.4 In-depth review: quality assurance results	65
3.5 Summary of results of synthesis	70
4. Implications	71
4.1 Strengths and limitations of this systematic review	71
4.2 Policy	72
4.3 Research	74
5. References	76
Appendices	79
Appendix 1.1: Authorship of this report	79
Appendix 1.2: Milestones in the review process	80
Appendix 2.1: Search strategy for electronic databases	81
Appendix 2.2: Data extraction form	119

## List of abbreviations

AEI	Australian Education Index
ASER	Assessment Survey Evaluation Research Centre
AsiaJOL	Asia Journals Online
ASSIA	Applied Social Sciences Index and Abstracts
BEI	British Education Index
CPCI-SSH	Conference Proceedings Citation Index - Social Science and Humanities
CREATE	Consortium for Research on Educational Access, Transitions and Equity
DCE	discrete choice experiment
DFID	UK Department for International Development
DISE	District Information System for Education
EBSCO	EBSCO
EFA	Education for All
EMIS	Education Management Information System
ERC	Education Research Complete
ERIC	Education Resources Information Center
ETP	Extra Teacher Program
GNI	gross national income
IBSS	International Bibliography of the Social Sciences
IIEP	UNESCO International Institute for Educational Planning
ILO	INTERNATIONAL LABOUR ORGANIZATION
IMF	International Monetary Fund
ISI	ISI Web of Knowledge
JSTOR	JSTOR Database
LAMJOL	Latin America Journals Online
NBER	National Bureau of Economic Research
OLS	ordinary least squares
OVB	omitted variable bias
PASEC	Programme on the Analysis of Education Systems
PICOS	population, intervention, comparison, outcomes and study design
PICOST	population, intervention, comparison, outcomes, study design and time
RCT	randomised controlled trials

REEL	Research Evidence in Education Library
RePEc	Research Papers in Economics
RIS	Routing Information Service
Rs	Indian rupee
SIGLE	System for Information on Grey Literature in Europe
SR	Systematic Review
SSRN	Social Science Research Network
TRC	Teacher Reference Center
UNDP	United Nations Development Programme (UNDP)
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESDOC	UNESCO Publications
WoE	weight of evidence

## Abstract

Contract teachers (also known as para-teachers) have been increasingly used in large parts of Africa, South Asia and Latin America in the last few decades with the view to addressing rising student numbers by progressively financially constrained governments. The primary objective of this systematic review (SR) is to understand whether contract teachers and para-teachers are a cost-effective intervention to address teacher shortages and improve learning outcomes. Using stringent guidelines and procedures provided by the EPPI-Centre, a set of quantitative and qualitative studies is arrived at for in-depth review to address the key questions posed in this SR. On the whole, it can be concluded that the evidence indicates that contract teachers are generally more effective in improving student outcomes than regular teachers. Having said that, the research does indicate that these findings are often context-specific. This is coupled with the fact that all of the studies that look into the question of relative efficiency of contract teachers state categorically that they appear to be a more cost-effective means of imparting learning. However, it should be noted that there is a dearth of research on this front and most of the work on costs appears to be an appendage to the principal aim of answering the question of relative effectiveness. Similarly, rigorous evidence on whether contract teachers help alleviate teacher shortages is limited despite the fact that theoretically one would expect this not to be questionable as contract teachers policy is mainly instigated to overcome the teacher shortage problem.

## **Executive summary**

### **Background**

Contract teachers have been increasingly used in large parts of Africa, South Asia and Latin America in the last few decades with the view to addressing rising student numbers by progressively financially constrained governments. While the nature of contracts differ, the basic premise of contractual hiring remains the same: by hiring teachers on fixed-term contracts and often at a fraction of what regular, civil service teachers are paid, governments hope to achieve several goals, efficiency and equity being the foremost on their agendas. However, it is a useful exercise to collate the evidence on whether this experiment of hiring contract teachers has achieved the goal of addressing teacher shortages in a cost-effective manner. Even more importantly, because teachers are the most important input into schools, whether the nature of the contract has resulting implications for student learning is a critical question to address.

### **Objectives**

The primary objective of this systematic review (SR) is to understand whether contract teachers and para-teachers are a cost-effective intervention to address teacher shortages and improve learning outcomes. This can, in turn, be thought of encompassing three sub-questions:

- i. How effective are contract teachers at imparting learning compared to regular teachers?
- ii. What are the relative costs of regular and contract teachers, and hence their cost-effectiveness?
- iii. To what extent do contract teachers succeed in addressing teacher shortages?

### **Methods of the review**

This SR used explicit inclusion/exclusion criteria to conduct a search of bibliographic databases, key journals and organisational websites as well as supplemental keyword searches, hand-searches and contacting authors and experts to arrive at a comprehensive collection of literature on contract teachers. Using the stringent procedures provided under the guidelines of the EPPI-Centre, the studies were screened and then independently assessed by the authors to arrive at the final set of 17 studies for in-depth review. Stringent quality assurance procedures were met to ensure only studies that met pre-determined guidelines were finally reviewed by the authors. Thus, after the application of the inclusion/exclusion criteria, remaining studies were carried forward to the validation, reliability and applicability stage. A hierarchy of evidence was used evaluate the validity of the studies.

Contract teachers are often appointed to schools with fewer resources in more remote areas and often serve disadvantaged children, so any valid estimate of the contract teacher effect must take account of the wider social and economic

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

context in which these contract teachers are employed and also the potential non-random matching of contract teachers to particular children/schools on the basis of unobserved characteristics of both the teachers and the students. For example, contract teachers may be systematically assigned to less-able children within a school. Finding that contract teachers are not as effective as regular teachers in imparting learning, for instance, may therefore be largely due to the low-ability profile of the students they teach rather than a pure contract teacher effect. It may also be that contract teachers are systematically different in their unobserved characteristics from regular teachers. It is therefore very important to control for the observed and unobserved student, school and teacher characteristics in a study that aims to estimate true contract teacher effects. The studies were classified as (i) high quality, (ii) medium quality or (iii) low quality. The evidence from these was then extracted and analysed on the basis of whether the first, second or third question was addressed. The results were synthesised and a weight of evidence (WoE) provided to each question addressed in the SR, classified as (i) robust evidence, (ii) modest evidence or (iii) insufficient evidence of the effect.

### **Results and conclusions**

Of the final 17 studies, 15 address the first question, i.e. how effective contract teachers are compared to regular teachers in imparting learning. From the WoE provided by these studies it can be concluded that contract teachers are generally more effective in improving student outcomes than regular teachers. However, the research does indicate that these findings are often context-specific and conducted at a sub-national level limiting generalisability of the findings. This is coupled with the fact that all of the studies that look into the question of relative efficiency of contract teachers state categorically that they appear to be a more cost-effective means of imparting learning. However, it should be noted that there is a dearth of research on this front and most of the work on costs appears to be an appendage to the principal aim of answering the question of relative effectiveness. Similarly, rigorous evidence on the third question, i.e. whether contract teachers help alleviate teacher shortages, is limited despite the fact that theoretically one would expect this not to be questionable as contract teachers policy is mainly instigated to overcome the teacher shortage problem.

The research that has been analysed in this SR can help guide policy-makers in several ways. One of the most prominent early studies on contract teachers by Muralidharan and Sundararaman (2008) identified four main characteristics of contract teachers: (i) they are appointed on annual renewable contracts with no guarantee of renewal, (ii) they are often less qualified than regular teachers and less likely to have a formal training certificate, (iii) they are paid much less than regular teachers (typically one-fifth of regular teachers' salaries), and (iv) they are more likely to be from the area where the school is located. Different countries have varying combinations of these features; for instance, India's contract policy displays all four. In contrast, Pakistan's contract policy only displays one of these features: contract teachers are paid less than regular teachers. The effectiveness of contract teachers depends very much on the features of the contract itself. The direction of the incentive effect cannot be determined theoretically: on the one

hand, the unfavourable conditions of new teacher contracts could be regarded as unfair and demotivating, and short-term contracts could prevent personal investments in pedagogical training and school specific human capital. On the other hand, for contract teachers, further employment prospects depend on performance and, among other things, parents' satisfaction, so that from this perspective, the contract statute could be expected to have a positive incentive effect. As far as the selection effect is concerned, the changed employment conditions could lead to a different composition of teacher candidates. On the one hand, we would expect a lower number of highly skilled candidates due to the inferior contract conditions; on the other, the reduced entry requirements could reduce entry costs and increase the attractiveness of (temporary) teaching positions. The higher demand for teachers would lead us to expect a lower quality in the marginal (newly employed) teacher.

From a policy perspective, research suggests that there is a need to devise policies and contracts that encourage more teacher effort. This can only occur if the incentives and disincentives are aligned within the contracts and effectively enforced. For example, the threat of dismissal has been identified as a key motivating factor among contract teachers. However, if this threat is not credible, the incentive to exert effort to ensure contract renewal disappears. It is also important to note that contracts 'as they are' will only go so far in raising teacher effort as the evidence has shown that all teachers' effort (even that of contract teachers) is low on an absolute basis, particularly as some studies note that those contract teachers who have more than one tenure period exert less effort in subsequent tenure periods. This points to the need for performance related renewal and for contract policy to be amended to combine the probationary, non-renewal aspect of contract terms with better salaries and benefits. Some researchers argue that explicit and implicit incentives for teachers are based on end-line performance of the group of students, rather than value added over time. If evaluations of a teacher's performance were on a value-added basis, teachers might be happier to work with initially lower-achieving students. This could provide some guidance to policy-makers in designing effective policies.

One concern about proposing expansion of contract teachers is that although it may be beneficial in the short run, in the long term it could potentially create a two-tier system, with an additional concern that this may lead to demand for regularisation of these teachers which in itself would defeat the purpose of hiring them in the first place. However if their progression to regularisation was performance related this could alleviate the above concerns and help integrate the two teacher types (as suggested by several of the papers in the review). There is a need to revisit the entire system because if the system of using contract teachers is merely a by-way to regular appointments, the education system may end up with a large number of non-professional teachers who will have the same weak performance incentives as the current regular teachers.

Low motivation and attendance of regular teachers has been cited as a key factor contributing to low student outcomes. It is important for policy-makers to recognise that the same factors that generate low effort among regular teachers (such as missing facilities and deficiencies in infrastructure) are contributory

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

factors in not only lowering student learning but also negatively impacting on the effort of contract teachers.

This SR can also provide guidance for key areas for future research. On the basis of this SR, the authors suggest broadening the evidence base to cover a more representative geographical area, especially the DFID (UK Department for International Development) priority countries. Additionally, the authors of this review suggest that while there is good progress being made towards addressing the first research sub-question, this SR has highlighted gaps on this front but more particularly the severe shortage of extensive and rigorous research on the second two questions. Superficial attempts have been made to address the questions of whether contract teachers are effective at eliminating teacher shortages and whether they are cost-effective, however more robust and in-depth analysis is needed. In addition, there is a need for research to look at programmes which have provisions for giving teachers civil service status. More longer-term rigorous data are needed not only on what happens upon placing contract teachers in education systems but also following up on these teachers and in particular examining the impact they have on students if and when they are given civil service status.

Research indicates that while globally several countries have initiated contract teacher programmes, few have given consideration to effective impact evaluations and implemented systems whereby such evaluations can be carried out. Research on this can not only provide guidance to policy-makers on evaluating the policies that they themselves have implemented but can also provide them with international best practice from other contract teacher policy reforms.

# 1. Background

## 1.1 Aims and rationale for current review

Contract teachers have become a central part of schooling reforms and expansion over the last 15 years. Their use is widespread across Africa and South Asia and in some parts of Latin America. The extent to which teachers have been hired on fixed-term contracts varies substantially by country. For example, contract teachers constituted 20 percent of the total teaching force in Chile and 11 percent in Peru while up to half the teaching force in West Africa is believed to be hired on a contract basis (Duthilleul 2005). At their peak, they constituted about 9 percent of the total teaching force in primary schools in Cambodia (Geeves and Bredenberg 2005). In India, para-teachers (contract teachers) accounted for 9.4 percent of the total number of elementary school teachers based on the District Information System for Education (DISE 2009). The officially stated rationale for provision of contract teachers is to achieve three major equity and efficiency aims in an affordable way: expanding access to schooling in unserved communities; eliminating single-teacher schools and relieving multi-grade teaching; and reducing high pupil:teacher ratios.

In many developing countries, contract teachers are hired at the local as opposed to the state level. For example, in China contract teachers hired directly by the local community represented approximately half of all teachers in primary and secondary education in 1980. Similarly, in Nicaragua, education decentralisation has been promoted and teachers are employed by the school council rather than by the Ministry of Education (Duthilleul 2005). The practice of hiring teachers from within and by the community is often driven by a desire to increase accountability particularly in countries where evidence on teacher absenteeism and effort has raised concerns. In addition, locally recruited teachers are more likely to be socially and culturally similar to the students and parents in the schools where they teach. This reduction in ‘social distance’ between the teacher and the taught has been argued to have positive impact on student learning (Rawal and Kingdon 2010).

The rationale for hiring teachers on fixed-term contracts is not just a relatively more flexible response to urgent schooling needs (such as providing teachers to students in remote rural areas or ethnic minorities) which are often not met through the slow-responding teacher deployment system in many countries with government teachers on permanent contracts. Some problems of teacher deployment stem from the inability of existing government systems to respond to changing student enrolments and staff vacancies/long-term illnesses while others arise because the mechanisms needed to effectively staff remote, hard-to-reach areas either do not exist or are ill-functioning in many developing countries. Governments hiring regular teachers on permanent contracts find themselves constrained to meet changing needs. Increasingly, the hiring of contract teachers is also believed to be a cost-saving strategy among financially constrained governments. While regular government school teachers are hired on permanent contracts with salaries often linked to the civil service pay scale, contract teachers are hired on fixed-term contracts (annually renewable or otherwise depending on

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

the country with the provision that their contracts can be made permanent after an interim period in some countries) and are paid a fraction of what regular teachers are paid (and are often less qualified than their regular counterparts). While initially these contracts were drawn up to meet teacher shortages mainly in primary schools in rural areas and especially for remote locations, they are increasingly used to respond to larger student enrolments, substitute teachers on leave and even replace teachers when official vacancies are not filled (Diaz and Saavedra 2002, cited in Duthilleul 2005). While on the one hand they may provide a low cost way to address rising student populations, budgetary constraints and high costs of regular teachers, the hiring of contract teachers may raise equity concerns as they are often appointed in remote rural schools that tend to serve more disadvantaged students (e.g. child labourers, small habitations, tribal children or ethnic minorities). This raises the concern that social inequality may be exacerbated if contract teachers are found to be less effective than regular teachers in imparting learning.

Many developing countries have witnessed a mushrooming of the private educational sector in which all teachers are employed on a contractual basis. For example, private school enrolments accounted for 30 percent of all enrolments across all education levels in Pakistan and 60 percent of all institutions in urban Pakistan were reportedly privately owned (Ministry of Education 2006). This rise in private schooling has resulted in many questions being asked about the nature of the contracts and governance environment surrounding teachers in government versus private schools. The effectiveness of private schools in terms of student achievement has been studied in numerous settings and while the evidence is mixed, the balance is relatively tilted towards suggesting that private school students have better learning outcomes than their government school counterparts (Aslam 2009, Kingdon and French 2010). This has led to discussions about the nature of existing systems for teacher recruitment, transfer, postings and promotions. It is argued that regular government school teachers suffer from a lack of accountability and a lack of incentives for meeting even the minimum requirements - to turn up for work and teach classes - let alone undertake creative and innovative teaching. In many developing countries the existing salary systems reward experience gained through age and not performance or responsibility. One of the key issues that raises its head across many developing countries is that once recruited, government school teachers are virtually unsackable. This, however, is not true for private school teachers and certain other types of teachers (para-/contract and community teachers in Bangladesh for instance, and temporary teachers in Nepal). Thus, teachers' attitudes and effectiveness can vary depending on the incentives they are offered. Having 'jobs for life' crucially alters incentives and hence teacher effectiveness. It is therefore interesting to compare not just the effectiveness of contract teachers in government schools with their regular counterparts but also the effectiveness of teachers employed on a contractual basis in private and public sectors. This will provide an insight into the impact on outcomes not only of being employed on a contractual basis but also whether differing contractual obligations and the surrounding wider contextual factors affecting the educational setting also matter and to what extent. It should be mentioned that the scope of this review does not extend to the efficiency versus

effectiveness of private versus government education. We only aim to ask whether the contractual basis under which government teachers are employed are more effective than those under which private teachers are employed.

Rigorous evaluations on the effectiveness of contract teachers are relatively scarce. The limited evidence that does exist provides mixed results. The literature that exists is limited in scope in relation to the research question (in that it mainly looks at the impact of contract teachers on learning outcomes) as well as geographical focus (mainly covering India).

Given that teachers are the most important input into schools, the relative effectiveness of contract and regular teachers is one of the most policy-relevant and quality-focused issues in education today. On the one hand, their use provides a low-cost way for the state to increase the number of teachers in the face of rising student populations, budgetary troubles and rapid real increases in salaries of regular teachers. On the other, it raises educational quality and educational equity concerns.

The proposed question is: are contract teachers and para-teachers a cost-effective intervention to address teacher shortages and improve learning outcomes? It can be thought of encompassing three sub-questions:

- i. How effective are contract teachers at imparting learning when compared to regular teachers?
- ii. What are the relative costs of regular and contract teachers, and hence their cost-effectiveness?
- iii. To what extent do contract teachers succeed in addressing teacher shortages?

## 1.2 Definitional and conceptual issues

Here we outline and define the key issues that will be addressed in this review. A systematic research synthesis requires explicit and precise definitions so that the limits of the review are made clear prior to developing a search strategy.

### 1.2.1 Definitional issues

#### *Contract teachers*

We follow the IIEP (International Institute for Educational Planning) and define a contract teacher as a teacher who is on a fixed-term rather than a permanent contract. We further define a contract teacher as a government employee, rather than a community-paid teacher.

#### *Educational setting*

Our main focus is on contract and regular teachers in government schools. However, research that compares contract teachers in government schools to those in private schools is not to be excluded. This is because DFID (UK Department for International Development) is evaluating mechanisms to support the private sector and so evidence about effectiveness of teachers in the private sector can prove extremely useful. It is interesting to include private teachers in the analysis

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

because, as all teachers in private schools are essentially contractual employees, it can give some insight into whether the educational setting and differences in contractual obligations in the two sectors impact on outcomes. This will enable the findings of the review to be applied by DFID and other donors to evaluate funding of contract teacher schemes by recipients of international aid through budget support. The focus is on the use of contract teachers in primary schools, where they are most prevalent. Given the increasingly specialised nature of education at post-primary level, the impact of contract teachers will differ. This review is not intended to comment on such issues.

#### *Low- and middle-income countries*

We focus on low- and selected middle-income countries only, as the nature of the report is to aid donor governments' decisions in funding contract teacher schemes in recipient countries. We do not confine our countries to DFID aid recipients, as the choice of recipients is fluid and to do so would exclude many countries where schemes exist or may be proposed in the future. We incorporate select middle-income countries, as the majority of the world's poor now live in middle-income countries. We use the following criteria to select our countries: a three-year average GNI (gross national income) per capita of less than \$1,086 or a three-year average GNI per capita of less than \$3,500 but where 20 percent or more of the population live below the \$1.25 per day poverty line.

#### *Educational outcomes*

The review covers studies which focus on cognitive educational outcomes, excluding any non-cognitive skills such as social, emotional and physical development skills. These studies can encompass both quality (cognitive test scores) and quantity (years of schooling, completion and progression rates). The review also focuses on the cost-effectiveness of regular and contract teachers. In developing countries, teacher salaries constitute the major proportion of recurrent educational expenditure. Therefore, for example, cost effectiveness of different types of teachers can be judged by comparing teacher salaries per achievement point for contract versus regular teachers.

#### *1.2.2 Conceptual issues*

One of the main issues in the review is drawing a meaningful comparison of the relative effectiveness of contract and regular teachers from studies which use different methodologies, and examine different counterfactual questions. Care has been taken to ensure that only estimates which examine the same counterfactual are compared - such as studies which evaluate the 'as is' status of contract teachers as measured in a randomised trial or in the reduced form estimate from survey data. The effects here will differ from those estimates which are conditional on teacher characteristics such as age, experience and qualifications, where the contract teacher effect is likely to be higher (as contract teachers are generally younger and less well trained). Contextual factors may also hinder comparisons - are contract teachers given the opportunity to graduate to regular teachers? How long are the contracts for? Who appoints the contract teachers, and to whom are they responsible? All of these factors will influence their

effectiveness, and a contract teacher who has strong accountability incentives (e.g. as in Uttar Pradesh, India) may perform better than one with weaker incentives (e.g. in Bihar, India). A further problem is the effect on subgroups of students - contract teachers may have heterogeneous effects; for example, they may perform relatively better when teaching pupils of the same economic standing or social group as themselves, which may be masked when the effects are aggregated across all student types. Furthermore, the findings from the review may contradict those from individual studies, which must be explained if the review is to form part of the evidence base. Finally, another issue is that, depending on the study and the context, the contract teacher effect on child learning might in fact really be a class size effect since the appointment of a contract teacher often leads to a reduction in class size at the level of the school.

While these limitations may appear copious, the systematic review (SR) will aim to ensure meaningful comparisons where possible. This will be done firstly through stringent procedures to ensure the comparison of like with like. Secondly, robust exclusion and inclusion criteria will be enforced as will measures to guarantee screening only in accordance with the stringent validity criteria. Thirdly, clearly attributing causality or identifying the true contract teacher effect especially when it relates to student learning is challenging. This is especially true because comparing learning across different populations is not without pitfalls. Any study that attempts to overcome the methodological and contextual constraints discussed above is likely to meet the validity criteria and be part of the final studies selected for review.

### 1.3 Theoretical framework

Figure 1.1 below sketches the theory of change of the proposed contract teacher effect studied in this review. The aim is to identify the causal relationship between the type of teacher and the outcomes of interest. The first step in this chain is the intervention, i.e. the introduction of a teacher on a fixed-term contract. As mentioned above, these programmes are likely to be introduced more in remote rural regions where regular teacher deployment may prove difficult and there is a need to address teacher shortages or where governments are especially keen to bring in cost-saving measures.

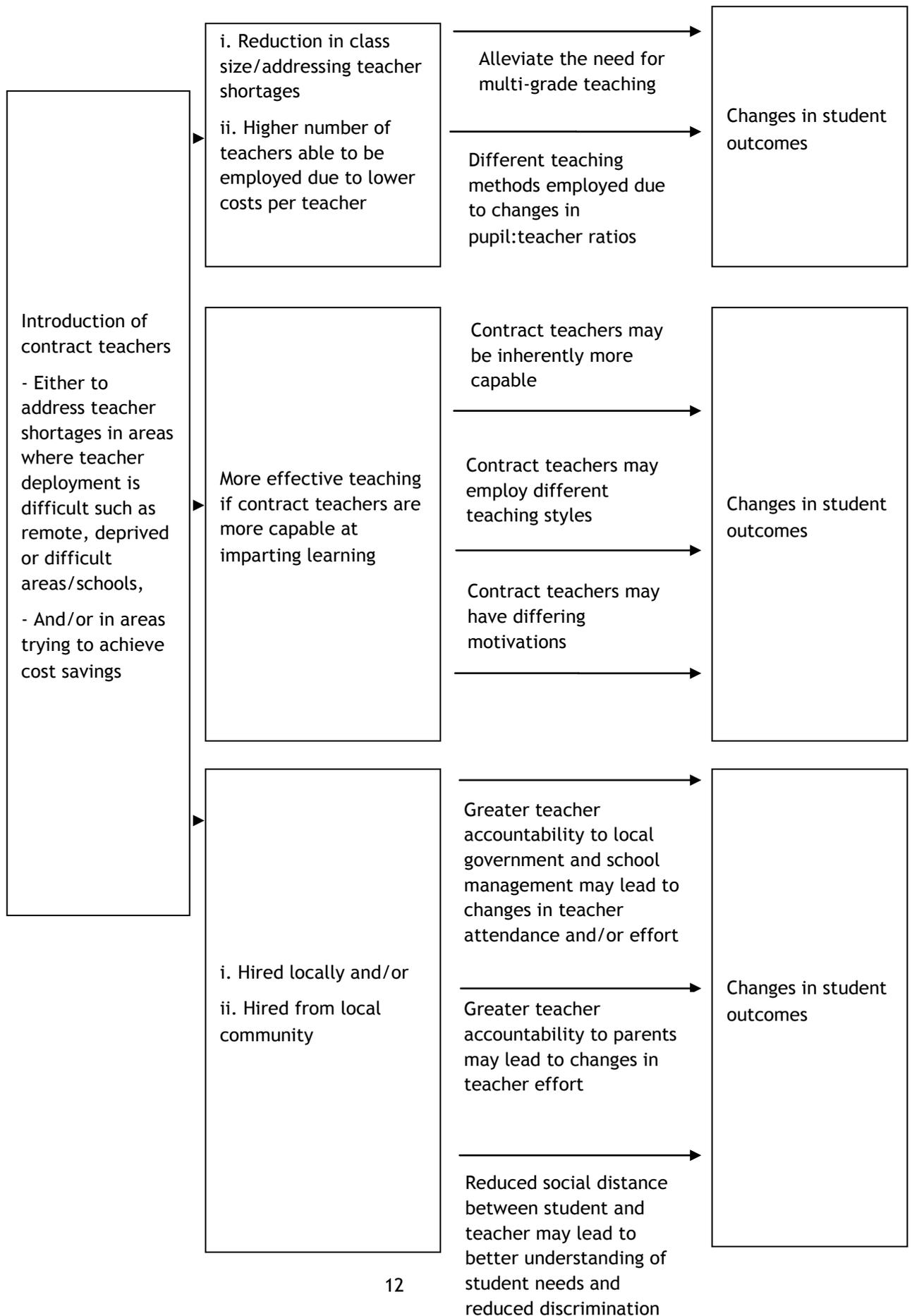
Theoretically, the introduction of contract teachers may improve student outcomes through various channels. There could, for instance, be an immediate alleviation of teacher shortages or a reduction in class sizes which improve student outcomes (such as learning, grade progression, participation). Contract teachers may also be more cost-effective because they improve student outcomes at a lower per-child cost or because a larger number of teachers can be hired with a given pot of money, resulting in alleviation of teacher shortages and improved student outcomes. Alternatively, contract teachers may simply be more effective, for instance in their pedagogic approaches or their attitudes towards their students, for instance because the social distance between the teacher and the taught is less if they are recruited from the local community, or because they are more accountable to the parents or the school, etc.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

There is also the possibility that contract teachers either have no effect on student learning or negatively impact student outcomes. This may happen for instance when the intended objective of reducing teacher shortages is met by hiring a lower quality pool of unqualified and untrained teachers. In some countries accepting a contract teaching job is the only route to attaining a regular teaching position. For example, anecdotal evidence from Togo suggests that contractual teachers are rarely, if ever, dismissed (Vegas and De Laat 2003). In order for the contract to be effective in impacting on performance positively, there has to be a credible risk of non-renewal or termination which in many instances is known not to exist.

The studies in the literature have variously looked at these different channels of effect. For example, Atherton and Kingdon (2010) find that contract teachers do no worse than regular teachers in imparting learning and may in fact be more effective. There is no evidence that this effect is driven by class size reductions, i.e. the contract teachers are not only more effective because they work with smaller and mono-grade classes. The authors argue that one plausible reason for improved student outcomes under contract teachers could be because they are more accountable and that the social distance between the teacher and the taught is potentially reduced which helps improve student outcomes. The authors suggest that contract teachers are better value for money than regular teachers hired under permanent contracts. In comparison, Vegas and De Laat (2003) find that contract teachers in Togo systematically underperform (in terms of their students' outcomes) compared to regular teachers even after controlling for student, household and school characteristics. They suggest that this variation is not due to teaching methods, teacher effort and resentment over unfair pay but instead due to policy reforms that have triggered a reduction in the quality of teachers hired on contracts.

**Figure 1.1:** Theory of Change



*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Of the three questions addressed in this SR, it is the first two which are of most interest to policy-makers, and have attracted the most interest from researchers. The evidence base on the first one, i.e. whether contract teachers are more effective in imparting learning compared to regular teachers, is well established but of varying quality. For the purposes of dealing with this first question, effective teaching is defined as teaching that leads to improvements in student outcomes. For the purposes of the review, student outcomes may be variously defined as learning, participation, grade progression, etc., as measured by quantifiable improvements in the outcome of interest. Student learning is usually measured through standardised test scores on literacy and numeracy instruments designed to test a wide range of cognitive capabilities. Given the intended global focus of the review question, the authors are mindful of the fact that learning is context-specific and any cross-comparisons will be made with this caveat in mind.

Studies investigating the relationship between type of contract and student outcomes use a wide range of methodologies. While some studies rely on descriptive statistics (EdCil 2007 Govinda and Josephine 2004, Leclercq 2002, NCAER 2008, Pratiche Trust 2002), others use ordinary least squares (OLS) methodologies (Vegas and De Laat 2003 Sankar 2008) while yet others use more complex econometric techniques to deal with the endogeneity of the 'contract teacher' variable within the achievement specification (Atherton and Kingdon 2010). Several studies have used randomised controlled trials (RCT) methods, permitting a strong causal interpretation of the contract teacher effect (Duflo et al. 2009, Muralidharan and Sundararaman 2010). Care must be taken when evaluating these studies to isolate what is actually measured by the contract teacher effect, differentiating 'conditional' estimates (which control for differences across regular and contract teachers in age, experience and qualifications) and 'reduced form estimates. In the second case we answer the question 'what is the relative effectiveness of contract and regular teachers given their existing characteristics'. This is an 'as is' evaluation of the impact of contract teachers: for simplicity we call this the reduced form estimate. In the first case we answer the question 'what would the relative effectiveness be of contract teachers vis-à-vis regular teachers if they had the same observable characteristics'. This corresponds to the policy question: 'at the time of recruiting new teachers, what will be the effect on learning of these two different teacher types?' The difference between these two types of studies is key to our conclusions, and the literature must be evaluated with this in mind. The authors of this SR are extremely familiar with this evidence base and have contributed to it personally.

The evidence on the second sub-question relating to the relative cost-effectiveness of contract versus regular teachers is less well formalised. Considering that the largest proportion of recurrent educational expenditures in most countries is allocated to teacher salaries and the government remains the largest employer of teachers, an examination of cost-effectiveness would revolve around comparing the value for money of hiring a regular teacher versus a contract teacher for a given improvement in student outcomes. While hiring teachers on different contracts is associated with economic and social costs (and benefits), only the former will be examined because of the difficulties in quantifying the latter. For

example, while salary costs are often the most visible cost, there may be other social costs such as the cost for students of getting to know a new teacher and their teaching style. There may also be additional economic costs such as costs to the schools of training contract teachers. Studies looking into this question focus only on the larger issue of salary costs and many of the associated social and incremental economic costs are ignored. However, while such additional costs should not be ignored, in some situations contract teachers receive a fraction of in-service training (and no pre-service training as they are plucked from a non-civil service pool) with the resultant economic training costs likely to be a small fraction of what they are for regular teachers. Having said that, in some countries, such as Guinea, contract teachers receive as much as 18 months of training. This compares, for instance, with Senegal and Mali where contract teachers are provided with three months of training. In India, on the other hand, while regular teachers are required to complete two years of initial teacher education, contract teachers are only required to undertake an induction programme of varying lengths prior to starting their teaching. Considering the pertinent differences in training and salaries across the private and state sectors, any cost-effectiveness analysis would benefit from cross-sector comparisons. For example, in certain countries private sector teacher salaries are a fraction of those paid to regular government teachers. Private sector teacher salaries may also be lower than contract teacher salaries. Given the suggestion that private schooling outcomes may be better than government schooling outcomes, it may well be the case that even though contract teachers may be more cost-effective in imparting learning than regular teachers, private school teachers may be the most cost-effective of them all.

Muralidharan and Sundararaman (2010) and Atherton and Kingdon (2010) explicitly model the cost-effectiveness of contract teachers in India, and Froelich and Michealowa (2009) do so for West Africa. While most of the other studies highlight the salary differences, they do not explicitly model the relative cost-effectiveness (Vegas and De Laat 2003, Duflo et al. 2009, Froelich et. al. 2009, Atherton and Kingdon 2010). Some studies, such as Fyfe (2007), offer information on the relative cost of contract and regular teachers but do not match these to achievement differentials. Such studies can be synthesised in a meta-analysis to formally model the cost-effectiveness of contract teachers, using information on the relative salaries and predicted achievement differences where available.

One of the officially stated rationales for hiring contract teachers is to alleviate teacher shortages and rapidly expand enrolments in primary and secondary schools. The third of our questions deals with this, but the evidence field is less developed than in the first two. Studies such as Fyfe (2007) and Duthilleul (2005) discuss the impact of contract teachers on increasing enrolments across West Africa and India. Govinda and Josephine (2004) also analyse this issue. However, addressing teacher shortages does not just cover the hiring of teachers, as teacher absenteeism is high in many countries and the time on (teaching) task (when the teacher is present in school) is low. An important facet of this question is then 'do contract teachers have lower absence rates, or higher time on task than regular teachers?' a point which is dealt with by Muralidharan and Sundararaman (2010) and Atherton and Kingdon (2010) for India, and Duflo et al. (2009) for Kenya. Another facet of this

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

particular query is whether students taught by contract teachers are better in terms of alternative outcomes such as their participation, drop-out or school completion rates. If a shortage of teachers has implications which manifest for instance through higher drop-outs or reduced participation of children, then addressing these shortages through the provision of contract teachers may help in alleviating these problems. Therefore, in tackling this third question we will also address the alternative way in which contract teachers may be able to solve the problems associated with teacher shortages, for instance by examining studies that look at the rate at which students drop out or complete their primary education under a contract versus a regular teacher.

#### **1.4 Authors, funders and other users of the review**

It is expected that the review will be of substantial interest to policy-makers in developing countries, as contract teacher schemes are widespread and of growing importance as countries aim to expand their education systems in a fiscally manageable way. The findings will add rigour to the decision whether or not to expand or curtail contract teacher schemes.

It is the aim of the authors to publish the review in a peer-reviewed journal, such as the *Journal of Development Effectiveness*. The final review will be presented to policy makers at DFID and national governments where available. It will be disseminated to the authors of the contributing studies, who were consulted in the process of conducting the review - both to aid the study and also complete knowledge gaps as appropriate.

The review team includes a policy implications section. This is done because not only is the topic of this research of academic interest but also the questions raised in this review have important policy implications. For example, there are likely to be interesting political economy questions arising from the potential juxtaposition of staff hired on a permanent basis by a ministry of education versus non-permanent staff. The controversies surrounding the hiring and management of different types of teachers are real issues for many developing countries and the implications of these (as they arise from the review) are discussed for policy guidance.

## 2. Methods used in the review

This section includes all the details necessary to allow replication of the methods.

### 2.1 User involvement

We have engaged users in all aspects of the review from beginning to end. Prior to and during the protocol stage, users (such as policy leads from DFID) had the opportunity to assess and comment on the scope of the review. This included discussions on all elements including the conceptual framework, search strategy and draft inclusion and exclusion criteria. This allowed us to take into consideration DFID's expectations from the review; for example potentially using the review as evidence for informed policy development, identifying possible gaps in the literature and evidence base and to inform new questions that may arise from the analysis. Advisors were sent the draft protocol and suggested amendments implemented as appropriate. The findings of the draft report were presented in an appropriate forum to generate feedback. In addition to this once, the report has been updated in light of the feedback/comments we intend to publish these findings in a relevant journal.

### 2.2 Identifying and describing studies

#### 2.2.1 Identification of potential studies: search strategy and search criteria

##### *Search Strategy*

The majority of our searches took place online, using keyword searches on education and economics databases, such as JSTOR, the Education Resources Information Center (ERIC), Google Scholar and the Applied Social Sciences Index and Abstracts (ASSIA), among others. The searches were conducted in English, French, Spanish and local languages where possible.

In addition to the published literature, sites such as Research Papers in Economics (RePEc) were searched for working papers, the Conference Proceedings Citation Index - Social Science and Humanities (CPCI-SSH) and Index of Conference Proceedings (available via the British Library) were searched for conference papers, and the Dissertation Abstracts database searched for PhD and masters dissertations at accredited universities in the USA and UK. This list is non-exhaustive, and more was searched in an iterative procedure.

##### I. DATABASES FOR PUBLISHED PAPERS AND REPORTS

JSTOR: social sciences, [www.jstor.org/](http://www.jstor.org/)

EBSCO International Bibliography of the Social Sciences (IBSS): economics, politics, sociology, anthropology and economics, [www.csa.com](http://www.csa.com)

EBSCO business and economics databases: <http://search.ebscohost.com>

ScienceDirect: all sciences and humanities, [www.sciencedirect.com](http://www.sciencedirect.com)

Web of Knowledge: all sciences and humanities, <http://apps.isiknowledge.com>

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

EconLit <http://www.ebscohost.com/academic/econlit>

ERIC: [www.eric.ed.gov/](http://www.eric.ed.gov/)

ISI Web of Knowledge: <http://apps.isiknowledge.com>

ASSIA: <http://www.csa.com/factsheets/assia-set-c.php> PsycINFO :  
<http://www.apa.org/pubs/databases/psycinfo/index.aspx>

African Journals Online: <http://ajol.info/index.php/index/browse/alpha/index>

Asia Journals Online (AsiaJOL): <http://asiajol.info/index.php/index>

Australian Education Index: [www.acer.edu.au/library/aei](http://www.acer.edu.au/library/aei)

Dialnet: Spanish resources, <http://dialnet.unirioja.es/>

Latin America Journals Online (LAMJOL): Latin American and Caribbean,  
[www.lamjol.info](http://www.lamjol.info)

## II. DATABASES FOR WORKING PAPERS AND REPORTS

For scholarly working papers, and forthcoming papers and reports, we searched in the following databases:

Social Science Research Network (SSRN): <http://papers.ssrn.com>

National Bureau of Economic Research (NBER) Working Papers:  
[www.nber.org/papers](http://www.nber.org/papers)

RePEc: <http://econpapers.repec.org>

Centre for International Development at Harvard University:  
<http://www.hks.harvard.edu/centers/cid/publications>

World Bank: working papers and reports,  
<http://publications.worldbank.org/ecommerce/>

International Monetary Fund (IMF): working papers and reports,  
[www.imf.org/external/pubind.htm](http://www.imf.org/external/pubind.htm)

United Nations Development Programme (UNDP): research papers and reports,  
[www.twinside.org.sg](http://www.twinside.org.sg)

United Nations Educational, Scientific and Cultural Organization (UNESCO):  
research papers and reports,  
<http://cms01.unesco.org/en/literacy/resources/papers-and-reports/>

International Labour Organization (ILO): working papers and reports,  
[www.ilo.org/public/english/dialogue/sector/papers/index.htm](http://www.ilo.org/public/english/dialogue/sector/papers/index.htm)

Consortium for Research on Educational Access, Transitions and Equity (CREATE):  
[www.create-rpc.org/database](http://www.create-rpc.org/database)

## III. DATABASES FOR THESES

For PhD theses, we searched in the following databases (the sources are in addition to the ones listed above):

Index to Theses: contains all theses submitted in Great Britain and Ireland universities, [www.theses.com/](http://www.theses.com/)

System for Information on Grey Literature in Europe (SIGLE): [www.opengrey.eu/](http://www.opengrey.eu/)

#### IV. GOOGLE SCHOLAR

<http://scholar.google.co.uk/>

In addition to the databases listed above, we searched in Google Scholar, using the same search criteria.

#### V. MANUAL SEARCH

In addition to database searches manual searches were conducted once we had exhausted the automatic searches, to locate the grey literature not covered. We followed the guidelines issued by Joanna Briggs Institute (2008) and Centre for Reviews and Dissemination (2009), which include: (a) searching the references of the papers in the sample, (b) citation searches (Google Scholar was used for these), and (c) contacting the most published authors on this topic to query knowledge of other work in this area.

#### *Search criteria*

We searched the sources mentioned above using a number of keywords and synonyms. Initially we searched in title, abstract and the search terms given below.

Broadly speaking, the searches were carried out for three main concepts:

##### CONCEPT 1: TERMS FOR CONTRACT TEACHERS

contract teacher(s), contract teaching staff, contract educator(s), contract personnel, para teacher(s), para teaching staff, para educator(s), para education staff, para personnel, temporary teacher(s), temporary teaching staff, temporary educator(s), temporary education staff, temporary personnel, interim teacher(s), interim teaching staff, interim educator(s), interim education staff, interim personnel.

(Please note that when implementing the search, phrase searches such as “contract teaching staff” or proximity searches such as contract AND “teaching staff” and contract within three words of “teaching staff” were done.)

##### CONCEPT 2: TERMS FOR LEARNING OUTCOMES

academic achievement(s), academic assessment(s), academic performance(s), academic progress, academic test(s), academic mark(s), academic result(s), achievement(s), assessment(s), attainment, classroom learning, classroom performance, classroom test(s), cognitive achievement(s), cognitive outcome(s), cognitive result(s), education, evaluation(s), exam result(s), educational performance(s), educational attainment, educational achievement(s), educational result(s), grade score(s), learning, learning outcome(s), learning result(s), mark(s), performance(s), progression, progress, retention, result(s), scholastic achievement(s), scholastic attainment, scholastic performance(s), score(s), test(s), test result(s), test score(s).

(Please note that the search terms above were pre-fixed with student/pupil/child in the free text where required. Once again a combination of free text, phrase and proximity searches was carried out.)

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

CONCEPT 3: COUNTRIES

Bangladesh\*, Benin\*, Bhutan\*, Burkina Faso, Burund\*, Cambodia\*, Cameroon\*, Cape Verde, "Central African Republic", Chad, Comoros, Congo\*, "Côte d'Ivoire", "Ivory Coast", Eritrea\*, Ethiopia\*, Gambia\*, Ghana\*, "Guinea-Bissau", Haiti\*, India\*, Indonesia\*, Kenya\*, Kiribat\*, Korea\*, Kyrgyz\*, Lao\*, Lesotho, Liberia, Madagascar, Malawi\*, Mali\*, "Marshall Islands", Mauritania\*, Micronesia, Mozambique, Nepal\*, Nicaragua\*, Niger, Nigeria\*, Myanmar, Pakistan\*, Papua New Guinea, Philippin\*, Rwanda\*, Samoa, "São Tomé and Príncipe", Senegal\*, Sierra Leon\*, Solomon Islands, Somalia\*, Sudan\*, Swaziland, Syria\*, Tajik\*, Tanzania\*, "Timor-Leste", Togo\*, Tonga, Turkmenistan\*, Tuvalu\*, Uganda\*, Uzbek\*, Vanuatu\*, Vietnam\*, Yemen\*, Zambia\*, Zimbabwe\*, "less developed country(ies)", "least developed country(ies)", "developing country(ies)", "lower middle income country(ies)", "low income country(ies)", "lower income country(ies)", "low(er) middle income nation(s)", "low(er) income nation(s)".

(Please note that \* indicates truncation, therefore Bangladesh\* found Bangladesh AND Bangladeshi and so on.)

For quality assurance purposes the searches were conducted independently by a research assistant. She compiled the search results and uploaded them to EPPI-Reviewer. They were checked for duplication. A summary of actions taken was provided for each stage of the search process.

*Strategy for the search*

As far as possible, the searches followed the strategy outlined in Table 2.1 (this varied depending on the available interfaces).

**Table 2.1:** Search Strategy

Search No.	Search strategy
1.	Terms for contract teachers in the title
2.	Terms for contract teachers in the abstract
3.	Controlled terms for contract teachers
4.	Search 1 OR 2 OR 3
5.	Terms for learning outcomes in the title
6.	Terms for learning outcomes in the abstract
7.	Controlled terms for learning outcomes
8.	Search 5 OR 6 OR 7
9.	Search 4 AND 8, i.e. (Search 1 OR 2 OR 3) AND (Search 5 OR 6 OR 7)

When the above search strategy yielded too many results, we followed the same steps again but also included the country terms.

When the search strategy that combined concepts as in search 9 (Table 2.1), yielded narrow or few results, then a search was run for concept 1 only and the search results imported into EPPI-Reviewer. Screening for concepts 2 and 3 was carried out at the ‘applying inclusion and exclusion criteria’ stage.

#### EXAMPLE OF AN ERIC SEARCH

Below is an example search for concept 1 (i.e. contract teachers). This search yielded 152 results. We give the search string used in the advanced search forms of the ERIC database. A keyword search was run, which locates the search terms in both the title and abstract.

```
(KW:"contract teacher" OR KW: "contract teachers" OR KW:"contract teaching staff" OR KW:"contract educator" OR KW:"contract educators" OR KW: "contract personnel" OR KW:"para teacher" OR KW:"para teachers" OR KW:"para teaching staff" OR KW:"para educator" OR KW:"para educators" OR KW:"para education staff" OR KW:"para personnel" OR KW:"paraeducator" OR KW:"paraeducators") OR (((KW:contract AND KW:"teaching staff") OR (KW:contracted AND KW:"teaching staff") OR (KW:para AND KW:"teaching staff")) OR (KW:"temporary teacher" OR KW:"temporary teachers" OR KW:"temporary teaching staff" OR KW:"temporary educator" OR KW:"temporary educators" OR KW:"temporary education staff" OR KW:"temporary personnel" OR KW:"interim teacher" OR KW:"interim teachers" OR KW:"interim educators" OR KW:"interim educator" OR KW:"interim teaching staff" OR KW:"interim education staff") OR ((KW::temporary AND KW:"teaching staff") OR (KW:temporary AND KW:"education staff") OR (KW:interim AND KW:"teaching staff") OR (KW:interim AND KW:"teaching staff")) Publication Date: 2000-2012
```

(Please note that this example is from a search that has been run on the free-ERIC database version. This interface does not allow for proximity searches such as contract within three words of teaching staff, therefore phrase searches and proximity searches using brackets and Boolean operators have been shown here.)

### 2.2.2 Screening studies: applying inclusion and exclusion criteria

#### *Defining relevant studies: inclusion criteria*

The review focuses only on studies from developing countries, and only on schemes which hire contract teachers as formal teachers, not as teaching aides or classroom assistants. To evaluate the relative effectiveness of differing types of teachers, they must perform the same roles. Essentially this meant comparing only contract and regular teachers within the state sector, excluding those who teach in private schools. However, if there were any studies that compare contract teachers in the government sector with teachers in the private sector, they were also included. Studies which generally compare regular government and private school teachers were not included as the question specifically relates to the effectiveness of contract teachers. We included both published and unpublished studies from both the academic and policy world, including the ‘grey’ literature (conference proceedings, non-peer reviewed journals). Only studies since the Education for All (EFA) Conference in Dakar 2000 were considered. Specific inclusion criteria are defined in section 2.3

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

*Defining relevant studies: exclusion criteria*

As indicated above, the review has a specific focus. We therefore did not look at studies of high-income countries or transition economies. We also did not consider middle-income countries where less than 20 percent of the country lives on under \$1.25/day. Secondary schoolchildren or older were not considered. Volunteer teachers and classroom assistants were excluded as were outcomes such as non-cognitive scores, measures of well-being and outcomes such as self-reported happiness. Any studies prior to the EFA Conference in Dakar in 2000 were not considered.

Once the studies were identified they were uploaded to EPPI-Reviewer, and the screened for their relevance to the SR. We used the following relevance criteria based on both title and abstract.

- i. Does the study analyse a contract teacher scheme?
- ii. Does the study focus on a low- or middle-income country?

If a study scores ‘Yes’ for both relevance criteria it was brought forward to the inclusion/exclusion stage.

*2.2.3 Inclusion/exclusion criteria*

We defined our inclusion criteria using the PICOS method (population, intervention, comparison, outcomes and study design), to which we added time. These inclusion and exclusion criteria were applied to title, abstract and full text. This framework required screening of results with respect to population, intervention, comparison, outcome and time. In relation to our research question the PICOST framework was as indicated in Table 2.2.

**Table 2.2:** PICOST inclusion/exclusion criteria for defining studies (quantitative and qualitative)

	<b>Included</b>	<b>Excluded</b>
Population	Low-income countries Middle-income countries where more than 20% of population live on under \$1.25 per day. Primary schoolchildren	High-income countries Transition economies Middle-income countries where less than 20% of the population live on under \$1.25 per day Secondary schoolchildren and older
Intervention	Teachers who have same responsibilities as regular teachers. Contract teachers in government schools	Classroom assistants Volunteer teachers
Comparison	Regular civil service teachers in government schools	Classroom assistants Volunteer teachers
Outcome	Academic achievement tests Completion or progression rates	Self-reported happiness, measures of well-being

	Included	Excluded
		Non-cognitive scores
Time	Since EFA conference in Dakar (2000)	Prior to EFA conference in Dakar (2000)

Excluded studies failed to satisfy at least one inclusion criteria or met at least one of the exclusion criteria. Studies that failed to meet inclusion criteria were coded as failing to meet inclusion criteria and were coded such that we could report how many inclusion criteria each study failed to meet and what these criteria were. Excluded studies were coded similarly.

#### 2.2.4 Characterising included studies (if EPPI-Centre review: EPPI-Centre and review-specific keywording)

The studies remaining after application of the criteria were keyworded/coded. All the keyworded studies were added to the larger EPPI-Centre database, Research Evidence in Education Library (REEL), for others to access via the website. Coding of included studies was carried out as shown in Table 2.3.

**Table 2.3:** Coding of included studies

	Coding
1. Region	Specify broad geographic region (South Asia, Latin America, etc.)
2. Country	Specify which country, specify if it is a DFID priority country, specify if a fragile state
3. Setting	Rural/semi-rural/urban
4. What is the comparison?	Regular government teacher vs government contract teacher, regular government teacher vs contract private teacher
5. What outcome does study consider?	Learning (test scores), completion rates, drop-out rates, etc.
6. Sample size	Number of cases considered in study
7. Confounding factors	Does the study convincingly account for confounding factors in the analysis, for example using econometric techniques, randomisation?
8. Data collection method	For example, secondary sources or primary data collected
9. Blinding in analysis? (For studies with comparison groups only)	Yes, no
10. Appropriateness of data analysis method	Appropriate/inappropriate
11. Study design	11.1 Quantitative/qualitative

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

	11.2 Quantitative: what type of study is it? RCT, OLS, etc.
	11.3 Qualitative: what type of study? Case study, focus group, ethnographic research, etc.
12. Time scale of study	Which year was study conducted in?
13. Language	What language was study conducted in?

## 2.3 In-depth review

### 2.3.1 Identifying and describing studies: quality assurance process

Once the review studies were identified, pairs of research group members worked independently and then compared their decisions and came to a consensus. Any disagreements that arose among the reviewers were resolved through discussion or with input from the third Principal Investigator. Data extraction was done in a similar manner.

Studies identified as meeting the inclusion criteria were analysed in depth, using the EPPI-Centre's detailed data-extraction software, EPPI-Reviewer.

Even if a study met the initial inclusion criteria for the review, it may not meet the quality standards for the review. Therefore, a quality and relevance assessment was carried out. We drew heavily on EPPI-Centre methods and guidelines and adapted the tools for this review. This included using three dimensions of critical appraisal, as follows:

- i. Assess the methodological quality of the study.
- ii. Assess the relevance/appropriateness of the research design for answering the review question.
- iii. Assess the relevance of the focus of the study in answering the review question.

These provided an overall weight of evidence (WoE) for each study to answer the review question.

After the application of the inclusion/exclusion criteria, remaining studies were carried forward to the validation, reliability and applicability stage. For example, we used the following hierarchy of evidence to evaluate the validity of the studies.

- i. SR of RCTs.
- ii. An Individual RCT (a) which evaluates contract teacher effect alone, or (b) which evaluates contract teacher effect in conjunction with changes in class size/multi-grade teaching.
- iii. SR of cohort studies.
- iv. Individual cohort study (a) using techniques to control for endogeneity of contract teacher effect, or (b) comparison of means.

Contract teachers are often appointed to schools with fewer resources in more remote areas and often serve disadvantaged children, so any valid estimate of the

contract teacher effect must take account of the wider social and economic context in which these contract teachers are employed and also the potential non-random matching of contract teachers to particular children/schools on the basis of unobserved characteristics of both the teachers and the students. For example, contract teachers may be systematically assigned to less-able children within a school. Finding that contract teachers are not as effective as regular teachers in imparting learning, for instance, may therefore be largely due to the low-ability profile of the students they teach rather than a pure contract teacher effect. It may also be that contract teachers are systematically different in their unobserved characteristics from regular teachers. It is therefore very important to control for the observed and unobserved student, school and teacher characteristics in a study that aims to estimate true contract teacher effects. Studies which ranked iv(b) and below on the hierarchy of evidence do not take this into account as effectively, and were excluded from our review. This is because studies ranking above iv(b) are able to control for the wider social and economic context and provide generalisability more accurately. For example, a study such as (ii) based on an RCT can exploit the random allocation of teachers to estimate the pure effect of hiring an additional contract teacher as opposed to a regular teacher.

The validity of qualitative studies was also analysed by choosing those that give relevance to the wider context in which the effectiveness of contract teachers can be judged. This was based on factors such as the extent to which the study employs a methodology that minimises the risk of bias.

In relation to reliability the studies were judged on the extent to which the findings of the study were reproducible while the applicability of the studies was judged on the extent to which their findings could be applied to low- and middle-income countries. Studies which were excluded based on not meeting the reliability, validity and applicability criteria were coded as such.

Because we anticipated coming across different types of study design, the assessment of quality of these studies followed a rigorous process. All studies, irrespective of design, were judged according to the standards below. Those studies that met all of the criteria were considered high quality; those meeting a majority of the criteria were considered medium quality while those that did not meet most of the criteria were considered low quality and were excluded from the in-depth review.

i. **Completeness of reporting:** this entails assessing transparency, reporting bias and publication bias. We expected a good quality study to have a description of the intervention (i.e. the presence of the contract teacher) and the participants (children), a clear account of methods of data collection and analysis and consideration of confounding factors along with complete reporting in relation to measured results. A study was considered of poor quality if it failed to meet one or more of these requirements.

ii. **Feasibility of assumptions:** if the reviewers remained unconvinced about the assumptions made within the study on which the conclusions were based, the study would be classified as of low or medium quality.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

iii. Appropriateness of methodology: methodology was analysed to ensure trustworthiness, reliability and validity. Assessment of the appropriateness of the methods depends on whether a study is quantitative or qualitative in nature. These were assessed according to the approaches discussed below.

iv. Consideration of confounding factors: these included (when necessary) assessing sampling bias, attrition bias, detection bias, endogeneity bias, ability to address heterogeneity effectively and so on. Confounding factors can be controlled for at the sampling stage or at the analysis stage. If studies take no consideration of confounding factors at either stage, they were considered of poor quality and were excluded from the in-depth review. Studies that controlled for confounding factors at any one stage were considered of medium quality and were included in the in-depth review. Studies controlling for these factors at both stages were considered of high quality and were used for in-depth review.

v. Comprehensive reporting of findings: were the study's findings apparent and comprehensively reported? For example, if the study initially aimed to measure certain outcomes and did not report on all of the outcomes, it was judged of poor quality and excluded.

*Evaluating the quality of methodology of quantitative studies (see point 11.2 in Table 2.3, above)*

We used the following critical appraisal approach to evaluate the methodology of quantitative studies:

(i) How was the intervention (the contract teacher) assigned? i.e. was assignment random or non-random? If random, the study was judged of high quality; and if non-random, medium or poor quality depending on how the intervention was further assigned. (a) If randomised, is the counter-factual clearly stated? i.e. contract versus regular teachers? Contract versus no teacher? Or contract versus private school teacher? Yes/no/partly; (b) If non-random, is selection bias a threat to internal validity? Yes/no. If selection bias threatens internal validity (i.e. yes), then: is the selection explicitly modelled or controlled for? If not, the study was considered of poor quality and excluded from the in-depth review.

(ii) What question is being asked in the study? Does it evaluate the 'as is' effect of contract teachers, or does it evaluate a conditional effect? A study that controls for the 'as is' effect was considered medium quality while one controlling for the conditional effects was considered of high quality. Both were included in the in-depth review.

(iii) Is the contract teacher effect homogenous across different student-types? A study that considers the contract teacher effect across different student types was considered high quality, and one that did not was considered medium quality. Both were included in the final review.

(iv) Is the cohort representative of the population? If not, does the sample have any characteristics which may affect the external validity of results? If so, the study was considered of poor quality and was excluded from the in-depth review.

*Evaluating the quality of methodology of qualitative studies (see point 11.3 in Table 2.3 above)*

We used the following critical appraisal approach below to evaluate the methodology of qualitative studies:

- i. Is the epistemological approach clearly stated? Yes/no/partly. Studies where it is clearly stated were considered of high quality; if partly stated, of medium quality; and where not stated at all, of poor quality.
- ii. Was sampling appropriate? Yes/no/partly. Studies where it was appropriate were considered of high quality; where partly appropriate, of medium quality; and where not appropriate, of poor quality.
- iii. Was data collection appropriate/repeatable and trustworthy? Yes/no/partly. Studies where it was appropriate/trustworthy were considered of high quality; where partly so, of medium quality; and where not appropriate/trustworthy at all, of poor quality.
- iv. Was the approach to data analysis appropriate/repeatable and trustworthy? Yes/no/partly. Studies where it was appropriate/trustworthy/repeatable were considered of high quality; where partly so, of medium quality; and where not appropriate/trustworthy at all, of poor quality.

Judgments relating to whether and to what extent the above criteria are met (to classify studies as high, medium or low quality) were made independently by the two reviewers. Where there was a difference in opinion, the third expert was called upon and a mutual decision arrived at.

Studies were coded on the basis of the above stated quality criteria to arrive at the WoE.

*2.3.2 Synthesis of evidence from included studies*

Once we had identified and assessed our studies, we collated the research using methods such as meta-analysis and systematic empirical narrative to try and answer our research questions. The synthesis is presented in the form of a structured narrative and summary tables. This synthesis is then used to formulate conclusions and recommendations. Due to the limited studies that emerged from the systematic review, meta-analysis was not possible and narrative empirical synthesis was used to collate the results from the different types of empirical research.

### 3. In-depth review: describing the studies and results

#### Outline of chapter

This chapter describes the studies included in the in-depth review and reports key findings thereof. Section 3.1 describes the initial results from the search and screening process. Section 3.2 contains details of the studies included in the in-depth review organised by research question. Section 3.3 reports the main findings by research question.

#### 3.1 Studies included from searching and screening

The figure below (Figure 3.1) is a flow diagram of the filtering process illustrating how the studies were pared down from scoping to in-depth review. The searches were conducted from January to March 2012. A total of 1,770 citations were obtained from the searches. Title and abstract screening was conducted on all of these documents resulting in 137 documents being brought forward for full document screening. Titles and abstracts were screened using the criteria described in detail in section 2 above. Details of the basis on which they were excluded are illustrated in the Figure 3.1. Of the 1,492 studies excluded, a majority was excluded on the basis of the country or the intervention (674 and 484 respectively). The next two largest categories in which citations were excluded were the participants in the research (106) and the outcomes (105) being investigated.

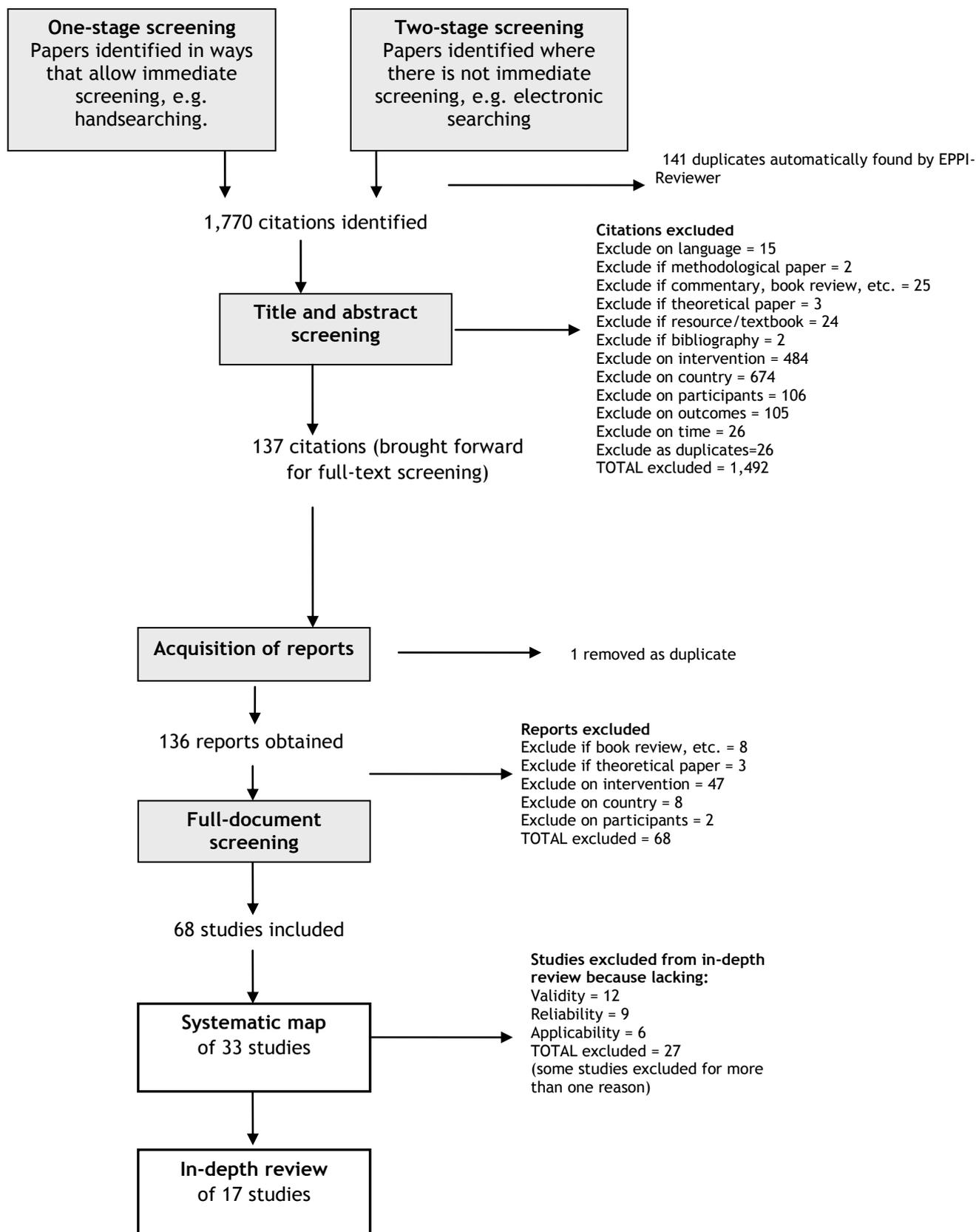
A total of 137 citations was then acquired and full-document screening applied to all of these. At this stage one document was identified as a duplicate and excluded. The same criteria were applied to the full document as had been applied to the title and abstract. By doing so, we ended up with a systematic map of 68 studies. The criterion on which most studies were excluded at this stage was intervention, i.e. they were excluded if the intervention dealt with classroom assistants or unpaid volunteer teachers. During the next step, quality assurance was conducted independently by the reviewers on each of these 68 studies. The quality assurance procedure followed the stringent guidelines noted in section 2.3.1 above. Thus, even if a study had met the initial inclusion criteria for the review, it may consequently have been excluded because it did not meet the standards set. This was done by independent assessment by each of the individual reviewers. Where disagreement was found, consensus was reached through detailed discussion.

In addition to assessing the studies based on the three dimensions of critical appraisal set by the EPPI-Centre and highlighted above, the studies were also subjected to rigorous validity, reliability and applicability criteria. Twelve studies were excluded based on failing the validity criteria, nine on failing reliability and six on applicability (some studies were excluded based on failing more than one criterion). This resulted in 17 studies being carried forward for in-depth review. Once the reviewers had independently assessed the studies, any differences in

### *3. In-depth review: describing the studies and results*

opinion were discussed and a consensus was reached to take forward the 17 studies for the in-depth review. Table 3.1 shows the details of each of the 33 studies, highlighting which were included/excluded at this stage to give the 17 studies carried forward for in-depth review.

**Figure 3.1:** Filtering of papers from searching to map to synthesis



**Table 3.1:** Details of literature from systematic map

	Author (s), and year	Research question/s addressed	Country/region	Included/excluded
1	Atherton and Kingdon 2010	Question1, 2 and 3	India	Included
2	Bonnet 2007	Question 1 and 2	Sub-Saharan Africa	Excluded
3	Bourdon et. al. 2005	Question 1	Niger	Included
4	Bourdon et. al. 2010	Question 1 and 3	Niger, Togo and Mali	Included
5	Chaudhry et. al. 2006	Question 3	Ecuador, Indonesia, Peru and India	Included
6	Vegas and De Laat 2003	Question 1	Togo	Included
7	Duflo et al. 2009	Question 1, 2 and 3	Kenya	Included
8	Duflo et al. 2011	Question 1, 2 and 3	Kenya	Included
9	Duthilleul 2005	Question 1, 2 and 3	Cambodia, Nicaragua and India	Excluded
10	Fagnäs and Pelkonen 2011	Question 3	India	Included
11	Geeves and Bredenberg 2005	Question 3	Cambodia	Included
12	Glewwe et al. 2011	Question 1	Review of developing countries	Excluded
13	Gottelmann-Duret and Tournier 2008	Question 3	Review of developing countries	Excluded
14	Govinda and Josephine 2004	Question 3	India	Excluded

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

15	Goyal and Pandey 2009	Question 3	India	Excluded
16	Goyal and Pandey 2011	Question 1, 2 and 3	India	Included
17	Habib 2010	Question 1	Pakistan	Included
18	Kingdon and Sipahimalani-Rao 2010	Question 3	India	Included
19	Kingdon and Teal 2002	Question 1	India	Excluded
20	Kremer et al. 2005	Question 1 and 2	India	Included
21	Lambert 2004	Question 1 and 3	Cameroon, Ghana, Kenya, Madagascar, Senegal, Tanzania and Uganda	Excluded
22	Mehrotra and Buckland 2001	Question 3	Review of developing countries	Excluded
23	Michaelowa and Wittman 2007	Question 1 and 2	Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar and Senegal	Included
24	Muralidharan and Sundararaman 2008	Question 1 and 2	India	Included
25	Muralidharan and Sundararaman 2009	Question 1	India	Included
26	Muralidharan and Sundararaman 2010	Question 1, 2 and 3	India	Included
27	Nkengne Nkengne 2010	Question 3	Francophone Africa	Excluded

3. In-depth review: describing the studies and results

28	Pandey 2006	Question 3	India	Excluded
29	Pandey et al. 2008	Question 1	India	Excluded
30	Ramachandran et al. 2005	Question 1	India	Excluded
31	Snehi and Nath 2004	Question 1 and 3	India	Excluded
32	Usman et al. 2007	Question 1	Indonesia	Excluded
33	Zafeirakou 2007	Question 1 and 3	Review of developing countries	Excluded

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

### **3.2 Describing the studies according to research question**

The primary aim of this SR is to identify studies that address any or all of the following three questions in a systematic and rigorous way:

- i. How effective are contract teachers at imparting learning when compared to regular teachers?
- ii. What are the relative costs of regular and contract teachers, and hence their cost-effectiveness?
- iii. To what extent do contract teachers succeed in addressing teacher shortages?

In the following sections, we provide details of how some of the studies included in the in-depth review address these questions and in what contexts. Table 3.2 below summarises the studies used in the in-depth review.

The studies reviewed are also classified as belonging to one of the following three categories (see section 2.3.1 for how these assessments were arrived at):

- i. High quality.
- ii. Medium quality.
- iii. Low quality.

The quality assurance results are discussed in detail in section 3.4 below.

**Table 3.2:** Summary and Quality Ranking of Included Studies

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
Muralidharan and Sundararaman 2008	To investigate alternative approaches to improving primary education, i.e. through incentives (aimed at individual teachers based on improvements in their students' achievement and group incentives based on the performance of the whole school) and 'smart inputs' (provision of a para-teacher or provision of a cash block grant).	Andhra Pradesh, India, 2005 (Andhra Pradesh Randomized Evaluation Study): 500 schools collected through random sampling.	RCT data from 100 control schools and 100 treatment schools used for analysis.	Incentive schools perform better than control group schools. No difference in effectiveness (as measured by learning outcomes) between group versus individual incentives. Input treatments have a positive effect on outcomes, in particular the provision of a contract teacher improves mathematics and language scores by 0.1 and 0.7 standard deviations (SDs) respectively. In terms of inputs there is no difference the effects of the block grant and the contract teacher. In terms of other learning outcomes the study finds no difference between control and treatment groups.	High

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
Muralidharan and Sundararaman 2009	As above.	As above using an additional year of data (2005-06).	As above.	Similar results to the entry above. Students in schools with an extra contract teacher have better learning outcomes than those in control schools (by 0.15 and 0.13 SDs in mathematics and language). Incentives are more cost-effective interventions than provision of inputs (para-teachers/school grants).	High
Muralidharan and Sundararaman 2010	To examine whether expanding the contract teacher programme will improve student outcomes,	As above.	Panel data used to construct 4 different non-experimental estimates on the relative effectiveness of contract and regular teachers (2 within school and 2 across school) using both school and student fixed effects.	After 2 years pupils in schools with an extra contract teacher perform significantly better than those in comparison schools by 0.15 and 0.13 SDs in mathematics and language tests. Contract teacher absence rates are lower and effort levels higher than regular teachers. Contract teachers are paid a fifth of a regular teacher salary and therefore contract teachers are also more cost-effective.	High

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
Atherton and Kingdon 2010	To investigate the causal effect of a contract teacher on student achievement and also looks into the mechanisms through which a potential contract teacher effect operates. In addition to estimate the unit cost of a contract versus a regular teacher to determine the cost-effectiveness of contract teachers as a policy reform.	India SchoolTells data, 2007/08, from two states (Uttar Pradesh (UP), Bihar). More than 4,000 children tested across 160 rural schools. Students in grades 2 and 4 tested at 2 points in time.	Estimation of the contract teacher effect at the student level using school fixed-effects models and value-added models. Controls for class size, multi-grade teaching and pedagogical style, which allow authors to get closer to the causal contract teacher effect.	Contract teachers raise child test scores by about 0.21 SDs compared to those taught by a regular teacher. Contract teachers are substantially more effective than regular teachers in UP and weakly more effective in Bihar. Teacher salary cost per achievement point shows that even after controlling for a multitude of characteristics, contract teachers are a more cost-effective mechanism for improving student outcomes.	High

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
Kingdon and Sipahimalani-Rao 2010	To Estimate teacher absence rates and student achievement by teacher type as part of a wider examination on the status and impact of para-teachers in India.	As above.	School fixed effects.	Contract teachers put in significantly more effort than regular teachers within the same school. Teacher absence rate among para-teachers is 12.4 percentage points lower than that among regular teachers. Living locally only partially explains the lower absence rate among para-teachers. In terms of student outcomes students taught by para-teachers in UP have achievement higher by about 0.21 SDs than those taught by a regular teacher.	Medium

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
Kremer et al. 2005	To present nationally representative data on teacher absence (from unannounced visits) in India.	Data from 20 Indian states, 3 unannounced visits to over 3,700 schools. Includes government run rural primary schools, and rural private and private-aided schools in villages where government schools are located.	Descriptive statistics and simple multi-variate regressions to examine correlates of teacher absence.	One in 4 teachers is absent and only 45% of the teachers present in school are actively engaged in any teaching activity. Absence rates among teachers are generally higher in low-income states and teaching activity considerably lower in high-absence states. Overall, higher teacher salaries are not associated with reduced teacher absence and there appears to be no significant difference in absence between regular and contract teachers. A 10% increase in teacher absence results in a 1.8% increase in students' absence and a reduction of 0.02 SDs in test scores. Contract teacher absence rate is 24.1% compared to 23.1% among permanent/regular teachers which is not statistically significantly different.	Medium

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
Goyal and Pandey 2011	To look at average school outcomes by teacher contract status.	Non-experimental data from India (Madhya Pradesh, Andhra Pradesh, 2006; 45 students from each school (15 each from grades 2, 3 and 4); 200 schools. All teachers teaching grades 1-5 are in the sample.	School fixed effects. Compares the average student/teacher outcomes of regular versus contract teachers. Does not look at the causal effect of a contract teacher versus a regular teacher as the data are non-experimental; presents an 'as is' relationship.	Contract teachers are associated with higher levels of effort than civil service teachers with permanent tenure. Higher teacher effort is associated with better student performance. Contract teachers 'as they are', however, appear weak as their effort levels on an absolute basis are low and appear to decline through the contract period. Contract teachers are also more cost-effective due to lower salaries. Average attendance and activity rates for regular teachers are 60% and 19%, and for contract teachers 75% and 37%. Therefore for contract teachers only 37% were engaged in teaching; the rest are either not teaching (38%) or not there (25%).	High

3. In-depth review: describing the studies and results

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
Habib 2010	To investigate whether the outcomes of teachers hired on contract are better than those of regular teachers.	Pakistan: author collected primary qualitative data. In-depth interviews, semi-structured and open-ended interviews yielded data on 40 respondents (32 teachers and 8 school heads).	Qualitative analysis techniques including in-depth interviews of 16 contract teachers, 16 regular teachers, and 8 principals.	Absenteeism among teachers with contracts is only moderately lower than among regular teachers. Contract policy does not address the perceived causes of teacher absence such as insufficient allowance for female teacher transport and family responsibilities. Overall, the contract policy has relatively little impact on teacher absenteeism.	Medium
Chaudhry et. al. 2006	To examine teacher and health worker absence in 6 countries, 4 of which use contract teachers.	Ecuador, Indonesia, Peru and India, 2002-03	Uses district-level fixed effects, to attempt to identify correlates of teacher absence with one of the independent variables being	Generally across all the countries contract teachers do not have lower absence rates. In Indonesia contract teachers are more absent, and in 2 other countries and the combined sample no statistical significant difference in absence rates are found. Absence rates are lower in private schools	Low

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
			the contractual status of the teacher.	than government schools in India.	
Duflo et al. 2011	Experimental evidence on the impact of tracking primary school students by initial achievement.	Kenya, 2005/06: Extra Teacher Program (ETP) (140 schools).	RCT data.	Student tracking increases test scores for all students regardless of their place in the initial achievement distribution. Students scores also improve regardless of group when they are assigned to be taught by contract teachers (indeed, initially low-scoring students assigned to a contract teachers benefit even more from tracking than initially high-scoring students); initially low-scoring students do not benefit from tracking if assigned to a civil service teacher. In contrast, tracking substantially increases scores for initially	High

3. In-depth review: describing the studies and results

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
				high-scoring students assigned to a civil service teacher.	
Duflo et al. 2009	To compare simply reducing the pupil:teacher ratio to two frequently used policy changes, firstly using contract teachers and secondly changes in school management practices including training and increasing parental involvement and teacher performance monitoring.	As above.	As above: - separately estimates 3 different effects: the effects of firstly change in class size, secondly change in class size accompanied by change in teacher incentives and finally change in class size accompanied by	Find that the reduction in the pupil:teacher ratio results in reduced teacher effort and to small and insignificant increases in test scores, in the absence of any other changes. Students assigned to contract teachers score 0.18 SDs better than those assigned to regular teachers in the same schools and 0.27 SDs better than students in comparison schools. Similarly significant improvements are also found in scores of pupils in	High

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
			changes in teacher management issues.	schools where school committees are given extra training. However, all of these results are short-lived as follow up work has indicated. Positive effects only remain significant for those pupils who are assigned to contract teachers and in schools where school committees were trained.	
Bourdon et. al. 2005	To quantify the effects of the contract teacher statute on education quality as measured by primary school student achievement and to investigate whether there is, as suggested, a trade-off between enrolment and educational quality.	Niger, 2000. Program on the Analysis of Education Systems (PASEC) data.	Propensity score matching to compare test scores of similar students who only differ in terms of contractual status of their teacher.	The contract teacher programme in Niger has considerably enhanced enrolment. There may however be a quantity-quality trade-off which needs to be taken seriously. Once other factors, most importantly experience, are taken into account the performance of contract teachers is not generally worse than that of other teachers. This coupled with	High

3. In-depth review: describing the studies and results

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
				<p>their important positive impact on enrolments lead the authors to assess the contract teacher programme in Niger as being positive overall.</p>	
<p>Bourdon et. al. 2010</p>	<p>To analyse the potential effect of hiring contract teachers on student achievement in three francophone sub-Saharan countries.</p>	<p>Niger, 2000; Togo, 2000; and Mali 2001. PASEC data.</p>	<p>Quantile treatment effects used to examine the effect of contract teachers on different segments of the student population</p>	<p>The contract teacher programme in Niger shows the worst results, i.e. either insignificant or clearly negative. In contrast, the Malian results are consistently positive and significant. Togo, on the other hand, occupies a more 'middle' position. Overall, results suggest that contract teachers do a relatively better job in low-ability contexts. This, the authors' state, suggests that they are able to reduce inequalities in student performance.</p>	<p>High</p>

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
Michaelowa and Wittman 2007	To look at the factors that determine teachers' job satisfaction, how this satisfaction relates into learning outcomes and which cost-effective measures can be used to increase both job satisfaction as well as education quality.	Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar and Senegal (1995-98). PASEC data.	Multi-level modelling. Regresses job satisfaction on student outcomes.	Teachers on private contracts show similar levels of job satisfaction to regular teachers, however they display lower levels of absenteeism. They miss 1.5-2 days less of work per month. Contracted teachers also have a significant positive relationship with student outcomes. The authors attribute this to the fact that they exert more effort.	Low
Vegas and Le Laat 2003	To examine whether differences in teacher contracts affect student performance.	Togo 2000. PASEC data.	OLS regression	Regular teachers outperform contract teachers systematically in Togo. Student performance is higher in schools where the share of contractual teachers is lower. This can possibly be attributed to their lower levels of experience compared to regular teachers. However, contract teachers' in Togo tend to have higher levels of education and this has a	Medium

3. In-depth review: describing the studies and results

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
				<p>positive effect on student learning. Therefore with this higher level of education alleviating any negative impact contract teacher have on student outcomes, they may in fact provide a cost-effective means of imparting learning during tough economic times.</p>	
<p>Fagnäs and Pelkonen 2011</p>	<p>To look at potential differences between para-teachers and permanent teachers and their work motivation by measuring differences in job preferences and skills. Specifically to examine trade-off between preferences of local para-teachers to work in remote locations versus their skills.</p>	<p>India (Uttarakhand), 2010 survey with sample of 700 trainee teachers.</p>	<p>Discrete choice experiment (DCE) to measure the preferences of teachers.</p>	<p>Overall para-teachers may be more content to locate in remote and more disadvantaged rural areas and on contracts that may involve rotation and possibly to teach large class sizes as well but there is an apparent trade-off: general skills versus job preferences.</p> <p>Recruitment of para-teachers (in Uttarakhand) would help address teacher shortages and is also likely</p>	<p>High</p>

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Author(s) and year	Purpose of study	Setting and sample	Methodology	Key findings	Quality ranking
				to be more cost-effective than hiring permanent staff.	
Geeves and Bredenberg 2005	To look at how contract teachers have affected education provision.	Cambodia. Primary (limited) data collected (attitudinal survey of 80 school principals), secondary data from a variety of sources, some interviews with key informants.	Descriptive statistics and narrative.	Contract teachers are an effective albeit short-term means to meet teacher demand and often, particularly in remote rural areas, they can be the only viable option. However the authors also state that there may be better alternatives such as incentive schemes and redeployment especially considering oversupply of teachers in urban areas.	Low/ medium

### 3.2.1 How effective are contract teachers at imparting learning when compared to regular teachers?

From our investigation, it was found that we can further sub-categorise the studies investigating the first question into those focusing on South Asia and on Africa. Below we summarise the nature of some of these studies and the manner in which they aim to address this first question.

#### *Studies focusing on Asian countries*

A total of seven studies were found to focus on different states from India. The studies address the first question in the following states: Andhra Pradesh (four studies), Uttar Pradesh and Bihar (one study) and Madhya Pradesh (one study), while one study covers 20 Indian states. Another study is a multi-country study investigating teacher and health worker absence and is more general in nature. However, because teacher absence is pertinent to addressing the question our study focuses on, this study is included in the in-depth review. These eight studies (seven on India and one multi-country study) include a South Asian focus and are quantitative in nature. Our report also includes one qualitative study on Pakistan that investigated teacher absence of contract versus regular teachers in one district of the country.

Several studies use experimental evidence from Andhra Pradesh. Data were collected through the Andhra Pradesh Randomized Evaluation Study. The authors sampled five districts across each of the three cultural subregions of Andhra Pradesh in proportion to population. A division was then randomly selected in each of the five districts from which 10 mandals were randomly sampled. In the resulting 50 mandals, the authors randomly selected 10 schools using probability proportional to enrolment. This resulted in a total of 500 schools that the authors state are representative of the schooling conditions faced by a typical child attending a government primary rural school in Andhra Pradesh. From among these 500 schools the authors then selected 100 schools as the control group (where no incentive/input was provided). Another 100 schools were only provided an extra para-teacher and 100 schools were only provided an extra block grant (both inputs were provided unconditionally and the amount of grant was roughly the same as the cost of providing an extra para-teacher i.e. about 3 percent of the average annual variable cost of running the school). The schools could decide how to spend the grant, provided it was spent on non-teacher inputs that were directly used by students (the majority spent it on notebooks, workbooks, charts and maps, etc.). On the other hand, conditional incentives were provided to 200 schools: in 100 of them it was announced that a bonus would be given to teachers whose students showed improvements in achievement at the end of the school year and in the other 100, they were told that the school would receive a bonus conditional on improvements in test scores (the minimum improvement in scores was 5 percent). No school received more than one treatment. Unannounced visits were made six times during the year to gather information on student achievement and process variables such as teacher attendance and for classroom observation of how the teacher taught. Three hundred further schools (other than the 500 receiving treatments) were also sampled and considered 'pure control' schools. Comparing

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

the 100 control group schools and 100 randomly selected schools from the 300 'pure control group' schools allowed a measure of the effect of external monitoring on school outcomes.

These data have been subsequently used to analyse several questions. In one study, the authors (Muralidharan and Sundararaman 2008) investigate alternative approaches to improving primary education, i.e. through incentives (aimed at individual teachers based on improvements in their students' achievement and group incentives based on the performance of the whole school) and 'smart inputs' (provision of a para-teacher or the provision of a cash block grant). The purpose of the paper is to attempt to answer several questions in the context of primary schooling in a developing country setting. The authors list following questions they wish to address:

(i) Can teacher incentives based on test scores improve student achievement? (ii) What, if any, are the negative consequences of teacher incentives? (iii) How do school-level group incentives perform relative to teacher-level individual incentives? (iv) What is the impact of simply monitoring schools and measuring students' achievement without attaching incentives? (v) How does teacher behaviour change in response to incentives? (vi) How cost-effective are teacher incentives relative to other uses for the same money? (vii) Will teachers support the idea?

In addressing these questions, the authors focus specifically on student learning outcomes (grades 3 and 5 students) while also addressing teacher attendance and classroom behaviour (teaching process).

Another study emerging from these data looks at teacher performance pay (Muralidharan and Sundararaman 2009). This study investigates the same question as the authors' 2008 study but does so using data from two years of the programme.

In another study using the same data, Muralidharan and Sundararaman (2010) examine whether expanding the contract teacher programme will improve student outcomes. Random assignment in a representative sample provides estimates that are potentially directly applicable to scaling up. While they can show that the marginal product of a contract teacher is positive they cannot directly compare the effectiveness of regular and contract teachers. Therefore they use their panel data to construct four different non-experimental estimates on the relative effectiveness of contract and regular teachers (two within school and two across school) using both school and student fixed effects. They also look at private schools in the same districts and find that private school teachers have more similar characteristics to contract teachers than regular teachers do. Because the authors are able to use panel data, they are able to look at the impact of the programme on test scores (mathematics and language).

Atherton and Kingdon (2010) look at the relative effectiveness and costs of contract and regular teachers in India. This is done by investigating the causal effect of a contract teacher on student achievement and also looking into the mechanisms through which a potential contract teacher effect operates. Unlike the studies above that provide the rigour of an experimental dataset, the data used in

this study are from a cross-sectional sample of more than 4,000 children in 160 schools in rural Uttar Pradesh and Bihar. However, they permit estimation of the contract teacher effect at the student level using school fixed-effects models and value-added models. This study also allows the authors to control for class size, multi-grade teaching and pedagogical style, bringing them closer to the causal contract teacher effect. The key outcome of interest is student achievement as measured by standardised test scores in mathematics and language (administered to grade 2 and 4 students). A similar methodology using the same dataset is presented in the study by Kingdon and Sipahimalani-Rao (2010) where the authors investigate whether contract teachers have differing student outcomes and effort levels, measured by absence rates, compared to regular civil service teachers.

A study by Kremer et al. (2005) also examines the issue of teacher absence as a measure of teacher performance. Using a nationally representative dataset on teacher absence derived from unannounced visits in schools in 20 states in India, the authors use descriptive statistics and simple multi-variate regressions to discuss teacher absence and the correlates of absence in India. This is done to shed light on whether the contractual status of teachers affects their absence and hence their effort.

Another study using non-experimental data focuses on Madhya Pradesh and Andhra Pradesh in India (Goyal and Pandey 2011). The study is based on data from a sample collected in 2006 based on 45 students per school (15 each from grades 2, 3 and 4) from 200 schools in total. Data on all teachers teaching grades 1-5 were included in the sample. A school fixed-effects methodology is used to compare the average student/teacher outcomes of regular versus contract teachers. The study focuses on student achievement in language and mathematics. In addition to these outcomes, the authors also look at teacher attendance and teacher engagement in teaching as indicators of performance.

A qualitative study by Habib (2010) looks at the impact of Pakistan's National Teacher Contract Policy Reform on Teacher Absenteeism. As in other developing countries, teacher absenteeism is a persistent problem in Pakistani government schools. Under a new policy, teachers hired in Pakistani schools after 2002 are hired on fixed-term contracts that are renewed, in part, based on low absenteeism. The purpose of the study is to investigate whether the outcomes of teachers hired on contract are better than those of regular teachers. Contract teachers were hired at lower salaries and on fixed-term contracts and had higher qualifications than their regular counterparts. A key objective of the study is to ascertain if incentives and sanctions built into the reforms (such as threat of termination of contract for unsatisfactory teacher attendance) are effective in reducing teacher absenteeism in a selected sample of schools in Pakistan. The study aims to identify why teachers are absent and whether the contract policy seems to be mitigating factors that encourage absenteeism, such as weak supervision mechanisms and unsatisfactory work environment, by comparing absenteeism among regular and contract teachers. An analytical framework and research questions supported by the literature on contract teachers and worker and teacher absenteeism were developed to further probe the various factors that influence teacher absenteeism and how the contract policy counteracts the likely

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

causes of absenteeism. Three research questions are analysed: Do contract teachers tend to be absent less than regular teachers in a sample of Lahore schools? What are teachers' and principals' perceptions of the impact of the contract policy on teacher absenteeism? What are teachers' and principals' perceptions of the impact of specific school and individual teacher characteristics on teacher absenteeism? To achieve her objectives, the author collected primary qualitative data (through in-depth interviews, semi-structured and open-ended interviews). The study uses qualitative analysis techniques to assess the impact of contractual hiring on teacher absenteeism based on the perceptions of teachers and principals from a sample of schools in Lahore, Punjab Province. In-depth interviews were conducted with 16 contract teachers, 16 regular teachers, and 8 principals from a representative sample of eight schools. Stratified random sampling was used to identify the schools. Schools were stratified by student gender (girls only, boys only), level (middle, primary, high school), rural versus urban, and catering to high- or low-income areas.

In one study, Chaudhry et al. (2006) look at teacher and health worker absence and include information on differences in this outcome for contract as compared to regular teachers in four countries (Ecuador, Indonesia, Peru and India). Using district-level fixed effects, the authors attempt to identify correlates of teacher absence with one of the independent variables being the contractual status of the teacher.

#### *Studies focusing on Africa:*

Our in-depth review includes six studies that focus on Africa and address either directly, or indirectly, the first question posed in the SR. Two studies focus exclusively on Kenya, another on Niger, while another is based on analysis in Mali, Niger and Togo. The fifth study focuses on Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar and Senegal while a final study bases its analysis in Togo. These studies are quantitative in nature.

Two of the studies analysed in this SR are based on data generated through an RCT in Kenya. This was conducted in 210 primary schools in a bid to address critical questions pertaining to peer effects and student tracking and the use of additional resources versus organisational changes in education. Among the 210 schools, 140 schools were randomly selected to participate in the Extra Teacher Program (ETP). Under ETP 121 schools were given funds to hire an additional teacher on a contractual basis. The programme provided funds for schools to create one additional section in first grade, taught by the contractual teacher. Most schools (121) had only one first grade section, and split it into two sections. Schools that already had two or more first grade sections added another section. The average section size was reduced to 46 students in the 140 schools that received funds for a new teacher (compared to 84 before the programme). The sample frame consists of approximately 10,000 students enrolled in first grade in March 2005 in one of 121 primary schools enrolled in the study. After students were assigned to sections, the contract teacher and the civil service teacher were then randomly assigned to a section. In the second year of the programme, all children not repeating the grade remained assigned to the same group of peers and the same teacher.

The first study we assess in this review based on the above data (Duflo et al. 2011) mainly focuses on the impact of tracking primary school students by initial achievement. The experimental design is such that it involves hiring an additional teacher on a contractual basis. In this way, it allows the examination of the relative effectiveness of a contract teacher versus a regular teacher.

The second study (Duflo et al. 2009) aims to compare the effects of simply reducing the pupil:teacher ratio to two frequently used policy changes, firstly using contract teachers and secondly changes in school management practices including training and increasing parental involvement and teacher performance monitoring. Studies by both Vegas and De Laat (2003) and Muralidharan and Sundararaman (2008) suggest that teacher organisation may be a more effective policy tool than changing the level of resources, however very few studies have explicitly looked at comparing the effectiveness of both these policies within a given and common context. As most studies look at a single given reform at a particular time in a given context, comparability across types of intervention can be difficult. However, Duflo et al. (2009) aim to achieve exactly that: comparing three most commonly discussed interventions in one context at one time. The study design allows them to separately estimate three different effects. It allows them to estimate firstly the effect of change in class size, secondly the effects of change in class size accompanied by change in teacher incentives and finally the effects of change in class size accompanied by changes in teacher management issues. The outcomes they look at are student test scores in mathematics and language and teacher effort as measured by absence and time on task.

Unlike the experimental nature of the above two studies, the study by Bourdon et al. (2005) uses non-experimental data. In doing so, the authors delve into quantifying the effects of a contract teacher on primary school student achievement in Niger and aim to find out whether the trade-off between aiming to improve student enrolment through contract teachers and the suspected deterioration in educational quality actually exists. The authors use Programme on the Analysis of Education Systems (PASEC) data from 2000 which provides comprehensive data on teachers, schools and students. Propensity score matching is conducted to compare test scores of similar students who only differ in terms of the contractual status of their teachers.

In a later study (Bourdon et al. 2010), the same authors use the same dataset to analyse the possible effect of hiring contract teachers on student achievement in three francophone sub-Saharan African countries: Mali, Niger and Togo. While these countries implemented teacher reforms to address similar problems (essentially rising student enrolments and a shortage of regular teachers), the actual contracts and the characteristics of the programmes varied considerably. The specific characteristics underpinning these programmes may have been critical in determining their success/failure and the authors provide this comparison, focusing especially on the incentive effect of the teacher contract. Information is available for the 2nd and 5th grade of primary schools in francophone sub-Saharan Africa. PASEC generally uses student, teacher and director questionnaires that are uniform for a number of core questions, so that results are comparable across countries. Education quality is measured in terms of student achievement in

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

mathematics and French, which is assessed using standardised tests for the three countries they assessed. Evidence is presented on a sample of over 2,800 students in Togo (from 240 classes) and 4,200 students from Niger and Mali (from 280 classes). Quantile treatment effects (a non-parametric approach) are used to look at the effect of contract teachers on different segments of the student population.

The richness of the PASEC dataset is exploited in another paper focusing on Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar and Senegal. A study by Michaelowa and Wittmann (2007) looks at the potential factors determining teachers' job satisfaction and how this satisfaction relates into learning outcomes and therefore identify the most cost-efficient measures that can be used to increase both job satisfaction and education quality. Multi-level modelling techniques are used to investigate the relationship between job satisfaction of contract versus regular teachers on student outcomes and teacher absence.

In another study, Vegas and De Laat (2003) investigate whether contract teachers in Togo, who receive lower pay (40 percent of regular pay) and fewer benefits and have less job security than regular teachers, are more effective than regular teachers in improving student performance. Using OLS, the authors address this question using data for over 800 students across 78 schools. These data were collected during 2000/01 as part of the PASEC dataset.

*3.2.2 What are the relative costs of regular and contract teachers, and hence their cost-effectiveness?*

There are fewer studies that address this specific sub-question and that are included in the in-depth review. Most of the studies are based on evidence from India and are quantitative in nature. We found a total of seven studies addressing this question out of which six focus on India and one on Togo.

#### *Studies focusing on South Asia*

The study by Atherton and Kingdon (2010) investigates sub-question two after addressing question one. As noted in Table 3.1 above, this study is based on SchoolTells data from two states (Uttar Pradesh and Bihar) in India. Other studies (also mentioned above) by Muralidharan and Sundararaman (2008, 2009, 2010) also investigate the question of the relative cost of contract and regular teachers using data from Andhra Pradesh in India. Another study, by Goyal and Pandey (2011), also provides some insight into answering this second question although its main focus is on question one.

A study by Fagernäs and Pelkonen (2011) focuses almost exclusively on addressing the question of whether to hire contract versus regular teachers (in terms of their cost-effectiveness). In doing so, this study looks at potential differences between para-teachers and permanent teachers and their work motivation by measuring differences in job preferences and skills, two variables often unobserved by researchers. The main focus is the potential trade-off between skills and preferences for working in rural, or remote, locations that may emerge during the recruitment of local para-teachers. The data used in this study are based on trainee teachers (former para-teachers and competitively selected teacher

students on the same training programme) in Uttarakhand, India. The sample consists of approximately 700 respondents. All respondents were also asked to complete a simple skills test consisting of knowledge of countries, English vocabulary and arithmetic. The study uses a discrete choice experiment (DCE) to measure the preferences of teachers. In DCEs, the indirect utility function of respondents is estimated from repeated choices of designed bundles of goods or services that are presented to them. This study investigates the nature of employment contracts and preferences especially over geographical location. This is done by presenting respondents repeatedly a pair of alternative job contracts with different levels of job attributes, and they are asked to choose the one they prefer.

#### *Studies focusing on Africa:*

We only found one study in Africa attempting to address question two. The study by Vegas and De Laat (2003) in Togo attempts to answer question 2 after addressing question one (see above for details).

#### *3.2.3 To what extent do contract teachers succeed in addressing teacher shortages?*

This is the final sub-question that this SR aims to address. In total, we found three studies that helped address it. Of them, one study focuses exclusively on India and one on Cambodia. The third study addresses this question for several countries in Africa.

The study on India (Fagernäs and Pelkonen 2011) investigates sub-question three while focusing also on addressing question two (see above). The study by Bourdon et al. (2010) has already been cited above as addressing question one. While this study analyses the potential effect of hiring contract teachers on student achievement in the three francophone sub-Saharan African countries of Mali, Niger and Togo, it does so by looking at the bigger question of teacher shortages, their contracts and their impact on education in Africa and, in doing so, helps address the third sub-question posed in this review.

The SR includes a study in Cambodia by Geeves and Bredenberg (2005). Cambodian authorities initially instituted a contract teacher scheme in the country to meet chronic shortages of teachers particularly in rural and remote areas and contract teachers continued (up until time of this report) to be the mainstay for staffing remote areas. They were and continue to bridge the widening gap between primary school teacher numbers and classes. They were popular at the local level as they allowed staffing flexibility and also provided local employment opportunities but quality concerns led the scheme to be curtailed and questioned. This particular research aims to look at how contract teachers have affected education provision in the country. This is done by looking at secondary data sources and interviews with key informants. Some limited primary data collection was also done (via an attitudinal survey of around 80 school principals). Thus, by relying on a mainly descriptive summary of findings from a variety of different sources, the authors aim to look at teacher shortages/numbers as the key outcome of interest with the view to addressing question three as posed in this SR.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

### **3.3 Key findings of studies included in the in-depth review**

The findings of the studies are reported by research sub-question.

#### *3.3.1 How effective are contract teachers at imparting learning when compared to regular teachers?*

*Studies focusing on South Asia:*

The study by Muralidharan and Sundararaman (2008) finds that students in incentive schools perform better than those in control group schools. The authors do not note any adverse effects of the programme on student performance in mechanical and conceptual questions or on incentive versus non-incentive subjects. There is no difference in effectiveness (in terms of learning outcomes) of group versus individual incentives.

The input treatments have a significant positive impact on student test scores. The provision of a para-teacher improves mathematics and language scores by 0.1 and 0.07 standard deviations respectively relative to the control schools. In terms of differences between the two inputs, there is no significant difference between the effects of the block grant and the para-teacher. A comparison of the inputs treatment versus the incentives treatment, however, shows that the overall effect of incentives on student learning is higher than the provision of inputs. However, it should be noted that because the authors pooled inputs (para-teacher and grant) and incentives (individual and group) for this comparison, it is not possible to isolate the effect of para-teachers as inputs versus incentives.

In terms of other outcomes, the study finds no difference in either teacher attendance or classroom behaviour between control and treatment schools. The authors state that one explanation for this could be that teachers' actions converge to certain norms of behaviour when under repeated observation. Their analysis seems to corroborate this explanation. The study also finds that teachers in incentive schools are significantly more likely to assign more homework, give tests, pay more attention to weak students and give remedial classes to children who need them compared to teachers in control groups. The authors claim that while incentive programmes do not alter teachers' attendance, the programmes based on end-of-year testing make teachers more effective when they are in class. This study also considers other contextual factors such as teacher turnover and student attrition.

The authors claim that their results are relevant not just for Andhra Pradesh's rural schools but for rural schools throughout India because the government's access policy makes small schools common. The benefits of group and individual incentives can be seen in the context of rural schools where there are a small number of teachers who appear to benefit from cooperation among themselves. However, the authors claim that these findings are not applicable to large schools in which there are likely to be too many teachers to foster such cooperative behaviour and the resultant benefits from designed incentives.

Muralidharan and Sundararaman (2010) find that, after two years, pupils in schools with an extra contract teacher perform significantly better in learning outcomes

than those in comparison schools by 0.15 and 0.13 standard deviations in mathematics and language tests. These effects are particularly found in the case of children in their first year of school and those in remote schools. They also look at teacher absence and find that contract teachers display lower levels of absence than their civil service counterparts. Contract teachers have absence rates of 16 percent compared to 27 percent displayed by civil service teachers. The authors also find that contract teachers exhibit higher levels of effort. However they acknowledge that this is easier to manipulate than absence as teachers can start teaching on seeing enumerators, while absent teachers cannot just appear. They use four different estimation procedures and all find that contract teachers are no less effective than regular teachers despite being less well qualified, less well trained and paid a fifth of the salary. With this and other research indicating that private schools are more effective at improving student outcomes, the authors of this study also look at private school teachers. They find that their characteristics such as age and gender (young and female) are more like those of contract teachers. They tend to live closer to the school in which they teach than regular teachers though not as close as contract teachers. They tend to have less training and lower salaries than even contract teachers.

The study by Atherton and Kingdon (2010) finds that in Uttar Pradesh, after controlling for observed teacher characteristics and for all observed and unobserved school characteristics, contract teachers raise child test scores by about 0.21 standard deviations compared to children being taught by a regular teacher. In Bihar, the authors find that in the school fixed-effect achievement equation conditioning on teacher characteristics, the contract teacher variable has a positive and weakly significant coefficient. This suggests that pupils of contract teachers score 0.069 standard deviations higher than those of their regular teacher counterparts in the same school. This effect, the authors argue, is substantially smaller than in Uttar Pradesh possibly due to contract teachers facing lower accountability pressures. The study concludes that contract teachers are substantially more effective than regular teachers in Uttar Pradesh and weakly more effective in Bihar. The saturated model used in their study also suggests that there is substantial heterogeneity in the effects of contract teachers across pupil and teacher types. Most notably, the contract teacher effect is dependent on the gender of the contract teacher and the socio-economic status of pupils. This suggests that while the average pupil in the average school will neither benefit nor suffer from being taught by a contract teacher, they will gain if they are of below average socio-economic status and if the contract teacher is male.

Another study (Kingdon and Sipahimalani-Rao 2010) based on the same dataset as the one above notes that contract teachers put in significantly more effort than regular teachers within the same school. They find that teacher absence rate among para-teachers is 12.4 percentage points lower than that among regular teachers and that living locally only partially explains the lower absence rate among para-teachers. In terms of student outcomes, after potentially controlling for observed and unobserved school characteristics, this study notes that students taught by para-teachers in Uttar Pradesh have higher achievement by about 0.21 standard deviations compared to those taught by a regular teacher.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Kremer et al. (2005) also looks at the issue of teacher absence in India. The authors find that in their analysis of the data, one in four teachers are found to be absent with India having the second-highest average absence rate among eight countries where similar data were obtained. Even more importantly, only 45 percent of the teachers present in school are actively engaged in any teaching activity. The absence rate is found to vary considerably by state ranging from 15 percent in Maharashtra to about 42 percent in Jharkhand. They find that absence rates among teachers are generally higher in low-income states and teaching activity considerably lower in high-absence states. Moreover, only 1 percent of the primary school teachers who are absent are engaged in any official non-teaching duties with a large share of the absence being explained by unauthorised absence. Overall the authors find that higher teacher salaries are not associated with reduced teacher absence. The study did not find any significant difference in absence between regular civil service and fixed contract teachers. In addition, the study finds that a 10 percent increase in teacher absence results in a 1.8 percent increase in students' absence and a reduction of 0.02 standard deviations in test scores. These are small effects but can be explained by the limitations of the study (see below).

The study by Goyal and Pandey (2009) finds that contract teachers are younger and more likely to be female, have less experience and are less likely to have pre-service training. The authors note that contract teachers are associated with higher levels of effort than civil service teachers with permanent tenure (in regressions with and without school fixed effects). They also find that higher teacher effort is associated with better student performance after controlling for a range of pupil and school factors. Contract teachers 'as they are' however appear weak as their effort levels on an absolute basis are low and appear to decline through the contract period. The possible reasons the authors give for the greater effort are different contractual responsibilities as well as less social distance between the teacher and the taught. The study also looks at teacher attendance and activity rates. The findings show that for regular teachers average attendance and activity rates are 60 percent and 19 percent while for contract teachers they are 75 percent and 37 percent respectively. Therefore, even among contract teachers, only 37 percent are engaged in teaching and the rest are either not teaching (38 percent) or not there (25 percent). Thus, while they are better in terms of attendance and activity rates compared to regular teachers (i.e. relatively speaking), their performance is not exceptional when independently assessed. Thus, it would appear that even though the contract may be incentivising them to work harder than the civil service teachers they are still not incentivised enough. This is particularly important because the authors find that those contract teachers who have more than one tenure period exert less effort in subsequent periods. In another part of this study they found that the vast majority of school oversight committees and other hiring authorities did not even see hiring contract teachers or monitoring their attendance as part of their remit. Less than 5 percent of members in Uttar Pradesh stated that selecting contract teachers was one of their responsibilities and in Madhya Pradesh less than 6 percent thought monitoring teachers' attendance was one of their responsibilities. Finally, in terms of student outcomes, the authors find that correlations between teacher activity and language

and mathematics scores are positive and significant suggesting that contract teachers are associated with higher test scores through their higher levels of effort (attendance and engagement in teaching). In line with previous research, the authors also find that other teacher and school attributes (such as teacher education, experience, training, etc.), unlike teacher effort, do not appear to matter as much.

Continuing the theme of contractual status and teacher effort (as measured by absence) is the study by Habib (2010). This study in Pakistan is unique as it uses qualitative research to address the question of whether contractual status impacts teacher absence in Pakistan. It is also interesting because it was the only quality study we found that garners teachers' and headteachers' perceptions regarding contract policies to arrive at conclusions regarding teacher effort. The study finds that absenteeism among teachers with contracts is only moderately lower than among regular teachers. Some features of the contract policy, such as fewer options for leave, greater authority of the school principal to check absenteeism of contract teachers, merit-based hiring, and the threat of non-renewal, are perceived by teachers and headteachers to reduce absenteeism. The author concludes that the contract policy did not address other perceived causes of teacher absence, such as insufficient allowance for female teachers' transportation and family responsibilities, dissatisfaction with students' weak academic backgrounds, and deficient government policies, and that that is why it failed to have the desired impact on teacher effort. Respondents identify lower salaries for contract teachers than tenured teachers, despite higher qualifications, as encouraging absenteeism. The policy of contractual hiring is perceived to cause frequent resignation of contract teachers. Overall, the authors find that the contract policy has relatively little impact on teacher absenteeism. In particular, the study notes that it was students' inadequate academic preparation and socio-economic background that are important causes of teachers' dissatisfaction with their work environment and thus contribute to high contract teacher absenteeism and resignation. It is noted that there is inadequate attention paid to issues such as timely provision of textbooks, the need for remedial classes for students that would benefit, and a conflict between the school calendar and hot weather conditions and harvest activities. Contract teachers in girls' schools especially hold the view that inconsistent government policies exacerbate the effect of weak academic achievement among students, lowering teacher motivation and attendance.

The study by Chaudhry et al. (2006), in a similar vein, addresses the question of teacher (and health worker absence) in several developing countries. This study, like Habib (2010), concludes that across all the countries descriptively analysed by the authors, there is no evidence to suggest that contract teachers have lower absence rates. In Indonesia (and in two other countries) contract teachers are found to be more absent, although there are no statistically significant differences in absence rates between the two types of teachers in the combined samples. The authors do however note that absence rates among teachers are lower in private schools than government schools in India.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

*Studies focusing on Africa:*

A study by Duflo et al. (2011) in Kenya focuses on the question of student tracking and in doing so investigates whether students assigned to contract teachers within this tracking exercise have better or worse outcomes than those assigned to regular teachers. The authors find that student tracking increases test scores for all students regardless of their place in the initial achievement distribution. Students' scores also improve regardless of group when they were assigned to be taught by contract teachers (indeed, initially low-scoring students assigned to a contract teacher benefit even more from tracking than initially high-scoring students), while initially low-scoring students do not benefit from tracking if assigned to a civil service teacher. In contrast, tracking substantially increases scores for initially high-scoring students assigned to a civil service teacher. The authors then go on to question why tracking works and suggest that one possible factor could be that students benefit from more focused teaching and perhaps higher teacher effort. The authors present results for teacher effort (as measured by teacher presence and effort while in school) on tracking. The results are presented separately for civil service teachers and new contract teachers because they face very different incentives. The new teachers are on short-term (one-year) contracts which lead to incentives to work hard to increase not only their chances of contract renewal but also of eventually being hired as civil service teachers. The authors find that the new contract teachers attend more than the civil service teachers and are more likely to be found in class and teaching (74 percent versus 45 percent for the civil service teacher), and their absence rate is unaffected by tracking. They also find that civil service teachers are 5.4 percentage points more likely to be in schools in tracking. Overall, the authors claim that these results suggest that all teachers may be more motivated to teach a group of students with high initial scores than a group with low initial scores or a highly differentiated group. Higher teacher effort helps explain why tracking raised test scores for high-scoring students assigned to civil service teachers. The authors also find that the effort of civil service teachers also increases in tracking schools when the teacher is assigned to the top section, suggesting that the typical civil service teacher is more motivated when teaching students with greater initial achievement.

In another study, Duflo et al. (2009) find that the reduction in the pupil:teacher ratio (on average from 82 to 43) results in reduced teacher effort and to small and insignificant increases in test scores, in the absence of any other changes. Contrary to this, they find that the test scores of pupils who were randomly assigned contract teachers improve significantly. They find that students assigned to contract teachers score 0.18 standard deviations better than those assigned to regular teachers in the same schools and 0.27 standard deviations better than students in comparison schools. Similarly significant improvements are also found in scores of pupils in schools where school committees were given extra training. However, all of these results are short-lived as follow-up work has indicated. Positive effects only remain significant for those pupils who were assigned to contract teachers and in schools where school committees were trained. The authors state that the contract teacher effect is not only related to the differences in contract structure between contract and regular teachers, as one may assume,

but also to the fact that contract teachers themselves may be inherently different from regular teachers (younger, more recently and perhaps better trained, but less experienced). Also the environment in which they work may be different, for example the ETP was set up so that the contract teacher taught all subjects to one set of students while regular teachers continued to work under a rotation system and therefore their students faced an array of teachers which may in itself affect their learning experience. That said, the study finds that contract teachers are less absent and have higher time on task than both regular teachers in their own schools and regular teachers in control schools. Regular teachers are also more absent and less likely to be teaching as a result of the introduction of a contract teacher. This finding indicates that part of the positive effect of contract teachers and training of committees is due to an increase in teacher effort.

In their study of Niger, Bourdon et al. (2005) find that once confounding factors are controlled for, the performance of contract teachers is not generally worse than the performance of other teachers in terms of student outcomes. Without controlling for experience, there appears to be a negative effect of contract teachers on student outcomes, although this negative effect is largely an artefact of their limited job experience. The overall assessment of the contract teacher programme in the country is positive. In terms of specifics, matching students taught by contract teachers to those taught by civil servants provides no significant evidence of an advantage of the latter in grade 5. In grade 2, there appears to be evidence of a sizeable advantage of traditional teachers - but only as long as job experience is not appropriately taken into account. There also appears to be a strong positive impact of contract teachers on enrolment which combined with the generally insignificant effect on education quality indicates that the positive impact on enrolment dominates potential losses in quality through the provision of contract teachers (see section 4.1.3).

In another study, Bourdon et al. (2010) find that in Niger, after controlling for a large number of covariates (including individual child-, school- and teacher-level variables), while the low-ability students in class 2 do not seem to be affected by the teacher status, the high-ability students seem to suffer from being taught by a contract teacher. The effects are very similar for French and for mathematics. The results are strikingly different in Togo and Mali. Overall, the analysis quite strongly confirms the expectations that, given the different characteristics of the contract teacher programmes in the three countries considered, the impact of a contract teacher should be different. The contract teacher programme in Niger shows the worst results, i.e. either insignificant or clearly negative. In contrast, the Malian results are consistently positive and significant in mathematics for both grades. This suggests that the potentially negative role of low salaries (if any) is overcompensated by the positive incentive effect induced notably by parental responsibility and monitoring in the case of the Malian community. Togo, on the other hand, occupies a more 'middle' position, which the authors argue may suggest that parental monitoring responsibility has been reduced through the integration of parts of the contract teacher programme into the public administration system. The latter result is not due to missing pedagogical training as controlling for this does not change the results. Overall, the results suggest that

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

contract teachers do a relatively better job in low-ability contexts. This, the authors state, suggests that they are able to reduce inequalities in student performance. This could be because contract teachers are in a better position to work in a more difficult learning environment and to react to the needs of students with the most serious learning deficiencies.

In their multi-country study, Michaelowa and Wittmann (2007) investigate teacher job satisfaction and absence. They find that teachers on private contracts (volunteers as they are called) show similar levels of job satisfaction but lower levels of absenteeism. They miss 1.5-2 working days less per month compared to regular teachers. Interim directors (teachers on civil service contracts) are found to be less satisfied. In addition, the authors find that job satisfaction is positively related to student outcomes. When regressing job satisfaction on student outcomes, they find that volunteers have a positive significant relationship with student learning. The authors attribute this result to better effort on the part of contract teachers whose fear of losing their jobs and hopes of gaining a more favourable contractual situation leads to higher effort and hence better student outcomes.

Vegas and De Laat (2003) find that even after controlling for a multitude of factors such as prior attainment, household background, school and classroom factors, etc., students taught by regular teachers in Togo systematically outperform those taught by contract teachers. This gap cannot be explained by teaching methods, absenteeism and resentment over 'unfair' pay across contract types. They believe this is related to the unregulated quality of teacher entrants following introduction of the contract teacher policy. They include an interaction term for contractual basis and experience and find that contract teachers' lower experience exacerbated their ineffectiveness. The authors also control for education and find that contract teachers' higher levels of education may alleviate some of this ineffectiveness.

### *3.3.2 What are the relative costs of regular and contract teachers, and hence their cost-effectiveness?*

Teacher salaries account for a vast proportion of educational expenditures. Therefore, assessing the cost-effectiveness of different types of teachers is a fundamental research issue. Contract teachers tend to be paid far less than regular teachers across the globe. If, as suggested, this is not done to the detriment of quality, one would presume that contract teachers provide a more cost-effective mechanism of imparting learning. However, it may be that regular teachers are paid more than contract teachers to reward them for other favourable characteristics. The research methodology used in some of the papers analysed for this review (e.g. Atherton and Kingdon 2010) control for this and allow a more accurate estimation of the true cost-effectiveness of different teacher types. However, it must be noted that even these strategies only allow us to estimate the cost of predicted improvements in student outcomes.

### *Studies focusing on South Asia*

The study by Muralidharan and Sundararaman (2008) investigates the question of whether contract teachers are a more cost-effective intervention compared to other interventions (such as the provision of a block grant to schools, or individual teacher or group teacher incentives). The authors, using simple calculations, show that incentives are the most cost-effective treatment in terms of improved student learning (the annual spending by treatment, in rupees (Rs) per school, was: Rs10,000 on a para-teacher, Rs9,960 on a block grant, Rs7,114 on group incentives and Rs11,074 on individual incentives). Of the two types of incentives - group and individual - there is no difference in learning outcomes and therefore, because group incentives cost less than individual incentives, they can be seen as the more cost-effective intervention; group incentives generate similar student outcomes but at a lower cost.

In a later study, Muralidharan and Sundararaman (2009) use the same experimental data and examine the results at the end of two years of the programme. In doing so, they find that incentive schools perform significantly better than control schools in both mathematics and language (0.28 and 0.16 standard deviations respectively). The children were tested on conceptual as well as mechanical skills and improvements on both fronts suggest an actual increase in learning outcomes. The authors also find positive spill-over effects with incentive schools performing better even in non-incentivised subjects. The authors find similar results for cost-effectiveness of incentives and inputs (para-teachers and block grants) in terms of student outcomes.

The final study assessed in this review by the same authors (2010) notes that contract teachers are paid a fifth of what regular teachers are paid. The authors also state that these lower salaries of contract teachers are related to the low levels of unionisation of teachers on fixed-term contracts, who do not benefit from the rents accruing to unionised government teachers, rather than lower productivity of contract or private school teachers. Therefore, they can conclude that not only are contract teachers no less effective at improving student outcomes, but they are also more cost-effective. The authors also conclude that the input combination of private schools is closer to the efficient frontier (more teachers costing less) so by increasing use of contract teachers the government schools can achieve more efficiency.

Atherton and Kingdon's (2010) study claims that teachers in India are not compensated efficiently. Regression analysis on the log of teachers' pay indicates that it is not based on the characteristics that have been shown to improve student learning. As a result of this, investigations into the teacher salary cost per achievement point show that even after controlling for a multitude of characteristics, contract teachers are a more cost-effective mechanism for improving student outcomes. Using raw-salary differentials, regular teachers have a cost per predicted achievement point that is 5.27 times higher than contract teachers in Uttar Pradesh and 2.8 times higher than contract teachers in Bihar. Even after controlling for other wage-determining characteristics, contract teachers are paid just 33 percent of a regular teacher's wage in Uttar Pradesh, and

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

56 percent of the regular wage in Bihar, a fact at odds with the conclusions regarding their relative effectiveness. This view is endorsed by Goyal and Pandey (2011) who conclude that because contract teachers' salaries are significantly lower than those of regular teachers, the government can buy the same or more learning output at a lower cost by hiring contract teachers which makes them more cost-effective than regular, civil service teachers. The study by Fagernäs and Pelkonen (2011) discussed below also concludes that the recruitment of contract teachers in Uttarakhand in India is likely to be a cost-effective intervention.

#### *Studies focusing on Africa*

Vegas and De Laat's (2003) study in Togo, noted above, found that contract teachers are not as effective as regular teachers in imparting learning. However, contract teachers also have higher education levels than regular teachers and higher teacher education has a positive effect on student outcomes. Hiring contract teachers can be a cost-effective means of imparting learning especially in countries facing worsening economic conditions as some of the negative effects of reduced teacher pay and benefits (on hiring contract teachers) may be mitigated through positive effects of teacher education on student learning.

#### *3.3.3 To what extent do contract teachers succeed in addressing teacher shortages?*

##### *Studies focusing on Asia*

Fagernäs and Pelkonen (2011) find that the preferences of para-teachers versus 'standard' teachers differ; para-teachers are less averse to working in remote locations than the standard, competitively selected student teachers. The study also finds that para-teachers value the district capital no more than a remote village as a place of employment, whereas the standard students value the district capital significantly more. In addition, there is evidence that both types of students have strong preferences for working in their home village or town but this preference is weaker for para-teachers. In summary, the authors state that para-teachers, who almost all come from rural areas, prefer rural areas in general and standard teachers less so. However, higher pay and a permanent contract are valued significantly by both. The study finds that para-teachers are indifferent to whether contracts involve rotation as long as they are permanent, whereas the standard students strictly prefer permanent contracts without rotation. There is also some evidence that para-teachers prefer to work with larger class sizes. The authors argue that some of the difference in preferences can be explained by life-cycle factors such as the relatively higher teaching experience of para-teachers' relatively greater teaching experience, and also having children, compared to the younger sample of standard teacher trainees. In that regard, it is possible that the preferences of standard students will converge somewhat towards those of para-teachers as the standard students start families and gain more experience. The authors also find that the skills of contract and regular teachers differ (as measured by standardised test scores). Standard students score higher on all tests and especially in mathematics. Standard students also obtain higher scores in all sub-tests, in particular in arithmetic. Para-teachers perform on average 0.74

standard deviations worse than the standard students in a competitive written test. This is a large difference. However, to what extent these differences in skills translate into differences in teaching at the primary level, the authors argue, is somewhat difficult to assess. In summary, their findings suggest that para-teachers may be more content to locate to remote and more disadvantaged rural areas and with contracts that may involve rotation and possibly with large class sizes as well but there is an apparent trade-off: general skills versus job preferences. The recruitment of para-teachers (in Uttarakhand) would help address teacher shortages and is likely to be more cost-effective as well.

Geeves and Bredenberg's (2005) study in Cambodia looks at how the country has tried to reduce the use of contract teachers and use other strategies to cope with teacher shortages such as incentive schemes, double shifting and redeployment (which can be particularly effective in light of teacher oversupply in urban areas). However, the authors note that the use of contract teachers was an effective strategy in addressing teacher shortages in Cambodia, particularly in the late 1990s when it was the government's primary line of defence in combating the teacher shortage problem. This can be seen in a table they present in the paper, reproduced as Table 3.3 below.

**Table 3.3:** Proportion of teacher shortages addressed by contract teachers in Cambodia, 1997-2003 (source: Geeves and Bredenberg 2005, Table 4.1/EMIS)

Year	Estimated Teacher Shortage	Number of Contract Teachers	Proportion of Gap Filled by Contract Teachers
1997	2,161	2,336	108%
1998	4,840	4,135	85%
1999	7,209	2,867	40%
2000	10,296	3,684	36%
2001	13,044	4,214	32%
2002	11,464	1,292	11%
2003	11,382	1,152	10%

Source: EMIS, 1997-2003

Table 3.3 shows explicitly the estimated teacher shortage in the country, the number of contract teachers hired and the resultant proportion of the gap thus filled. The authors find, therefore, that in 1997 more than 100 percent of teacher shortages were filled through hiring contract teachers. There was a sharp decline in the proportion filled through contractual hiring in subsequent years although the estimated teacher shortage rose dramatically between 1997 and 2003.

Given the largely non-existent human resources available in very remote Cambodian regions, the use of contract teachers is an example of the most and at times only viable option available. In particular it is important to note that for many Cambodian children if they had no contract teacher they would have no education at all. For example in one province in 2001, 100 percent of teachers were contract teachers. All in all, the evidence seems to point towards using contract teachers as an effective but short-term means to meet demand but the study questions whether there may be better ways of doing so and point in effect to this as sometimes being the only and last option to resort to.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

#### *Studies focusing on Africa:*

Bourdon et al.'s (2005) study on Africa finds that contract teacher programmes have enabled Niger and other countries to considerably enhance enrolment and hence reduce teacher shortages. The authors argue that the introduction of these programmes therefore represents an important step towards universal primary enrolment and completion and in doing so also represents a major step towards the reduction of poverty. However, a certain quantity-quality trade-off might exist and has to be taken seriously, as schooling will only enhance children's abilities to master their everyday lives if at least a certain minimum quality can be ensured. However, we noted that this study finds that the introduction of contract teachers does not worsen student learning which suggests that any positive impact on enrolment outweighs potential losses in educational quality.

### **3.4 In-depth review: quality assurance results**

The last column of Table 3.2 illustrates our assessment of each of the studies in relation to how well they address the questions specifically posed in this SR. Papers judged to be of low quality or excluded on various grounds may well be of high quality with respect to answering other pertinent research questions which are not the specific of this SR. Of the 17 studies reviewed, 10 were found to be of high quality, four of medium quality, one of medium/low quality and two of low quality.

Based on our quality assurance criteria, the study by Muralidharan and Sundararaman (2008) is assessed to be of high quality. However, there are some limitations to this study. For instance, a key constraint is that the results of the study are based only on data from the first year of the programme. The authors argue that the impact of incentives may be larger in subsequent years once the programme gains credibility in the community. However, another possibility is that the gains in outcomes do not persist as the programme loses its novelty over time. The authors also claim that it is unclear how the dynamics of student learning affect rational teacher's responses to incentives and whether unanticipated effects emerge as teachers become more familiar with the programme rules. In addition, the authors claim that there is no clear cut notion of what the optimal ratio of base and bonus pay would be as setting a bonus at very high levels increases the possibility of incentive distortion while setting it too low would not have the desired effects. Finally, the authors claim that part of the large effects observed in the first year of the programme despite relatively small bonuses could be because teachers had consumption commitments which were met.

The Muralidharan and Sundararaman (2009) study helps address the initial limitation of the short-term nature of the data by including results based on two years of the programme. The authors conclude, for example, that the results of the study are unlikely to be driven by novelty effects arising from the implementation of the programme. This study is also assessed to be of high quality. However, some of the limitations and challenges set forth by the authors themselves (as in the 2008 study) remain unaddressed. In addition to this, the authors accept that the accuracy of the performance pay formula used in this project was limited by the need for it to be transparent to all teachers as this was their first experience of

such a pay scheme in their careers. A better formula for teacher bonuses suggested by the authors would be one that netted out home inputs allowing estimation of a more accurate measure of the value added for the teachers. Also, the potential heterogeneous effects of teacher effort on student outcomes at different points in the achievement distribution would call for an appropriate solution.

The study by the above authors from 2010 is also rated as a high quality study. There are several reasons for classifying these three studies as high quality. Firstly, the experimental design ensures that no school receives more than one treatment with the result that the impact of each treatment of the programme can be independently analysed without worrying about confounding interactions. The authors also look carefully at the effects of attrition and turnover within the sample.

For the Muralidharan and Sundararaman (2010) study, it must be noted that the contract teacher is allocated to the school not to a particular grade. The school then decides where to allocate this teacher and it may just be that this is done at lower schooling levels thereby biasing the findings at this level as was found to be the case in the first and not in the second year as the authors also look at heterogeneous treatment effects by grade and found that class size effects matter more at lower grades. Importantly they also look across schools at the effect of adding a teacher to a school. This has the advantage of teacher assignment to a particular grade not suffering from endogeneity and is more policy-relevant as in reality policy-makers can allocate a contract teacher to a school but cannot stop schools from assigning teachers to a particular grade. Therefore the most important policy question is the relative impact of adding a contract teacher to school compared to adding a regular teacher to a school. The paper also looks at heterogeneous effects across schools and household characteristics and finds that remote schools benefit most from the provision of an additional teacher, although all student types benefit similarly. They find that the contract teacher effort is higher than regular teacher effort due to a combination of factors such as the fact that they tend to be from the local area and therefore face lower marginal costs of attendance and higher levels of connection to the community and hence a greater sense of obligation. In addition, their contracts are renewable which provides higher incentives to perform. It must be noted though that the authors do not aim to disentangle these effects.

In Muralidharan and Sundararaman (2010) the contract teacher effect appears to be indistinguishable from the effect of a reduction in class size that accompanies the provision of an extra contract teacher. This is because the provision of contract teachers may have beneficial effects on child learning by lowering pupil:teacher ratios and reducing or eliminating multi-grade teaching. Theoretically speaking, a randomised trial that has the power to estimate the pure contract teacher effect requires one of the following: (i) an additional treatment group who were allocated an extra regular teacher (to act as the comparator for the group that were allocated an extra contract teacher), (ii) the replacement of a regular teacher with a contract teacher (which would leave class sizes unchanged), or (iii) the random allocation of pupils to contract and regular teachers within a grade after the hiring of additional teachers. In the spirit of (iii), Duflo et al. (2009) exploit random

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

allocation of teachers across grade 1 classes following the hiring of contract teachers in Kenya, to isolate a contract teacher effect. They find that pupils assigned to contract teachers score significantly higher than those assigned to regular teachers.

The study by Atherton and Kingdon (2010) is also rated as a high quality study in this review. This is not only because it uses stringent methodologies, despite relying on cross-sectional non-experimental data, but in addition it addresses the possible worry that the contract teacher effect is in fact a class size effect. The authors find that appointment of extra contract teachers does not lead to a corresponding reduction in actual pupil:teacher ratios, presumably as it leads to higher regular teacher absence rates. This is similar to the findings for Kenya in Duflo et al. (2009), where the appointment of contract teachers leads to an increase in the absence of regular teachers. In addition, they find that while contract teachers lower class size (in both Uttar Pradesh and Bihar) and lessen multi-grade teaching (in Bihar), this does not appear to be driving the contract teacher effect. The authors also consider the possibility that the contract teacher effect on student learning is possibly an effort effect, i.e. that contract teachers exert more effort because of the accountability pressures arising from the incentives in-built in their contracts. The authors find that even after controlling for teacher effort, the contract teacher effect on student learning remains.

The study by Kremer et al. (2005) is assessed to be of medium quality for the purposes of addressing our research question. Among the limitations of the study are the fact that the small magnitudes of the relationship between student achievement and attendance and teacher absence can be explained either by measurement error in the teacher absence variable or by unobserved heterogeneity which the study is unable to control for due to its design. While the authors acknowledge that the latter could arise if marginal students drop out of the high-absence schools, the characteristics of students in schools with high teacher absence may be very different from those with low teacher absence. The study acknowledges this constraint but is unable to control for it.

Goyal and Pandey's (2011) study is assessed to be of high quality for the purposes of this review. One key limitation acknowledged by the authors is that they cannot look directly at the effect of contract teachers on test scores due to endogeneity concerns. These arise because whether a teacher is on a contract or not will be correlated with unobserved teacher, school and village characteristics that influence student performance. Therefore the effect will not be of the contract alone unless explicitly controlled for. An additional concern is that schools in the sample are often taught in a multi-grade setting so a student's performance can only be related to average school and teacher characteristics which precludes school fixed effects.

Habib's (2010) study is assessed to be of medium quality. One key limitation, acknowledged by the author is the relatively small sample size (eight schools and 16 contract and 16 regular teachers and 8 head teachers). However the sample was purposeful and drawn using stratified random sampling. Another limitation, however, is that the author did not randomly choose the teachers (only schools

were randomly chosen) as the school headteacher decided which teachers would be questioned but the author stresses that the need for the headteacher to be random in his/her choice was emphasised by the author. Nonetheless, there could be some selection issues that arise in this study as a consequence of the resulting sample design. Another limitation that weakens the study is that teachers may not have revealed their true feelings/answered questions truthfully. However, the author stresses that she adjusted and adapted questions within semi-structured interviews to allow for this. Finally, there are concerns about the extent to which this study is generalisable.

Chaudhry et al.'s (2006) study is assessed to be of low quality in this review. This is mainly because it only indirectly addresses question one and does not discuss or control for endogeneity in the main variables of interest.

We assess Duflo et al.'s (2011) study to be of high quality. However, two limitations regarding external validity are highlighted by the authors. Firstly, they claim that in this programme, teachers were randomly assigned to sections. If the best teachers are assigned to the highest achieving students, the initially lower achieving students could be disadvantaged. Secondly, the authors question the applicability of tracking policies and whether similar results would be obtained in different contexts and settings. However, it must be noted that the key research question the authors focus on pertains to tracking and whether that can be beneficial for student learning. That tracking in this setting is achieved through the provision of a para-teacher is helpful as it helps us focus on question one while at the same time studying a hitherto unexplored angle in the literature. Another study by the same authors in 2009 is also assessed to be of high quality in addressing question one. The authors look at other factors that could be driving their results such as the fact that contract teachers are hired from the local community and are solely responsible for their group of students which helps address contextual factors that may be affecting their findings. In particular, the authors make several comparisons: (i) against just a reduction in class size, (ii) with a policy that increases a contract teacher and (iii) a policy that addresses school and teacher management, including training of a committee and increased parental involvement. In terms of the contract teacher effect, the comparison made here is a direct measure of the impact of being taught by a contract teacher rather than a civil service teacher in a school where there is a contract teacher. The authors note that because the effort of the civil service teacher was probably affected by the presence of the contract teacher, this comparison cannot be interpreted as the effect of hiring contract teachers rather than civil service teachers to achieve pupil:teacher ratios reductions.

Bourdon et al.'s (2005) study is assessed to be of high quality. While it is based on non-experimental data, it uses econometric techniques that help reduce biases in the estimates. We also rate Bourdon et al.'s (2010) study to be of high quality as this study is able to identify the effect of a contract teacher from the effect of a teacher who may have taught the students during the year of the assessment. This is because students are tested both at the beginning and at the end of the school year which allows the use of a value-added approach. As in the 2005 study, the

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

authors use sound methodological approaches to address potential biases in the estimates.

Because Michaelowa and Wittmann's (2007) dataset has a lot of missingness, which in many regressions reduces the dataset by up to 60-70 percent, this study has been ranked of low quality for the purposes of this review. The data are also very old (from the 1990s) and the study does not control for endogeneity well enough and does not directly address our research questions. Finally, the study does not clearly address limitations which lead to this low rank.

Vegas and De Laat's (2003) rich dataset reduces the potential effects of omitted variable bias (OVB) which will exist if parents choose schools based on the contractual status of its teachers. However, OLS even with a rich set of explanatory variables does not eliminate OVB entirely. The authors discuss the possibility of OVB arising as a result of student ability, although they argue that this is minimal as households in Togo are so budget constrained that the choice to send a child to a particular school is based more on household income than a child's ability/potential. We consider this study as a medium quality one. Despite limitations, the authors attempt to acknowledge and mitigate them to the best extent possible. They also include prior student attainment as a control variable as well as teacher sorting. In addition they discuss selection and attenuation bias and how these are mitigated.

Fagnäs and Pelkonen's (2011) study is assessed to be of high quality for the purposes of addressing the key questions asked in this review. The study is based on a sound assessment of the issue under consideration. In particular, since the student teachers have only recently entered the training programme, it can be assumed that the programme itself has not yet significantly shaped their skills or preferences. Thus, it provides a picture of para-teachers 'as they are' and standard students in the first stage of their career. The authors also conduct robustness checks to overcome the possible limitation that respondents use strategic behaviour in responding or use what the authors term 'lexicographic preferences'. The estimates and conclusions remain unchanged even after these checks. There may also be concern that because the authors' sample contains para-teachers who have more experience than standard trainee teachers, their preferences may be altered by this fact. The authors restrict their sample to only trainee teachers with at least one year of teaching experience and find that there are only minor differences in the main results.

Geeves and Bredenberg's (2005) study is assessed to be of medium/low quality. While the study looks at teacher shortages in great detail and how the contract teacher programme has been very effective in addressing these issues, it is mainly based on analysing descriptive statistics and narrative analysis. The authors do mention the question of whether contract teachers are less effective than regular teachers but no rigorous research is done to investigate it and differing levels of qualifications and training of regular versus contract teachers are merely mentioned. The study does, however, mention that more contract teachers tend to be from ethnic minorities so therefore more able to speak the local language and provide more community relevant education. The fact that this study addresses

question three (which is a difficult question to address methodologically) allows us to rank it as a medium/low quality study.

### 3.5 Summary of results of synthesis

In the table below, we summarise the WoE for each sub-question asked in the SR.

**Table 3.4:** Summary of synthesis of results

Outcome category	No. of studies	No. of studies showing positive effect of contract teacher	No. of studies showing negative effect of contract teacher	No. of studies showing no effect of contract teacher	Strength of evidence? <sup>1</sup>
Student learning	15	10	1	4	Modest (depends on context)
Cost-effectiveness	7	7	0	0	Robust
Teacher shortages	3	3	0	0	Insufficient

<sup>1</sup> Categories: robust evidence, modest evidence, evidence of no effect, insufficient evidence.

The vast majority of the studies that look at contract teachers address the first sub-question. On the whole, it can be concluded that the evidence indicates that contract teachers are generally more effective in improving student outcomes than regular teachers. Having said that, the research does indicate that these findings are often context-specific. For example, Bourdon et al. (2010) found mixed results of contract teacher effectiveness despite the fact that their overall conclusion regarding contract teachers in the three countries was positive. This is coupled with the fact that all of the studies that look into the sub-question of relative efficiency of contract teachers state categorically that they appear to be a more cost-effective means of imparting learning. However, it should be noted that there is a dearth of research on this front and most of the work on costs appears to be an appendage to the principal aim of answering the question of relative effectiveness. Similarly, rigorous evidence on the third sub-question, i.e. whether contract teachers help alleviate teacher shortages, is limited despite the fact that theoretically one would expect this not to be questionable as contract teachers policy is mainly instigated to overcome the teacher shortage problem.

## 4. Implications

### Outline of chapter

Section 4.1 reviews the strengths and limitations of the research. Section 4.2 discusses the implications of the findings for policy makers. Section 4.3 outlines directions for future research.

### 4.1 Strengths and limitations of this systematic review

One of the key strengths of the research approach taken in this review is that by adopting a narrative synthesis approach, we are able to take a relatively broad view of including evidence thereby maximising the amount of information available for consideration. Unfortunately, a meta-analysis was not possible due to the nature of research in this field and any such work would have resulted in a non-representative depiction of the available evidence.

Another strength of this research is the heterogeneity of the types of publications and research designs that were incorporated. In addition, a large spectrum of outcome variables was considered resulting in a comprehensive range of policy implications. Finally, a significant strength of this review is some of its authors' own expertise and significant contributions in this area of research which benefited the quality of the review. Similarly, this SR has benefited from direct input from some of the other key contributors to this literature who were personally interviewed by the authors of the SR.

There are several limitations to the approach adopted in this research. Firstly, a key limitation of the review is the comparability across such differing studies adopting different methodological approaches. In addition, while conflicting results/evidence restrict the ease with which conclusions can be reached, in-depth discussion of context and confounding factors have helped posit alternative views in a comprehensive manner. The issue of subjectivity is also an important limitation in that while the tools used and the use of explicit criteria and of two independent reviewers may serve as quality control mechanisms, essentially this approach is based on the judgment of these reviewers to extract data and evaluate the studies. Additionally, outcomes such as test scores, while indicative of educational quality are not necessarily a comprehensive reflection of the holistic nature of the expectations placed on an education system. Limited studies take the RCT format and even those which utilise stringent econometric techniques do so on cross-sectional rather than panel data all of which point to the lack of quality data on which rigorous research can be based. Finally, the search strategy may have resulted in important and relevant research not being included due to the fact that it is not available on the Internet, not published in peer-reviewed literature, published in a language we did not include, etc., and therefore it not being represented in this SR despite stringent search processes and attempts by the authors.

## 4.2 Policy

A theory of change was proposed to posit the theoretical framework surrounding the research sub-questions addressed in this review. The research evidence has suggested that the relationships between contract teachers and student outcomes do manifest themselves in a manner similar to that suggested in the theoretical framework. However, the nature and size of this effect is context-specific.

From a policy perspective, research suggests that there is a need to devise policies and contracts that encourage more teacher effort. This can only be effective if the incentives and disincentives are aligned within the contracts and effectively enforced. For example, the threat of dismissal has been identified as a key motivating factor among contract teachers. However, if this threat is not credible, the incentive to exert effort to ensure contract renewal disappears. It is also important to note that contracts 'as they are' will only go so far in raising teacher effort as the evidence has shown that all teachers' effort (even that of contract teachers) is low on an absolute basis, and some studies note that those contract teachers who have had more than one tenure period exert less effort in subsequent tenure periods. This points to performance related renewal and the need for contract policy to be amended to combine the probationary, non-renewal aspect of contract terms with better salaries and benefits. Some researchers argue that explicit and implicit incentives for teachers are based on end-line performance of the group of students, rather than value added over time. If evaluations of a teacher's performance were on a value-added basis, teachers might be happier to work with initially lower-achieving students. This could provide some guidance to policy-makers in designing effective policies.

One concern in proposing an expansion of contract teachers is that although it may be beneficial in the short run, in the long term it could potentially create a two-tier system, with the additional concern that this may lead to demand for regularisation of these teachers which in itself would defeat the purpose of hiring them in the first place. However if their progression to regularisation was performance related this could alleviate the above concerns and help integrate the two teacher types (as suggested by several of the papers in the review). There is a need to revisit the entire system because if the system of using contract teachers is merely a by-way to regular appointments, the education system may end up with a large number of non-professional teachers who will have the same weak performance incentives as the current regular teachers.

Low motivation and attendance of regular teachers has been cited as a key factor contributing to low student outcomes. It is important for policy-makers to recognise that the same factors that generate low effort among regular teachers (such as missing facilities and deficiencies in infrastructure) are contributory factors not only in lowering student learning but also in negatively impacting on the effort of contract teachers.

The research that has been analysed in this SR can help guide policy-makers in several ways. One of the most prominent early studies on contract teachers by Muralidharan and Sundararaman (2008) identifies four main characteristics of contract teachers: (i) they are appointed on annual renewable contracts with no

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

guarantee of renewal, (ii) they are often less qualified than regular teachers and less likely to have a formal training certificate, (iii) they are paid much less than regular teachers (typically one-fifth of regular teachers' salaries), and (iv) they are more likely to be from the area where the school is located. Different countries have varying combinations of these features; for instance, India's contract policy displays all four. On the other hand, Pakistan's contract policy only displays one of the features: contract teachers are paid less than regular teachers. The effectiveness of contract teachers depends very much on the features of the contract itself as most of the studies reviewed here show. The direction of the incentive effect cannot be determined theoretically: on the one hand, the unfavourable conditions of new teacher contracts could be regarded as unfair and demotivating, and short-term contracts could prevent personal investments in pedagogical training and school specific human capital. On the other hand, for contract teachers, further employment prospects depend on performance and, among other things, parents' satisfaction, so that from this perspective, the contract statute could be expected to have a positive incentive effect. As far as the selection effect is concerned, the changed employment conditions could lead to a different composition of teacher candidates. On the one hand, we would expect a lower number of highly skilled candidates due to the inferior contract conditions. On the other hand, the reduced entry requirements could reduce entry costs and increase the attractiveness of (temporary) teaching positions. A higher demand for teachers would lead us to expect a lower quality of the marginal (newly employed) teacher.

Successful implementation of contract teachers relies upon several factors. As discussed above, credible threats of dismissal are clearly crucial in ensuring effort. Some studies show that hiring teachers from within the local community is an effective hiring mechanism. Additionally, many of the studies suggest the need for a single professional development ladder for contract and regular teachers because building promotion incentives into teacher contracts may be a useful way of raising teacher effort and motivation while simultaneously removing the existing dual system that may be detrimental to teacher morale. This would further entail a need for training programmes that develop skills of contract teachers to ensure they meet future needs.

This review has shown that contract teachers can impart learning at least as effectively as regular teachers but at a fraction of the cost. Therefore, heavy burdens of teacher salaries on educational expenditure budgets would warrant expanding contractual hiring. Practically, however, policy-makers' ability to further expand contract teacher usage may be constrained by political economy issues. Heavy unionisation and political involvement of teachers, as highlighted previously, may restrict the use of this potentially unpopular albeit cost-effective intervention. However, some of these concerns may be partially mitigated though not completely eliminated by implementing contractual hiring with single professional development ladders and building promotional incentives into existing contracts.

There are several additional points that must be considered as follows:

- i. New policies despite being backed by research and experience may not necessarily be implementable despite being known to be effective. This may be due to political opposition to them being implemented in the first place, them being implemented in a watered-down fashion or even them being rendered non-functional due to corruption. Therefore, international reviews originating from international research communities such as this may be helpful in this regard.
- ii. The use of contract teachers brings some features of the private sector into the public sector. In addition to this, in many situations the public sector may be in direct competition with the private sector with regards to contract teachers. Therefore more rigorous research in this arena is needed as highlighted by this review which indicates that there are very few such papers in existence.
- iii. Finally, assuming that the policies for contract teachers work as they should, it could be helpful for practitioners to be more explicit in listing the conditions under which the expansion in the use of contract teachers makes sense in view of the results. Such lists could be as follows:

Increase the use of contract teachers if:

- The pay difference to regular teachers is large (potential costefficiency gains)
- There are many qualified applicants for contract teachers' jobs (small trade-off in quality)
- Region is more remote / minority dominated (relative merits of contract teachers pronounced)
- Middle classes reject public system (public system fails the 'market test')<sup>1</sup>

### 4.3 Research

We recommend certain key areas and priorities for future research.

Firstly, our investigations have indicated a geographical concentration of research with the majority of studies focusing on the Indian subcontinent and some studies on African countries. Our review would suggest broadening the evidence base to cover a more representative geographical area especially the DFID priority countries.

Despite good progress being made towards addressing our first research question, this SR has highlighted gaps on this front but more particularly the severe shortage of extensive and rigorous research on the second two questions. Superficial attempts have been made to address the questions of whether contract teachers are effective at eliminating teacher shortages and whether they are cost-effective, however more robust and in-depth analysis is needed. For example, analysis of cost-effectiveness of contract teachers would suggest that the most policy-relevant question is not comparing one contract teacher to one regular teacher, as much of the literature has done, but more a question of comparing one regular teacher with

---

<sup>1</sup> We thank Panu Pelkonen for these comments.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

several contract teachers that could be afforded on the salary of one regular teacher with no resultant negative impact on student learning.

In addition to this, there is a need for research to look at programmes which have provisions for giving teachers civil service status. More longer-term rigorous data are needed not only on what happens when contract teachers are placed in education systems but also following up on these teachers and in particular examining the impact they have on students if and when they are given civil service status.

Research indicates that while globally several countries have initiated contract teacher programmes, few have given consideration to effective impact evaluations and implemented systems whereby they can be carried out. Research on this can provide guidance to policy-makers not only to evaluate the policies that they themselves have implemented but also to provide them with international best practice from other contract teacher policy reforms.

## 5. References

- Aslam M (2009) The relative effectiveness of government and private schools in Pakistan: are girls worse off? *Education Economics* 17(3): 329-354.
- Atherton P, Kingdon G (2010) *The relative effectiveness and costs of contract and regular teachers in India*. CSAE Working Paper Series 2010-15. Oxford: Centre for the Study of African Economies, University of Oxford.
- Bourdon J, Froelich M, Michaelowa K (2005) Broadening access to primary education: contract teacher programs and their impact on education outcomes in Africa - an econometric evaluation for the Republic of Niger. Paper presented at: *Annual Conference of the Research Committee Development Economics of the German Economic Association on 'Pro-Poor Growth'*, Kiel Institute for World Economics, Germany, 2005.
- Bourdon J, Froelich M, Michaelowa K (2010) Teacher shortages, teacher contracts and their effect on education in Africa. *Journal of Royal Statistical Society, Series A*: 173(1): 93.
- Chaudhry N, Hammer J, Kremer M, Muralidharan K, Rogers FH (2006) Missing in action: teacher and health worker absence in developing countries. *Journal of Economic Perspectives* 20(1): 91-116.
- Diaz, H. and Saavedra, J. (2002), 'Peru: Sobran Regulaciones, Falton Estimulos', in J.C. Navarro (ed.)? quienes son los maestros?: CARRERAS e incentivos docentes en America Latino, Washington D.C., IDB.
- DISE (2009) Flash Statistics 2009-10. New Delhi: District Information System for Education.
- Duflo E, Dupas P, Kremer M (2009) *Additional resources versus organizational changes in education: experimental evidence from Kenya*. Mimeo. Cambridge: Massachusetts Institute of Technology. <http://econ-www.mit.edu/files/4286>
- Duflo E, Dupas P, Kremer M (2011) Peer effects and the impact of tracking: evidence from a randomized evaluation in Kenya. *American Economic Review* 101(5): 1739-1774.
- Duthilleul Y (2005) *Lessons learnt in the use of 'contract' teachers*. Paris: International Institute for Educational Planning, UNESCO.
- EdCil (2007) *Teachers' absence in primary and upper primary schools in Andhra Pradesh, Madhya Pradesh and Uttar Pradesh: abridged report*. New Delhi: Educational Consultants India Ltd.
- Fagernäs S, Pelkonen P (2011) *Whether to hire local contract teachers? Trade-off between skills and preferences in India*. SERC Discussion Paper No. 83. London: Spatial Economics Research Centre, London School of Economics.
- Fyfe A (2007) *The use of contract teachers in developing countries: trends and impact*. Working Paper. Geneva: International Labour Office. May 2007.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

Geeves R, Bredenberg K (2005) *Contract teachers in Cambodia*. UNESCO commissioned report - country study. Paris: International Institute for Educational Planning, UNESCO.

Govinda R, Josephine Y (2004) *Para teachers in India: a review*. Mimeo. New Delhi: National Institute of Educational Planning and Administration.  
[www.unesco.org/iiep/eng/research/basic/PDF/teachers5.pdf32](http://www.unesco.org/iiep/eng/research/basic/PDF/teachers5.pdf32)

Goyal S, Pandey P (2009) *Contract teachers*. Report No. 28. Washington, DC: South Asia Human Development Sector, World Bank. November 2009.

Goyal S, Pandey P (2011) Contract teachers in India. *Education Economics*. DOI: 10.1080/09645292.2010.511854.

Habib M (2010) *The impact of 2002 national teacher contract policy reform on teacher absenteeism in Lahore, Pakistan*. Unpublished Phd dissertation, George Washington University, Washington DC.

Kingdon G, French R (2010) *The relative effectiveness of private and government schools in rural India, evidence from ASER data*. DQSS Working Paper 1003. London: Institute of Education, University of London.

Kingdon G, Sipahimalani-Rao V (2010) Para-teachers in India: status and impact. Special Article. *Economic and Political Weekly* 45(12). 20 March 2010.

Kremer M, Muralidharan K, Chaudhury N, Hammer J, Rogers FH (2005) Teacher absence in India: a snapshot. *Journal of the European Economic Association* 3(2-3), 658-667.

Leclercq F (2002) *The impact of education policy reforms on the education system: a field study of EGS and other primary schools in Madhya Pradesh*. CSH Occasional Paper No. 5. New Delhi: French Research Institutes in India.

Michaelowa K, Wittmann E (2007) The cost, satisfaction, and achievement of primary education - evidence from francophone sub-Saharan Africa. *Journal of Developing Areas* 41(1): 51-78.

Ministry Of Education (2006) Ministry of Education, Islamabad, Pakistan.  
[www.moe.gov.pk](http://www.moe.gov.pk)

Muralidharan K, Sundararaman V (2008) *Teacher incentives in developing countries: experimental evidence from India*. Working Paper 2008-13. Nashville: National Centre on Performance Incentives, Peabody College of Vanderbilt University.

Muralidharan K, Sundararaman V (2009) *Teacher performance pay: experimental evidence from India*. NBER Working Paper 15323. Cambridge: National Bureau of Economic Research. [www.nber.org/papers/w15323](http://www.nber.org/papers/w15323)

Muralidharan K, Sundararaman V (2010) *Contract teachers: evidence from India*. San Diego: Department of Economics, University of California at San Diego.

NCAER (2008) *Deployment and professional competence of para-teachers: executive summary*. New Delhi: National Council of Applied Economic Research.

Pratichi Trust (2002) *Education report*. [www.amartyasen.net/pratichi.htm](http://www.amartyasen.net/pratichi.htm)

Rawal S, Kingdon G (2010) *Akin to my teacher: does caste, religious or gender distance between student and teacher matter? Some evidence from India*. DoQSS Working Paper 10-18. London: Department of Quantitative Social Science Institute of Education, University of London.

Sankar D (2008) *Unravelling teachers' time on task and nature of tasks: evidences from three Indian states*. Draft paper. New Delhi: World Bank.

Vegas E, De Laat J (2003) *Do differences in teacher contracts affect student performance? Evidence from Togo*. Washington DC: World Bank.

## Appendices

### Appendix 1.1: Authorship of this report

Professor Geeta Kingdon, Institute of Education, University of London.

Dr Monazza Aslam, Institute of Education, University of London.

Shenila Rawal, Institute of Education, University of London.

Sushmita Das, ASER Centre, India.

Professor Kingdon has contributed to the literature base.

### Contact details

Dr Monazza Aslam

5 Downside End,

Risinghurst

Oxford, UK

OX3 8JF

Email: [monazza.aslam@wolfson.oxon.org](mailto:monazza.aslam@wolfson.oxon.org)

The EPPI-Centre reference number for this report is 2103.

This report should be cited as:

Kingdon K, Aslam M, Rawal S, Das S (2013) Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes? London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London

ISBN: 978-1-907345-47-0

## **Appendix 1.2: Milestones in the review process**

### ***Expected time frame of tasks to be completed***

15 October 2011:

Protocol to be submitted to the EPPI-Centre:

End-December 2011:

Protocol completed in light of reviewers' comments, approved by DFID.

Beginning January - end February 2012:

- i. Complete the search (on databases/manual/etc.)
- ii.) Upload search results onto EPPI-Reviewer
- iii. Apply search criteria on the basis of title and abstract information
- iv. Code selected studies and de-selected studies
- v. Document the initial selection process
- vi. Retrieve included studies

March 2012 - May 2012:

- i. Apply inclusion/exclusion criteria, code included studies and excluded studies
- ii. Document included and excluded studies
- iii. Carry out evaluation/critical appraisal
- iv. Code study characteristics (e.g. estimation method, publication type) and code studies in relation to research questions
- v. Extract information from each included study
- vi. Conduct remaining analysis

May 2012 - 17 June 2012:

Write review and submit to referees

June - end August 2012:

Amend review in light of comments and submit final draft

## Appendix 2.1: Search strategy for electronic databases

### EBSCO host

#### *Search syntax*

Boolean operators can be used within and between fields - AND, OR, NOT.

Truncation is denoted as usual, with \* (1 or more characters).

Wildcards are entered as ? (1 missing character) or # (0 or 1 missing characters).

Proximity searches are implemented using Nx (within x words of each other, any order) and Wx (within x words of each other, in order specified in search).

Parentheses ( ) are used to group terms. If search for (x) and (y), the database first finds x, then within those result, finds y.

Exact phrases can be searched for using quotation marks “x”. Quotation marks as in the search string below will not be recognised when copied and pasted. They must be entered manually in the search window.

Punctuation internal to phrases does not affect searches e.g. “para teacher” will find “para-teacher”.

Search mode should be set to ‘Boolean/Phrase’, in order to support all Boolean operators.

Searches are run separately in title, abstract and subject - TI, AB, SU. Searches are also separate by database, to allow individual searches of thesauruses.

#### *Search strings*

##### Initial search

Two key search strings are used initially. These are limited to 2000-12:

```
TI(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") W3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel"))
```

```
AB(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") W3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel"))
```

```
SU ("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")
```

Database	Details
ERC (Education Research Complete)	In ERC, searches are restricted to academic journals, conference papers, and reference books. ERC contains a full thesaurus of subject terms (a separate field “keywords KW” of author supplied terms is disregarded). In addition to the TI, AB and SU searches run above, a search of the following string is run within the thesaurus:  "contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR

"non-permanent" OR "fixed-term" OR "teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel"

After a manual search of the thesaurus for relevant terms, the following string is run:

DE ("TEACHERS' contracts" OR "SCHOOL personnel management" OR "INDIAN teachers" OR "TEACHER-school board relationships")

The four search strings are then combined, yielding 408 hits.

EconLit

"Personnel" is removed from the subject search, as this is a non-education database, which makes this too broad a term to use. In particular, because this is an economics database, "personnel" in combination with "contract" yields a large numbers of irrelevant hits. The concentrated subject search, which yields only 5 hits, is thus:

SU ("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff")

A manual search of index terms was also undertaken, though there did not appear to be any of use. Therefore, the above search is combined with the TI and AB searches noted under the initial search, with date restrictions. This yields 10 hits.

TRC  
(Teacher  
Reference  
Center)

This database contains both peer-reviewed pieces and magazine/periodical pieces. The search is restricted only to cover peer-reviewed pieces. Date restrictions are also used. The database does not contain a thesaurus, so the three strings noted under 'Initial search' are run, then combined. This yields 19 hits.

eBook  
Collection

This database does not contain abstracts or a thesaurus, so only title and subject searches are run. There are 0 hits.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## ProQuest

### *Search syntax*

Databases: Proquest is a platform with access to a number of databases. We search the following seven databases via Proquest: ASSIA, ERIC, IBSS, Dissertations and Theses: UK and Ireland, Australian Education Index (AEI), British Education Index (BEI) and PsycINFO.

Thesaurus terms are database specific, so each database must be searched individually.

Search fields: we search in title, abstract and subject, and separately in thesaurus, where available. Separate codes with commas can search two fields at once, e.g. TI,AB (education) will search both title and abstract for education. Descriptors are referred to as subject terms, and can be searched using the field DE.

Exact phrases: exact terms are specified using “x”, and brackets can also be used. Quotation marks must be typed directly into the search engine, the versions appearing below are not recognised. Punctuation marks inside quotation marks are ignored.

Combining terms: standard Boolean search terms apply - AND, OR, NOT. These can be applied across or within fields.

Proximity searches: can be implemented as within searches, which ignore word order, using W/x. Can also be implemented as pre-searches, which retain word order, using P/x.

Wildcards: standard wildcard characters can also be used, with \* for any number of characters, and ? for one character only.

Other: date restrictions are applied.

### *Search strings*

#### Initial search

In order to implement the search strategy, we run the following three searches in each database. We use the command line window to do this.

```
TI(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)
```

```
AB(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)
```

```
SU(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)
```

Results which appear potentially relevant are searched manually for potential thesaurus terms. In addition, a manual search of each database's thesaurus for each of the terms in the above searches is made, and additional relevant search

terms are added. This builds up a final search string for SU in each database. This search is then run, and finally, all three searches combined.

Database	Details of thesaurus search
ASSIA	<p>The final thesaurus search used is:</p> <pre>SU(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "employment contracts" OR "short term" OR "short term contracts" OR "temporary employees") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel" OR "teaching" OR "elementary education")) AND YR(&gt;=2000)</pre> <p>The final search used is (35 hits):</p> <pre>(TI(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(&gt;=2000)) OR (AB(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(&gt;=2000)) OR (SU(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "employment contracts" OR "short term" OR "short term contracts" OR "temporary employees") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel" OR "teaching" OR "elementary education")) AND YR(&gt;=2000))</pre>
IBSS	<p>This database utilises a subject field, with the field code SU. The following search is run within the SU field:</p> <pre>SU(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "labo?r contract" OR "temporary employment" OR "temporary work") AND ("teacher*" OR "teaching" OR "teaching staff" OR "teaching personnel" OR "schooling" OR "educator*" OR "education staff" OR "education")) AND YR(&gt;=2000)</pre> <p>The final search used is (47 hits):</p> <pre>(TI(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(&gt;=2000)) OR (AB(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(&gt;=2000)) OR (SU(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "labo?r contract" OR "temporary employment" OR "temporary work") AND ("teacher*" OR "teaching" OR "teaching staff" OR "teaching personnel" OR "schooling" OR "educator*" OR "education staff" OR "education")) AND YR(&gt;=2000))</pre>

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

ProQuest  
Dissertation This database does not have a searchable set of thesaurus terms, though it does have non-standardised subject headings which can be searched. There are only 3 hits from the first two searches, and these do not yield any useful subject headings. The final search is:

```
(TI(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (AB(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (SU(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000))
```

ERIC The final thesaurus search used is:

```
SU(("Contract*" OR "temporary" OR "Temporary Employment" OR "interim" OR "non-permanent" OR "fixed-term") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "Teacher Employment" OR "Teaching (Occupation)" OR "teacher recruitment" or "teacher characteristics")) AND YR(>=2000)
```

“Short term” is removed as this refers only to “short-term memory” in the thesaurus. “Para” is deleted because it refers specifically to persons in secondary teaching roles under ERIC definitions. The final search is thus:

```
(TI(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (AB(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (SU(("Contract*" OR "temporary" OR "Temporary Employment" OR "interim" OR "non-permanent" OR "fixed-term") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "Teacher Employment" OR "Teaching (Occupation)" OR "teacher recruitment" or "teacher characteristics")) AND YR(>=2000))
```

PsycINFO Thesaurus terms are referred to as ‘subject heading, all’ in Proquest. In addition to the standard search, a manual search of the thesaurus is run to locate descriptor terms. The thesaurus search is contained within the hits yielded by a search of the following string:

teach\* or educat\* or contract\* or temporary or interim or short-term or non-permanent

This yields three terms potentially of interest: “elementary education”, “elementary school teachers”, “teacher tenure”. The

first two replace “personnel”, which again yields large numbers of irrelevant hits because this is a non-education database. The third is added to the search string. The final subject search is then formed as:

```
SU(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "Teacher Tenure") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "elementary education" OR "Elementary school teachers" )) AND YR(>=2000)
```

This yields 199 hits. The final search string is (225 hits):

```
(TI(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (AB(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (SU(("contract" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "Teacher Tenure") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "elementary education" OR "Elementary school teachers" )) AND YR(>=2000))
```

AEI

Thesaurus terms are referred to as ‘subject heading, all’ in Proquest. In addition to the standard search, a manual search of the thesaurus is run to locate descriptor terms. The thesaurus search is contained within the hits yielded by a search of the following string:

```
teach* OR educat* OR contract*OR para*OR temporary OR interim OR short-term OR non-permanent OR fixed-term
```

This yields terms potentially of interest: “primary school teachers”, “contracts”, “employment status, “teacher employment”, “temporary employment”. These are used in the subject string as follows:

```
(SU(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "Temporary employment" OR "Employment status" OR "Teacher employment") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel" OR "Primary school teachers" )) AND YR(>=2000))
```

The final search string is (162 hits):

```
(SU(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "Temporary employment" OR "Employment status" OR "Teacher employment") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel" OR "Primary school teachers" )) AND YR(>=2000)) OR (TI(("contract*" OR "para" OR "temporary" OR "interim" OR "short-
```

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

term" OR "non-permanent" OR "fixed-term") P/3 ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (AB(("contract\*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel")) AND YR(>=2000))

BEI

This use the same string and logic as described above for AEI:

(TI(("contract\*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (AB(("contract\*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") P/3 ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel")) AND YR(>=2000)) OR (SU(("contract\*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term" OR "Temporary employment" OR "Employment status" OR "Teacher employment") AND ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel" OR "Primary school teachers")) AND YR(>=2000))

## Web of Knowledge

### *Search syntax*

Databases: Web of Knowledge contains three databases within the system: Medline, Web of Science and Biosis. We search only Web of Science, as the other two are specifically medical and life science databases. Web of Science itself contains five databases. As there is no option to search thesaurus separately, one search is run for all databases.

Search fields: the platform contains two relevant search fields. Title is as standard. Topic searches title, abstract and keywords simultaneously. Keywords are composed of two separate fields, author assigned keywords, and keywords plus. KeyWords Plus® are index terms created by Thomson Reuters in which the terms are derived from the titles of articles cited by the author of the article being indexed. Keywords and abstract are not separately searchable fields. Field tags, e.g. TI, can not be used.

Exact phrases: quotation marks “x” are used to denote exact phrase searches. Phrase searching can be done only within the Title and Topic search fields. Exact phrase searches cannot be used with the \$ wildcard.

Combining terms: standard Boolean operators apply - NOT, AND, OR. These operators can be typed as above into the database if you wish to use them. Searches are processed in order of precedence of operators noted above. Case does not matter when using Boolean operators, i.e. or and OR return the same results.

Proximity searches: these can be implemented using the NEAR/x command. For example, NEAR/3 will find phrases within three words of each other. Order does not matter in near searches. There is no option for pre-searches.

Wildcards: -\*stands for any number of characters (including none),?stands for one character only, and \$stands for no or one characters.

Limits: date limits are applied via the relevant search field. Searches are not truncated. Parentheses are used to set relationships.

Other: hyphens do not affect search output i.e. “para teacher” returns “para-teacher”.

### *Search strings*

Two slightly different searches were run. Both initial search string were run as follows in the Topic field, with years restricted to 2000 on:

```
("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") NEAR/2 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")
```

This yields 142 hits. These were searched as two separate results categories, one for articles, and one for all other hits, including conference proceedings. This means there are two final search strings. The first, yielding 97 hits, is rendered as:

‘Web of Knowledge’ The CIW file ‘Web of Knowledge’ was generated using the following

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

search string:

Topic=(("contract\*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") NEAR/2 ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel"))

Refined by: Document Type=( ARTICLE ) AND Web of Science Categories=( EDUCATION EDUCATIONAL RESEARCH OR INDUSTRIAL RELATIONS LABOR OR ECONOMICS OR MANAGEMENT OR PUBLIC ADMINISTRATION OR EDUCATION SCIENTIFIC DISCIPLINES OR PSYCHOLOGY APPLIED OR EDUCATION SPECIAL OR SOCIOLOGY OR SOCIAL ISSUES OR SOCIAL SCIENCES INTERDISCIPLINARY OR PSYCHOLOGY OR PSYCHOLOGY EDUCATIONAL OR SOCIAL SCIENCES MATHEMATICAL METHODS )

Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH. Lemmatization=On

Note the error in this string in that it includes all years. This string is restricted to include articles only. It yields 253 hits on an initial search, and after refining, this falls to 97.

'Web of Knowledge - Other'

It was later discovered that the string should have included conference proceedings and date restrictions. A second string was thus run:

Topic=(((("contract\*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") NEAR/2 ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel"))))

Refined by: Document Type=( BOOK CHAPTER OR EDITORIAL MATERIAL OR MEETING ABSTRACT OR PROCEEDINGS PAPER OR BOOK REVIEW OR LETTER OR NEWS ITEM OR REVIEW ) AND Web of Science Categories=(BUSINESS OR ECONOMICS OR MANAGEMENT OR EDUCATION EDUCATIONAL RESEARCH OR EDUCATION SCIENTIFIC DISCIPLINES OR POLITICAL SCIENCE OR SOCIAL ISSUES OR STATISTICS PROBABILITY OR HISTORY OR HISTORY OF SOCIAL SCIENCES OR WOMEN S STUDIES )

Timespan=2000-2012. Databases=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH. Lemmatization=On

This includes the date restrictions previously forgotten, and also includes all types of documents other than articles. As such, the results from this string are mutually exclusive with the above string. This yields 142 hits initially, and 17 after refining. The resulting CIW file is named 'Web of Knowledge - Other'. Both files are uploaded into the database.

For the purposes of reporting

This is obviously a little messy, as mistakes have been made in the search. For the purposes of reporting, the following string could be used. This yields 67 hits, and should cover all the potentially relevant

hits included in the previous searches:

Topic=((("contract\*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") NEAR/2 ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel")))

Refined by: Web of Science Categories=( EDUCATION EDUCATIONAL RESEARCH OR MANAGEMENT OR ECONOMICS OR EDUCATION SCIENTIFIC DISCIPLINES OR PSYCHOLOGY APPLIED OR BUSINESS OR PSYCHOLOGY OR PSYCHOLOGY MULTIDISCIPLINARY OR SOCIOLOGY OR BUSINESS FINANCE OR PSYCHOLOGY CLINICAL OR EDUCATION SPECIAL OR POLITICAL SCIENCE OR SOCIAL SCIENCES INTERDISCIPLINARY OR PSYCHOLOGY EDUCATIONAL OR PUBLIC ADMINISTRATION OR SOCIAL ISSUES OR SOCIAL SCIENCES MATHEMATICAL METHODS )

Timespan=2000-2012. Databases=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH. Lemmatization=On

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## **JSTOR**

### *Search syntax*

Search fields: JSTOR is non-bibliographic, and does not contain any thesaurus. It also contains abstracts for only 10 percent of articles contained on the database. Therefore, in order to avoid losing information, we search in two fields, title and full-text.

Exact phrases: quotation marks are used to define exact phrases, and brackets to delimit search fields.

Combining terms: standard Boolean operators apply - AND, OR, NOT. The default operator is AND.

Proximity searches: are implemented using the tilde symbol, with ~x denoting 'within xX words of each other, in any order'. However, such searches can only be implemented across single terms, not in terms using Boolean operators, so cannot be applied here.

Plurals: adding & at the end of a word specifically searches for both singular and plural forms at the same time. This includes cases where plural and singular are spelled entirely differently.

Wildcards: ? searches for a single character, \* searches for multiple characters, # finds all variations on a given word, e.g. operate# finds operator, operating, operation, and so on. However, only four wildcards can be included in any given search.

Restrictions applied: we do not restrict by languages, or by type of publication (as all pieces are in peer-reviewed journals). We do restrict by date. We further restrict to only journals in potentially relevant fields: business, development studies, economics, education, management and organisational behaviour, public policy and administration, psychology, sociology, statistics.

Other: "personnel" is again removed from the search, as in a non-education specific database, it yields many irrelevant hits on non-education personnel. Searches are truncated after a certain number of characters.

### *Search strings*

We use one initial string, searching separately in title and abstract:

("contract\*" OR "para\*" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher&" OR "teaching staff" OR "educator&" OR "education staff")

These yield 1 and 72 hits respectively. However, as only 10 percent of articles have abstracts, we also run a full-text phrase specific search. This search has to be run in multiple strings because searches are truncated, although they can be run as a single search by adding fields to the search form. Moreover each string has to be made phrase specific as proximity searches cannot be run across multiple terms. The strings used are:

"contract teacher" OR "contract teachers" OR "contract teaching staff" OR "contract educator" OR "contract educators" OR "contract education staff"

"para teacher" OR "para teachers" OR "para teaching staff" OR "para educator" OR "para educators" OR "para education staff"

"temporary teacher" OR "temporary teachers" OR "temporary teaching staff" OR "temporary educator" OR "temporary educators" OR "temporary education staff"

"interim teacher" OR "interim teachers" OR "interim teaching staff" OR "interim educator" OR "interim educators" OR "interim education staff"

"short-term teacher" OR "short-term teachers" OR "short-term teaching staff" OR "short-term educator" OR "short-term educators" OR "short-term education staff"

"non-permanent teacher" OR "non-permanent teachers" OR "non-permanent teaching staff" OR "non-permanent educator" OR "non-permanent educators" OR "non-permanent education staff"

"fixed-term teacher" OR "fixed-term teachers" OR "fixed-term teaching staff" OR "fixed-term educator" OR "fixed-term educators" OR "fixed-term education staff"

This yields 101 hits in total. The search engine cannot combine searches, as it can process only three or fewer wildcards per search in total. The results for the three searches are thus downloaded separately.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## **ScienceDirect**

### *Search syntax*

Search fields: ScienceDirect contains three searchable fields of interest, title, abstract and keywords. Title and abstract are standard. Keywords includes both author supplied keywords, and index terms utilised by the publishing company. There does not appear to be searchable thesaurus, or the ability to search any individual databases within the platform such that individual thesauruses could be used.

Exact phrases: are implemented using quotation marks “x”. The quotation marks search will find the phrase, ignoring internal punctuation. Separately, one can search for a phrase using brackets {x}. This will include any internal punctuation in the search.

Combining terms: Boolean operators are used, though these are non-standard - AND, OR, AND NOT.

Wildcards: the wildcard \* can be used to search for any number of characters. The wildcard? can be used to replace any number of terms.

Proximity searches: can be implemented using W/x, which searches for two phrases within x words of each other, in any order. Can also be implemented using Pre/x, which searches for phrases which precede another phrase by x words.

Plurals: using the singular form of a word automatically runs a search for plural and possessive forms, e.g. “city” will find city, cities and city’s.

Restrictions applied: in addition to standard search areas, this platform allows results to be refined by a set of ‘subject areas’, which operate at multiple levels of classification e.g. the subject ‘social science’ contains ‘education’. As such, at the first level of the search we restrict ourselves to the subject areas: ‘business, management and accounting’, ‘economics, econometrics and finance’, ‘psychology’ and ‘social sciences’. Date restrictions are also applied.

Other: we work via the ‘advanced search’ option.

### *Search strings*

We run initial searches in title and abstract of the form:

```
("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") PRE/3 ("teacher" OR "teaching staff" OR "educator" OR "education staff")
```

And a separate keyword search which uses an “and” instead of “pre” operator:

```
("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher" OR "teaching staff" OR "educator" OR "education staff")
```

These searches are then combined. The final search string is below, and yields 31 hits:

(pub-date > 1999 and KEYWORDS(("contract\*" OR "para\*" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher" OR "teaching staff" OR "educator" OR "education staff"))[All Sources(Business, Management and Accounting,Economics, Econometrics and Finance,Psychology,Social Sciences)]) OR (pub-date > 1999 and ABSTRACT(("contract\*" OR "para\*" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") PRE/3 ("teacher" OR "teaching staff" OR "educator" OR "education staff"))[All Sources(Business, Management and Accounting,Economics, Econometrics and Finance,Psychology,Social Sciences)]) OR (pub-date > 1999 and TITLE(("contract\*" OR "para\*" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") PRE/3 ("teacher" OR "teaching staff" OR "educator" OR "education staff"))[All Sources(Business, Management and Accounting,Economics, Econometrics and Finance,Psychology,Social Sciences)])

## AJOL

### Notes

Search fields: title and keyword are available. It is unclear what 'keyword' covers. Abstract is not available. Searches cannot be combined.

Exact phrases: search for an exact phrase by putting it in quotes; e.g., "open access publishing".

Combining terms: standard Boolean operators apply - AND, OR, NOT. The default operator is AND. Exclude a word by prefixing it with - or NOT; e.g. online -politics or online NOT politics.

Proximity searches: these are not available.

Wildcards: use \* in a term as a wildcard to match any sequence of characters, e.g. soci\* morality would match documents containing sociological or societal.

Restrictions: publications are from 1900 onwards, so date restrictions must be applied from 2000 to 2012. Parentheses can also be used to develop complex searches

Other: search terms are case-insensitive, i.e. capitalisation does not matter. Common words are ignored. Searches are truncated, so strings need to be run separately.

### Search strings

Search strategy is designed bearing in mind that proximity searches are not available, search strings are truncated by the interface, and multiple searches cannot be combined. We thus run the search as seven separate strings. These are run twice each, once in the title field, and once in the keywords field. All journals are searched. No language restrictions are applied. Date restrictions are applied in the year field (2003-12):

"contract teach\*" OR "contract teaching staff" OR "contract educat\*" OR "contract education staff" OR "contract personnel"

"para teach\*" OR "para teaching staff" OR "para educat\*" OR "para education staff" OR "para personnel"

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

“temporary teach\*” OR “temporary teaching staff” OR “temporary educat\*” OR “temporary education staff” OR “temporary personnel”

“interim teach\*” OR “interim teaching staff” OR “interim educat\*” OR “interim education staff” OR “interim personnel”

“short-term teach\*” OR “short-term teaching staff” OR “short-term educat\*” OR “short-term education staff” OR “short-term personnel”

“non-permanent teach\*” OR “non-permanent teaching staff” OR “non-permanent educat\*” OR “non-permanent education staff” OR “non-permanent personnel”

“fixed term teach\*” OR “fixed term teaching staff” OR “fixed term educat\*” OR “fixed term education staff” OR “fixed term personnel”

0 hits are returned.

## AsiaJOL

### *Search syntax*

Search fields: title and subject are available. It is unclear what 'subject' covers. Abstract is not available. Searches cannot be combined.

Exact phrases: search for an exact phrase by putting it in quotes, e.g. "open access publishing".

Combining terms: standard Boolean operators apply (AND, OR, NOT). The default operator is AND. Exclude a word by prefixing it with - or NOT; e.g. online -politics or online NOT politics.

Proximity searches: these are not available.

Wildcards: use \* in a term as a wildcard to match any sequence of characters, e.g. soci\* morality would match documents containing "sociological" or "societal".

Restrictions: publications are from 1900 onwards, so date restrictions must be applied from 2000 to 2012. Parentheses can also be used to develop complex searches.

Other: search terms are case-insensitive, i.e. capitalisation does not matter. Common words are ignored. Searches are truncated, so strings need to be run separately.

### *Search strings*

Search strategy is designed bearing in mind that proximity searches are not available, search strings are truncated by the interface, and multiple searches cannot be combined. We thus run the search as seven separate strings. These are run twice each, once in the title field, and once in the subject field. All journals are searched. No language restrictions are applied. Date restrictions are applied in the year field (2000-12):

"contract teach\*" OR "contract teaching staff" OR "contract educat\*" OR "contract education staff" OR "contract personnel"

"para teach\*" OR "para teaching staff" OR "para educat\*" OR "para education staff" OR "para personnel"

"temporary teach\*" OR "temporary teaching staff" OR "temporary educat\*" OR "temporary education staff" OR "temporary personnel"

"interim teach\*" OR "interim teaching staff" OR "interim educat\*" OR "interim education staff" OR "interim personnel"

"short-term teach\*" OR "short-term teaching staff" OR "short-term educat\*" OR "short-term education staff" OR "short-term personnel"

"non-permanent teach\*" OR "non-permanent teaching staff" OR "non-permanent educat\*" OR "non-permanent education staff" OR "non-permanent personnel"

"fixed term teach\*" OR "fixed term teaching staff" OR "fixed term educat\*" OR "fixed term education staff" OR "fixed term personnel"

0 hits are returned from any search.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## LAMJOL

### *Notes*

Searches are truncated, so strings need to be run separately.

Publications are from 2010 onwards, so there is no need for date restrictions.

Wild cards allowed: \* truncates searches.

Search strings pasted into full-text to yield the broadest possible search with no date or other restrictions specified.

0 hits are returned from any search.

Note: the journals contained in LAMJOL are all Spanish language journals, therefore it is not clear from the limited help files available if English search terms are appropriate.

### *Search strings*

“contract teacher\*” OR “contract teaching staff” OR “contract educator\*” OR  
“contract education staff” OR “contract personnel”

“para teacher\*” OR “para teaching staff” OR “para educator\*” OR “para education  
staff” OR “para personnel”

“temporary teacher\*” OR “temporary teaching staff” OR “temporary educator\*” OR  
“temporary education staff” OR “temporary personnel”

“interim teacher\*” OR “interim teaching staff” OR “interim educator\*” OR “interim  
education staff” OR “interim personnel”

“short-term teacher\*” OR “short-term teaching staff” OR “short-term educator\*”  
OR “short-term education staff” OR “short-term personnel”

“non-permanent teacher\*” OR “non-permanent teaching staff” OR “non-permanent  
educator\*” OR “non-permanent education staff” OR “non-permanent personnel”

“fixed term teacher\*” OR “fixed term teaching staff” OR “fixed term educator\*”  
OR “fixed term education staff” OR “fixed term personnel”

**SSRN***Notes*

Search fields: either title, or titles + abstract + keywords are searchable. We search the second.

Exact searches: are run using x” to denote phrases. Punctuation within the phrase is ignored, e.g. “para teacher” finds “para-teacher”.

Combining terms: Boolean operators are used - AND, OR, NOT. Any spaces are interpreted as AND by default (Does not always appear to support OR in searches!). “ ” marks need to be manually inputted in SSRN. Copy and paste inserts a different form of quotation mark.

Wildcards: wildcard searches do not appear to be supported.

Other: searches are truncated. No date restrictions are possible.

With no ‘OR’ condition, it is not possible to search for multiple phrases at the same time. Therefore, individual searches within concept 1 were run, using a title and abstract search.

*Search strings*

With truncated searches and lack of clarity as to whether ‘OR’ searches are supported, each term is searched for individually. Remember to manually type in the quotation marks, as copy and paste will not input quotation marks which the search engine recognises.

“contract teacher*”	3	“contract teaching staff”	0	“contract personnel”	0
“para teacher*”	1	“para teaching staff”	0	“para personnel”	0
“temporary teacher*”	0	“temporary teaching staff”	0	“temporary personnel”	0
“interim teacher*”	0	“interim teaching staff”	0	“interim personnel”	1
“short-term teacher*”	0	“short-term teaching staff”	0	“short-term personnel”	0
“non-permanent teacher*”	0	“non-permanent teaching staff”	0	“non-permanent personnel”	0
“fixed term teacher*”	0	“fixed term teaching staff”	0	“fixed term personnel”	0
“contract educator*”	0	“contract education staff”	0		
“para educator*”	0	“para education staff”	0		
“temporary educator*”	0	“temporary education staff”	0		
“interim educator*”	0	“interim education staff”	0		
“short-term educator*”	0	“short-term education staff”	0		
“non-permanent	0	“non-permanent education	0		

Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?

educator**		staff		
'fixed term educator**	0	"fixed term education staff"	0	

## NBER

### Notes

Search fields: full text (website), full text (publications), author and title, and researcher are available. We search within full text (publications).

Exact phrases: "x" denotes specific phrases. Quotation marks can be copied directly from documents into the search engine.

Combining terms: Boolean operators can be used. Spaces are interpreted as AND by default. Capitalisation of operators may be required.

Wildcards: wildcard notation \* is supported.

Other: searches are truncated. No restrictions on date or topics are possible.

### [Search strings](#)

With truncated searches, strings are run separately as below. This is done within the full text, publications search field:

"contract teacher\*" OR "contract teaching staff" OR "contract educator\*" OR "contract education staff" OR "contract personnel"

4 hits

"para teacher\*" OR "para teaching staff" OR "para educator\*" OR "para education staff" OR "para personnel"

1 hit

"temporary teacher\*" OR "temporary teaching staff" OR "temporary educator\*" OR "temporary education staff" OR "temporary personnel"

1 hit

"interim teacher\*" OR "interim teaching staff" OR "interim educator\*" OR "interim education staff" OR "interim personnel"

0 hits

"short-term teacher\*" OR "short-term teaching staff" OR "short-term educator\*" OR "short-term education staff" OR "short-term personnel"

1 hit

"non-permanent teacher\*" OR "non-permanent teaching staff" OR "non-permanent educator\*" OR "non-permanent education staff" OR "non-permanent personnel"

0 hits

"fixed term teacher\*" OR "fixed term teaching staff" OR "fixed term educator\*" OR "fixed term education staff" OR "fixed term personnel"

0 hits

## EconPapers

### *Search syntax*

Search fields: the available search fields are author, keywords and title, JEL code, and free text. We search keywords and title. JEL codes are only available for one-third of papers, so are not used as restrictions.

Exact phrases: these can be searched for using quotation marks. These need to be manually typed into the engine; copy and paste will not input quotation marks which the search engine recognises.

Combining terms: the standard Boolean operators AND, OR, NOT are supported. The default setting is AND. Parentheses are also supported.

Proximity searches: the operator NEAR is supported.

Wildcards: the \* wildcard is supported. This indicates any string of characters, including none.

Other: date restrictions are not possible. We search in working papers, articles, and books and chapters only. Keywords and title is set to 'search for phrase or word forms'.

### *Search strings*

The following string is run in the 'keywords and title' search field. "Personnel" is removed from the string because this is a general economics database, and hence yields large number of irrelevant hits.

```
("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")
```

This yields 100 hits exactly.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## World Bank

	Policy Research Working Papers Downloads	Policy Research Reports Downloads	World Bank Economic Review Downloads
Contract teacher	5	0	1
Contract teachers	2	0	0
Contract teaching staff	0	0	0
Contract educator	0	0	0
Contract educators	0	0	0
Contract education staff	2	0	0
Para-teacher		0	0
Para-teachers		0	0
Para-teaching staff		0	0
Para-educator	0	0	0
Para-educators		0	0
Para-education staff		0	0
Temporary teacher	0	0	0
Temporary teachers	0	0	0
Temporary teaching staff	0	0	0
Temporary educator	0	0	0
Temporary educators	0	0	0
Temporary education staff	0	0	0
Interim teacher	0	0	0
Interim teachers	0	0	0
Interim teaching staff	0	0	0
Interim educator	0	0	0
Interim educators	0	0	0
Interim education staff	0	0	0
Short-term teacher	3	0	0
Short-term teachers	3	0	0
Short-term teaching staff	0	0	0
Short-term educator	0	0	0
Short-term educators	0	0	0

*Appendix 2.1: Search strategy for electronic databases*

Short-term education staff	0	0	0
Non-permanent teacher	1	0	0
Non-permanent teachers	2	0	0
Non-permanent teaching staff	0	0	0
Non-permanent educator	0	0	0
Non-permanent educators	0	0	0
Non-permanent education staff	0	0	0
Fixed-term teacher	0	0	0
Fixed-term teachers	0	0	0
Fixed-term teaching staff	0	0	0
Fixed-term educator	0	0	0
Fixed-term educators	0	0	0
Fixed-term education staff	0	0	0

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## **IMF**

### *Notes*

IMF interface searches by three criteria: title, author, and subject/keyword.

There are no help files available.

No truncation or wild card strategies were used.

Results from searches indicate that quotation marks are supported in the syntax.

The search strings consist of phrase searches within quotes.

The following search strings were run simultaneously in the title and subject/keyword field, along with a date restriction. These strings yielded 0 hits.

### *Search strings*

Title: "contract teacher" OR "contract teachers" OR "contract teaching staff" OR "contract educator" OR "contract educators" OR "contract education staff" OR "contract personnel" Subject/Keyword: "contract teacher" OR "contract teachers" OR "contract teaching staff" OR "contract educator" OR "contract education staff" OR "contract personnel" Date: After 1999 (0 hits)

Title: "para teacher" OR "para teachers" OR "para teaching staff" OR "para educator" OR "para educators" OR "para education staff" OR "para personnel" Subject/Keyword: "para teacher" OR "para teachers" OR "para teaching staff" OR "para educator\*" OR "para education staff" OR "para personnel" Date: After 1999 (0 hits)

Title: "temporary teacher" OR "temporary teachers" OR "temporary teaching staff" OR "temporary educator" OR "temporary educators" OR "temporary education staff" OR "temporary personnel" Subject/Keyword: "temporary teacher" OR "temporary teachers" OR "temporary teaching staff" OR "temporary educator\*" OR "temporary education staff" OR "temporary personnel" Date: After 1999 (0 hits)

Title: "interim teacher" OR "interim teachers" OR "interim teaching staff" OR "interim educator" OR "interim educators" OR "interim education staff" OR "interim personnel" Subject/Keyword: "interim teacher" OR "interim teachers" OR "interim teaching staff" OR "interim educator\*" OR "interim education staff" OR "interim personnel" Date: After 1999 (0 hits)

Title: "short-term teacher" OR "short-term teachers" OR "short-term teaching staff" OR "short-term educator" OR "short-term educators" OR "short-term education staff" OR "short-term personnel" Subject/Keyword: "short-term teacher" OR "short-term teachers" OR "short-term teaching staff" OR "short-term educator" OR "short-term educators" OR "short-term education staff" OR "short-term personnel" Date: After 1999

Title: "interim teacher" OR "interim teachers" OR "interim teaching staff" OR "interim educator" OR "interim educators" OR "interim education staff" OR "interim personnel" Subject/Keyword: "interim teacher" OR "interim teachers" OR "interim teaching staff" OR "interim educator" OR "interim educators" OR "interim education staff" OR "interim personnel" Date: After 1999

Title: “fixed term teacher” OR “fixed term teachers” OR “fixed term teaching staff” OR “fixed term educator” OR “fixed term educators” OR “fixed term education staff” OR “fixed term personnel” Subject/Keyword: “fixed term teacher” OR “fixed term teachers” OR “fixed term teaching staff” OR “fixed term educator” OR “fixed term educators” OR “fixed term education staff” OR “fixed term personnel” Date: After 1999

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## **UNDP**

### *Search syntax*

Search fields: UNDP searches are powered by Google Scholar, and follow a very similar output. Only URL, title and full text searches are available. UNDP does not allow abstracts or keywords searches. The database is non-bibliographic, and does not contain any thesaurus.

Specific phrases: these are denoted by quotation marks. Care must be taken to type these directly into the search engine: typing into word and copying will yield q-marks which the search engine cannot read.

Combining phrases: Boolean operators can be used, but these are not standard. There is no AND operator, as this is set as the default. The OR operator can be used as standard, but must be capitalised when typed. The NOT operator is included by typing a minus sign, -, directly in front of the term to be excluded. The + operator can be used to include common terms.

Proximity searches: these are not supported.

Wildcards: these are not supported.

Other: date restrictions cannot be applied. Hyphens are recognised. Google truncates all searches after circa 150 characters.

### *Search strategy*

The search strategy is very similar to that used in Google Scholar. However, there appear to be some technical issues with using the 'At least one of the words' search field, so instead, we use the 'All of the words' search field and the 'OR' operator. Truncation does not allow us to run all of these phrases simultaneously, so they are as seven separate strings, according to their stems. We search in 'any language' and 'anywhere in the page'. Hits need to be manually uploaded, as there is no option to output references. The strings used are as follows:

"contract teacher" OR "contract teachers" OR "contract teaching staff" OR "contract educator" OR "contract educators" OR "contract education staff" OR "teacher contracts" OR "contract personnel" (17 hits)

"para-teacher" OR "para-teachers" OR "para-teaching staff" OR "para-educator" OR "para educators" OR "para education staff" OR "para-personnel"

4 hits

"temporary teacher" OR "temporary teachers" OR "temporary teaching staff" OR "temporary educator" OR "temporary educators" OR "temporary education staff"

14 hits

"interim teacher" OR "interim teachers" OR "interim teaching staff" OR "interim educator" OR "interim educators" OR "interim education staff"

0 hits

"non-permanent teacher" OR "non-permanent teachers" OR "non-permanent teaching staff" OR "non-permanent educator" OR "non-permanent educators" OR "non-permanent education staff"

0 hits

"short-term teacher" OR "short-term teachers" OR "short-term educator" OR "short-term educators" OR "short-term teaching staff" OR "short-term education staff"

0 hits

"fixed-term teacher" OR "fixed-term teachers" OR "fixed-term educator" OR "fixed-term educators" OR "fixed-term teaching staff" OR "fixed-term education staff"

0 hits

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## UNESCO

### *Search syntax*

Advanced search form and thesaurus are available.

No Boolean operators can be used within a search field.

Phrase searches can be done by using brackets (), e.g. (contract teachers).

Fields are implicitly connected with AND.

Wild cards: \* used for truncation. For example peace\* will retrieve peace education and \*computer\* retrieves computers, microcomputers, computers, etc. However, when this was tried it produced confusing results; therefore in the final searches truncation was avoided.

### *Search strategy*

The search strategy is therefore one of running each search term individually within the 'Words from title' search field. The 'All words in field option' was selected, date restriction was applied and only documents in English were searched. All document types were searched. The stem "personnel" has been removed as it yields a broad and largely irrelevant number of hits.

Thesaurus terms: the same search strategy as described above was used, as only two terms at a time were searched.

Output: UNESDOC does not allow output into reference management software; it only allows for search results to be emailed, therefore hits were manually screened before citations were imported into EPPI-Reviewer.

### *Search strings*

(contract teacher)	1	(short-term educator)	0		
(contract teachers)	-	(short-term educators)	0		
(para teacher)	541	(non-permanent educator)	0		
(para teachers)	-	(non-permanent educators)	0		
(temporary teacher)	0	(fixed term educator)	0		
(temporary teachers)	0	(fixed term educators)	0		
(interim teacher)	0	(contract teaching staff)	0		
(interim teachers)	-	(para teaching staff)	3		
(short-term teacher)	0	(temporary teaching staff)	0		
(short-term teachers)	0	(interim teaching staff)	0	Relevant hits uploaded to EPPI	
(non-permanent teacher)	0	(short-term teaching staff)	0	Contract teacher	1
(non-permanent	0	(non-permanent teaching	0	Para teacher	1

Appendix 2.1: Search strategy for electronic databases

teachers)		staff)			
(fixed term teacher)	0	(fixed term teaching staff)	0	Para educator	0
(fixed term teachers)	0	(contract education staff)	0	Para teaching staff	0
(contract educator)	0	(para education staff)	17	Para education staff	0
(contract educators)	0	(temporary education staff)	0		
(para educator)	83	(interim education staff)	0		
(para educators)	-	(short-term education staff)	0		
(temporary educator)	0	(non-permanent education staff)	0		
(temporary educators)	0	(fixed term education staff)	0		
(interim educator)	0				
(interim educators)	0				

*Thesaurus search results*

No brackets required for the keywords in the thesaurus search.

The following search terms were selected after a manual search of the UNESCO thesaurus. The selected terms appeared to be the most relevant.

	Keyword	All hits	Relevant hits Uploaded to EPPI-Reviewer
1	Teacher administration relationship	2	0
2	Teacher conditions of employment	86	7
3	Teacher recruitment	21	6
4	Teacher qualifications	68	5
5	School community relationship	35	0
6	Teacher employment	11	0
7	Teacher shortage	44	1
8	Educational manpower	1	1
	Total	268	20

*Note on screening*

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

The results from this database are very large, and outputting into EndNote/RIS files is not possible and also very limited scope is available to be able to screen in detail (as would have been possible in EPPI-Reviewer). Relevant hits were selected after scanning of titles, and where possible abstracts and in some cases preliminary scanning of full-text for those documents that had unrestricted access. This manual search and screening has been done to the best of our ability, given the constraints of this database.

## ILO

### *Search syntax*

This interface only allows for one term or phrase at a time.

It does not allow Boolean operators in the search fields.

No truncation allowed. A search for “contract teacher” also brings up results for “contract teachers” and vice versa.

Search terms “contract/para/temporary/interim personnel” are removed for this database, as it is a database for labour and it applies to a broad range of personnel.

EndNote/RIS exports are not supported.

Only basic searches of full-text are permitted.

### *Search strategy*

The following individual search phrases were used and refined:

i. “contract teachers” (103 hits)

This was further refined by the following:

Language: English + Topic: Education (11 hits)

ii. “contract teaching staff” (0 hits)

iii. “contract educators” (0 hits)

iv. “contract education staff” (0 hits)

v. “para teachers” (18 hits)

This was further refined by the following: Language: English + Topic: Education (2 hits)

vi. “para teaching staff” (0 hits)

vii. “para educators” (0 hits)

viii. “para personnel” (0 hits)

ix. “temporary teachers” (14 hits)

x. “temporary teaching staff” (2 hits)

xi. “temporary educators” (4 hits)

xii. “temporary education staff” (0 hits)

xiii. interim teachers (0 hits)

xiv. interim teaching staff (0 hits)

xv. interim educators (0 hits)

xvi. interim education staff (0 hits)

xvii. short(-) term teachers (0 hits)

xviii. short(-) term teaching staff (0 hits)

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

xix. short(-)term educators (0 hits)

xx. short(-)term education staff (0 hits)

xxi. fixed(-) term teachers (0 hits)

xxii. fixed(-) term teaching staff (0 hits)

xxiii. fixed(-)term educators (0 hits)

xiv. fixed(-)term education staff (0 hits)

#### *Notes on screening*

A total of 33 potentially relevant hits were found. Since the database does not allow export of citations, the 33 documents were screened and the relevant ones have been uploaded. Only 5 hits were found to be potentially relevant, and subsequently uploaded to EPPI-Reviewer.

i. Screening of “contract teachers” + English Language + Education

First hit focused on early childhood education: screened out.

Second hit: citation uploaded to EPPI-Reviewer.

Third hit was a statement from ILO and therefore irrelevant: screened out.

Fourth hit: citation uploaded to EPPI-Reviewer.

Fifth and sixth hits are same as first.

Seventh and eighth hit same as second.

Ninth hit: citation uploaded to EPPI-Reviewer.

Tenth and eleventh hits were a statement from ILO: screened out.

ii. Screening of “para teachers” + English Language + Education

First hit: citation uploaded to EPPI-Reviewer.

Second hit was a statement from ILO: screened out.

iii. Screening of “temporary teachers”

First hit was not relevant: screened out.

Second hit same as first hit: screened out.

Third hit was a training manual book: screened out.

Fourth hit same as first and second hits: screened out.

Fifth to ninth hits are meeting/sessions/discussion notes: screened out.

Tenth hit was the final report for hits 5 to 9: screened out.

Eleventh to Fourteenth hits were administrative documents: screened out.

iv. Screening “temporary teaching staff”

Both these hits were meeting documents: screened out.

v. Screening “temporary educators”

The 4 hits were duplicates: only one citation uploaded to EPPI-Reviewer.

## CREATE

### *Notes*

This database is powered by rebase, an open-source software, whose syntax is available at [www.refbase.net/index.php/Searching#Search\\_examples](http://www.refbase.net/index.php/Searching#Search_examples) and also at <http://etext.lib.virginia.edu/services/helpsheets/unix/regex.html>

All searches look for the exact phrase typed - quotation marks are not necessary to denote an exact phrase. However, searches are sensitive to punctuation, so “para teacher” and “para-teacher” return different results.

‘OR’ searches are implemented using brackets and the | character, as in STATA. So for example, to search for abstracts containing the phrases “contract teacher” OR “para-teacher”, you use contract teacher|para-teacher. Note that the spaces are important, there should be no spaces between phrases on either side of |.

Date restrictions: should be formed as 20[00-12].

Keywords: para-teachers, para are useful keywords, but a manual search of the keyword database reveals no further useful keywords. Possible keywords might include: assessment, attainment, attendance, enrolment, enrollment, examination, exams, literacy, non-state, outcomes, output, professional, salaries, staff, teachers, teaching

Searches are not truncated, but searches across fields are run as ‘AND’. This means that combined searches cut relevant results, as not all articles have abstracts or keywords.

Therefore, we run separate searches in title and abstract fields, with date restrictions, and export all results from both. We also run a separate keyword search with date restrictions.

### *Search strings*

contract teacher|contract teaching staff|contract educator|contract education staff|contract personnel|para-teacher|para-teaching staff|para-educator|para-education staff|para-personnel|para teacher|para teaching staff|para educator|para education staff|para personnel|temporary teacher|temporary teaching staff|temporary educator|temporary education staff|temporary personnel|interim teacher|interim teaching staff|interim educator|interim education staff|interim personnel|short-term teacher|short-term teaching staff|short-term educator|short-term education staff|short-term personnel|short term teacher|short term teaching staff|short term educator|short term education staff|short term personnel|non-permanent teacher|non-permanent teaching staff|non-permanent educator|non-permanent education staff|non-permanent personnel|non permanent teacher|non permanent teaching staff|non permanent educator|non permanent education staff|non permanent personnel|fixed-term teacher|fixed-term teaching staff|fixed-term educator|fixed-term education staff|fixed-term personnel|fixed term teacher|fixed term teaching staff|fixed term educator|fixed term education staff|fixed term personnel

This yields 3 hits in title, 3 in abstract, 1 duplication - 5 hits overall.

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

para|para-teachers

As a keyword search, this yields 11 hits, of which 6 actually contain these terms (as opposed to the term “comparative”), and 3 are non-duplicates.

### **Index of Conference Proceedings: Available via British Library**

The British library has an exhaustive index of conference proceedings from around the world. These are searchable via the 'Explore the British Library' advanced search interface:

[http://explore.bl.uk/primo\\_library/libweb/action/search.do?dscnt=1&dstmp=1330015924276&vid=BLVU1&fromLogin=true](http://explore.bl.uk/primo_library/libweb/action/search.do?dscnt=1&dstmp=1330015924276&vid=BLVU1&fromLogin=true)

#### *Search syntax*

The interface allows phrase searches in quotes.

Boolean operators within search fields are allowed.

Search fields are implicitly connected by the AND operator.

The interface is sensitive to the sequence of words, e.g. "contract teacher" and "teacher contracts" yield different number of hits, therefore this has been adjusted in the search string.

No descriptors/controlled terms possible.

Wildcards: these are possible, symbol for this is \*. They have not been used in the search string as they gave confusing results.

Output format: individual citations can be outputted into EndNote.

No restrictions on material type or search scope were included.

Search string was run by using the default selections, i.e. 'anywhere' and 'contains'.

#### *Search string*

The final search string that was run is as follows. This yielded 23 hits.

"contract teacher" OR "contract teachers" OR "contract teaching staff" OR "contract educator" OR "contract educators" OR "contract education staff" OR "teacher contracts" OR "para teacher" OR "para teachers" OR "para teaching staff" OR "para educator" OR "para educators" OR "para education staff" OR "temporary teacher" OR "temporary teachers" OR "temporary teaching staff" OR "temporary educator" OR "temporary educators" OR "temporary education staff" OR "interim teacher" OR "interim teachers" OR "interim teaching staff" OR "interim educator" OR "interim educators" OR "interim education staff" OR "short-term teacher" OR "short-term teachers" OR "short-term teaching staff" OR "short-term educator" OR "short-term educators" OR "short-term education staff" OR "non-permanent teacher" OR "non-permanent teachers" OR "non-permanent teaching staff" OR "non-permanent educator" OR "non-permanent educators" OR "non-permanent education staff" OR "fixed-term teacher" OR "fixed-term teachers" OR "fixed-term teaching staff" OR "fixed-term educator" OR "fixed-term educators" OR "fixed-term education staff"

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## **SIGLE**

### *Search syntax*

Search fields: these must be specified in the search string. A variety are available, but we use abstract: , title: , and subject: . Subject is filled for very few documents, and it may be useful to use keyword: as a substitute. There is no thesaurus.

Specific phrases: are denoted by quotation marks. Stop words are removed from the search. Exact words can be searched for by prefixing them with +. Exact words can be excluded by prefixing them with -.

Combining phrases: standard Boolean operators are supported - AND, OR, NOT. These should be capitalised in search strings. Rackets are used as usual.

Proximity searches: these are implemented using the NEAR/x operator. If x is not specified, it is set by default to 16.

Wildcards: the \*operator is supported, and stands for any number of characters.

Other: date restrictions are inputted using the operators BEFORE and AFTER, e.g. BEFORE 2004 returns all papers written before 2004, and does not include papers written in 2004.

### *Search strategy*

Given that it is specifically noted that subject terms are not filled in for the majority of records, we additionally run a keyword search. Four search strings are specified:

```
title:(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") NEAR/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AFTER 1999
```

```
abstract:(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") NEAR/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AFTER 1999
```

```
subject:(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AFTER 1999
```

```
keyword:(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AFTER 1999
```

These yield 0, 0, 0 and 3 hits respectively. The final search string is:

```
(title:(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") NEAR/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AFTER 1999) OR (abstract:(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") NEAR/3 ("teacher*" OR "teaching staff" OR "educator*" OR "education staff" OR "personnel")) AFTER 1999) OR (subject:(("contract*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher*"
```

OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel")) AFTER 1999) OR (keyword:("contract\*" OR "para" OR "temporary" OR "interim" OR "short-term" OR "non-permanent" OR "fixed-term") AND ("teacher\*" OR "teaching staff" OR "educator\*" OR "education staff" OR "personnel")) AFTER 1999)

*Are contract teachers and para-teachers a cost-effective intervention to address teacher shortage and improve learning outcomes?*

## Google Scholar

### Notes

Search fields: Google Scholar allows only title and full text searches. It does not allow abstracts or keywords searches. The database is non-bibliographic, and does not contain any thesaurus.

Specific phrases: these are denoted by quotation marks.

Combining phrases: Boolean operators can be used, but these are not standard. There is no AND operator, as this is set as the default. The OR operator can be used as standard. The NOT operator is included by typing a minus sign, -, directly in front of the term to be excluded. The + operator can be used to include common terms.

Proximity searches: these are not supported.

Other: date restrictions can be applied via drop-down menu. Google Scholar also truncates all searches after circa 150 characters. Citations need to be imported into EndNote format then imported into RIS.

### Search strategy

Searching for individual phrases, or groups of phrases, in the full text, yields an over-large body of hits. However, given the truncation problem, it is not possible to combine concepts in order to reduce hits, as search strings which attempt to do so are cut off. Therefore, the only search strategy which yields an analysable number of results is to search within titles only for the exact phrases from concept 1 that we are interested in. Truncation does not allow us to run all of these phrases simultaneously, so they are as seven separate strings, according to their stems. Each search string was placed in the field 'with at least one of the words'. Dates were restricted to 2000 onwards, and publications to 'social science' and 'business, economics, finance' titles. The strings used are as follows:

"contract teacher" "contract teachers" "contract teaching staff" "contract educator"  
"contract educators" "contract education staff" "teacher contracts" "contract  
personnel"

40 hits (title), 3,640 hits (full text)

"para-teacher" "para-teachers" "para-teaching staff" "para-educator" "para  
educators" "para education staff" "para-personnel"

16 hits (title), 1,100 hits (full text)

"temporary teacher" "temporary teachers" "temporary teaching staff" "temporary  
educator" "temporary educators" "temporary education staff"

8 hits (title), 1,180 hits (full text)

"interim teacher" "interim teachers" "interim teaching staff" "interim educator"  
"interim educators" "interim education staff"

0 hits (title), 90 hits (full text)

"non-permanent teacher" "non-permanent teachers" "non-permanent teaching staff"  
"non-permanent educator" " non-permanent educators" "non-permanent education  
staff"

0 hits (title), 57 hits (full text)

"short-term teacher" "short-term teachers" "short-term educator" "short-term  
educators" "short-term teaching staff" "short-term education staff"

0 hits (title), 0 hits (full text)

"fixed-term teacher" "fixed-term teachers" "fixed-term educator" "fixed-term  
educators" "fixed-term teaching staff" "fixed-term education staff"

0 hits (title), 29 hits (full text)

## Appendix 2.2: Data extraction form

Title of study:

Type of study (dissertation, journal article, book chapter etc.)

Authors:

Publication date:

Purpose of study:

Data and setting:

Methodology:

What were the outcomes stressed?

Findings:

Research question addressed?

What other comparisons?

Quality assurance (include here limitations of study):

Any additional/related issues that arise that may be interesting/relevant for the readers of this SR:

The authors of this report were supported by the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre).

The Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) is part of the Social Science Research Unit (SSRU), Institute of Education, University of London.

Since 1993, we have been at the forefront of carrying out systematic reviews and developing review methods in social science and public policy. We are dedicated to making reliable research findings accessible to the people who need them, whether they are making policy, practice or personal decisions. We engage health and education policy makers, practitioners and service users in discussions about how researchers can make their work more relevant and how to use research findings.

Founded in 1990, the Social Science Research Unit (SSRU) is based at the Institute of Education, University of London. Our mission is to engage in and otherwise promote rigorous, ethical and participative social research as well as to support evidence-informed public policy and practice across a range of domains including education, health and welfare, guided by a concern for human rights, social justice and the development of human potential.

This material has been funded by the Department for International Development. However the views expressed do not necessarily reflect the department's official policies. The report was first published in 2013 by:

Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre)  
Social Science Research Unit  
Institute of Education, University of London  
18 Woburn Square  
London WC1H 0NR

Tel: +44 (0)20 7612 6397  
<http://eppi.ioe.ac.uk>  
<http://www.ioe.ac.uk/ssru>

ISBN: 978-1-907345-47-0  
Cover image ©2007 Rabin Chakrabarti, Courtesy of Photoshare

The views expressed in this work are those of the authors and do not necessarily reflect the views of the EPPI-Centre or the funder. All errors and omissions remain those of the authors.

This document is available in a range of accessible formats including large print. Please contact the Institute of Education for assistance:  
telephone: +44 (0)20 7947 9556      email: [info@ioe.ac.uk](mailto:info@ioe.ac.uk)