

What are the impacts and cost-effectiveness of strategies to improve performance of untrained and under-trained teachers in the classroom in developing countries?



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List of abbreviations

APEID	Asia-Pacific Programme of Educational Innovation for Development
BRAC	Bangladesh Rural Advancement Committee
CIE	Centre for International Education (University of Sussex)
CIES	Comparative and International Education Society
CPD	Continuing professional development
DE	Distance education
DFID	Department for International Development (UK)
DICECE	District Centre for Early Childhood Education (Kenya)
GTZ	Gesellschaft für technische Zusammenarbeit (Germany)
ICT	Information and communication technology
INSET	In-service Education and Training
ITE	Initial teacher education
KRT	Key resource teacher (Kenya)
MIITEP	Malawi Integrated In-service Teacher Education Programme
MSSSP	Malawi Schools Support System Programme
MUKA	Mafunzu ya Ualimu Kazini Kufikia Daraja 'A' (Upgrading programme for teachers to Grade A (Tanzania))
NGO	Non-governmental organisation
NITEP	Northern Integrated Teacher Education Project (Uganda)
ODL	Open and distance learning
PASEC	Programme d'Analyse des Systèmes éducatifs des États et gouvernements membres de la CONFEMEN (Programme of Analysis of Education Systems of CONFEMEN (Francophone countries))
PSP	Primary Science Programme (South Africa)
SACMEQ	Southern and Eastern Africa Consortium for Monitoring Educational Quality
STUP	Special Teacher Upgrading Program (Nigeria)
TAC	Teacher advisory centre
TRC	Teacher resource centre
TTC	Teacher training college
TUP	Teacher Upgrading Project
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UUT	Untrained or under-trained teacher
WoE	Weight of evidence

Executive summary

Background

The study was funded by the Australian Agency for International Development (AusAID) as part of a joint call for systematic reviews with the Department for International Development (DFID) of the UK, and the International Initiative for Impact Evaluation (3ie). They and the policy makers, teacher educators and managers in the education systems sought information on the approaches to increasing the skills of untrained or under-trained teachers (UUTs) in the teacher workforce that are likely to be most effective in low- and middle-income countries and at what cost. This addresses a concern that previous strategies, such as the massive recruitment of untrained and less-educated teachers in order to meet vastly expanded pupil enrolment, have led to poorer learning and teaching outcomes. This greater demand has been created by the strategies of countries and development partners to meet the Millennium Development Goal of Universal Primary Education (UPE) and the related Education for All goals. Against this background, there is an urgent need to understand better the processes and outcomes involved in the classroom performance of these kinds of teachers and to investigate the various ways in which such teachers get a belated education, training or upgrading.

Aims and review question

This review explored the following research question:

What are the impacts and cost-effectiveness of strategies to improve performance of untrained and under-trained teachers in the classroom in low and middle-income countries?

This was done through the following sub-questions:

How do UUTs perform in the classroom, and what factors affect their performance?

What forms of intervention have been used to attempt to improve the performance of these teachers?

How have these interventions affected these teachers' methods, skills and motivation, the performance of their pupils, and the satisfaction of parents, headteachers and other stakeholders?

What is the available evidence for the effectiveness and cost-effectiveness of such interventions, and what are the factors that may influence these in different settings?

The review had a broad scope, considering interventions with untrained or under-trained schoolteachers from low- or middle-income settings countries in Latin America, the Caribbean, Africa, the Middle East, Asia and Oceania. Setting, contextual factors, barriers, facilitators and the reported views of stakeholders were taken into account in order to situate better these strategies and their range of applicability.

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Typology of teachers created for the review

Teachers' lack of training may be one major reason for low quality of teaching and poor student outcomes. However, as well as the lack of specific pedagogical training, another reason advanced for poor teacher performance is the lack of adequate education in relevant subject knowledge. This applies not only to untrained contractual teachers and teachers recruited by the community, but also to teachers trained under previous systems where entrants were accepted having completed primary school education only. Thus, alongside 'untrained' and 'under-trained' teachers are 'less-educated' teachers, whose lack of schooling may lead to a poor grasp of the concepts they need to teach. From this recognition, we developed a typology of UUTs based on duration of training and education to support us in identifying the most relevant studies.

Table 1: Typology of targeted teachers

	Educated	Less educated
Trained	1. (ET) Teachers who have at least the requisite minimum basic education and the requisite formal training or more.	2. (TL) Teachers who have a formal initial training but whose general education is below current minimum requirement.
Under-trained	3. (EU) Teachers who have at least the requisite minimum basic education but whose formal training has been short.	4. (LU) Teachers who do not have the requisite minimum basic education and whose formal training has been short.
Not trained	5. (EN) Teachers who have at least the requisite minimum basic education but no formal training.	6. (LN) Teachers whose general education is below the required minimum and who have received no formal training.

Methods of the review

The review followed guidelines for systematic reviews formulated by the EPPI-Centre.¹ The first steps taken were to draw up a protocol or plan that detailed our strategies for finding studies from a literature search and to define the most relevant studies using inclusion and exclusion criteria for a first broad mapping of the literature. A user group selected for relevant academic, policy and/or practice expertise was consulted on this protocol, on searching for relevant literature and on the draft report.

We searched 22 major databases using a variety of search terms and strategies. We also handsearched seven key journals and looked at fifteen websites, in addition to making use of citation tracking and personal contacts to identify potentially relevant studies. This initial search yielded 3,499 references, of which 130 studies met the inclusion criteria and were obtainable. A systematic mapping exercise was conducted on these by applying a standardised set of codes, giving a broad characterisation or picture of the research field. We then moved to an in-depth review by applying additional, stringent inclusion criteria that ensured that the

¹ See <http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=89&language=en-US>

final set of studies focused centrally on the review's primary focus of interest: the effectiveness and/or cost-effectiveness of interventions to improve classroom performance of UUTs. This set included studies using both quantitative and qualitative methods. Data were extracted from each study, and the study's methods subjected to quality assurance, by two reviewers working independently. Each study was then assigned a rating of high, medium or low for methodological trustworthiness (Weight of Evidence A) and robustness of contextualisation (Weight of Evidence B). This final set came to 23 studies (reported in 35 different publications). These were analysed by setting out the different strategies used and the different outcomes associated with the intervention, and synthesising these into an integrated account. From these synthesised results, we also derived further considerations for what makes a successful intervention, with the intention of informing future work with UUTs by policy makers and practitioners.

Limitations of the review

Studies of strategies and/or performance were included only if they concerned untrained, under-trained, and/or less-educated teachers, but frequently studies did not clearly state who the recipients were. Those that did often did not disaggregate the groups making it impossible to discern whether there were different responses from UUTs and other participants. If this distinction was not clearly made, studies that only made the occasional comment on UUTs rather than presenting clearly differentiated data sets were included but downgraded on Weight of Evidence B.

Little research was found that addressed issues of cost-effectiveness, especially studies presenting quantified data. Comparison was problematic as opportunity costs are often a major consideration, and in low-resourced situations, availability of funds varies greatly; what is expensive and what cheap are therefore context-specific. Thus cost-effectiveness is not fixed and quantifiable, but emerges from the claims made about inputs and outcomes in individual cases.

The aims of studies of relevant interventions varied and few came close to the kind of design or methodology that might have been specifically planned to answer the review question. Measuring or inferring a direct relationship between intervention and a specific outcome was therefore not usually possible. With so little scope for direct comparison of outcomes, the identification of factors shown to affect the success of interventions is a more useful outcome of the review.

Results from the in-depth review of 23 studies

Strategies used in the interventions

No one strategy was shown to be directly related to impact on teacher performance; rather, interventions included different combinations of strategies which were applied and evaluated as a package. This makes it hard to disaggregate the significant elements of the overall intervention. Successful interventions in the studies that were rated as more robust and trustworthy each included several strategies. The three most frequently applied strategies were:

- **training workshops** (long or short face-to-face meetings, tutorials, workshops or lectures, often in teacher resource centres or a central school within a geographical cluster)

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- **independent study** (structured distance learning self-study materials to enhance subject knowledge or prepare for written assignments or examinations)
- **in-class support** (provided by a trainer or mentor who visits a trainee in their classroom, and observes and discusses their teaching)

These three key strategies were followed in terms of frequency by:

- **in-school support** (groups or pairs of UUTs met to discuss or share their learning, sometimes facilitated by a tutor or more experienced colleague)
- **school clusters** (group activities and peer learning in school clusters through study circle meetings or pairings of teachers or groups, sometimes facilitated by a tutor to work on specific modules or to discuss practice).

Assessments of outcomes from the strategies used

Eight of the studies most convincing on methodological trustworthiness and robustness of contextualisation found that changes in the pedagogic methods used by UUTs were the main outcome of interventions that included the key strategies of face-to-face workshops, classroom support and, with the exception of one study, also self-study.

Two studies very convincingly demonstrated that coaching by highly qualified, experienced and expert coaches was effective in changing UUTs' teaching methods (Harvey 1999a; O'Sullivan 2003). However, both studies also raised concerns about its expense and labour-intensiveness.

Conversely, cascade training, whereby training is relayed back to classroom teachers from a starting point away from the region or school by successive trainers, senior and junior school staff, is not seen to be effective and does not have a great impact on UUTs (Hardman et al. 2009).

It is difficult to make claims about the effect of interventions on pupil learning. Of the four studies that convincingly reported some form of objective measures on pupil performance, one showed markedly improved attainment following a three-year cycle of training workshops, structured lesson plans and in-class support for UUTs (O'Sullivan 2003), with two others using residential workshops, self-study and frequent tutor support (Tatto et al. 1991; Binns and Wrightson 2006) indicating some partial improvement. One used similar strategies but minimum in-class support and showed no improvement (Stuart and Kunje 1999).

Although many studies reported that the improvement of teacher subject knowledge was an aim of the intervention, this often proved problematic: Tatto et al. (1991), Stuart and Kunje (1999), Bof (2004) and Akyeampong et al. (2010) found that gains failed to meet expectations. Mathematical learning seemed to be particularly difficult to improve through distance education (Stuart and Kunje 1999; Bof 2004; Akyeampong et al. 2010).

Some interventions were mainly evaluated by the way that participants completed the course and gained a qualification, often as the result of passing a written examination (e.g. Bof 2004; Sampong 2009). This is problematic if there is no other form of evaluation, as it is not evident how or whether achievement of certification translates into improved classroom performance.

Engagement in training activities, including gaining certification, can have a positive impact on the professional confidence and motivation of teachers within their school and community. This was reported in twelve studies. Bof (2004),

Guzman et al. (2000), Kruijer (2010) and Binns and Wrightson (2006) found a cumulative effect whereby teachers' awareness of new methods and desire to transfer their learning to the classroom led to more positive attitudes towards their students, with high numbers of teachers passing their examinations and getting qualified and promoted.

Cost-effectiveness

The figures presented in the studies reviewed strongly suggest that distance education methods are cheaper than conventional methods (Holmes et al. 1991; Tatto et al. 1991, 1993; Kunje 2002; Sampong 2009; Akyeampong et al. 2010; Kruijer 2010). However, they may not necessarily be the most effective, and some questions have been raised over whether or not the calculations of cost-effectiveness accurately take all relevant costs and benefits into consideration. Costs of training in rural areas, for example, are much higher than in urban areas. Cost-effectiveness also requires some measure of quality of outcomes against the costs of the programme. This does not challenge the conclusion that distance education is cheaper in absolute terms, but does question whether the system savings made are as great as sometimes claimed.

One of the most trustworthy and robust studies Tatto et al. (1991, 1993) noted that distance learning is effective in educating large numbers of untrained teachers at low cost and may be suitable in other contexts where resources are limited, but where there are large numbers of untrained teachers. As the backlog of untrained teachers is reduced, provided no new untrained teachers enter the system, the cost-effectiveness of distance education would decrease. In their later study, Tatto et al. (1993) suggested that as a ratio of change in skills and knowledge to total costs, while distance education may be cheaper, it is not as cost-effective as pre-service or in-service training. Traditional residential programmes were noted to be less cost-effective.

One study (Mehrotra and Buckland 2001) argued that increasing the proportion of trained teachers increased average teacher earnings and thus might not be sustainable in many low-income countries. This paper was not highly rated for methodological trustworthiness, but the logic of the argument is sound and provides a caution worth taking into account in long-term planning. Moreover, providing qualification without any concomitant improvement in classroom performance is certainly not cost-effective.

Charging fees for upgrading programmes is a stumbling block for the enrolment of vulnerable groups and individuals and may also exacerbate gender inequality. Untrained and under-trained teachers are often unwilling to bear the costs associated with attending training, such as books, materials, board and lodgings, travel and missed earnings. Time taken up by self-study can also impact negatively on UUTs' income. However, there is a risk that subsidy can become the primary motivation for attendance at training events.

Successful interventions include a range of strategies and it is the way that they interact with one another that contributes to the professional learning of UUTs. By including differentially expensive activities such as training workshops held within a school cluster, distance self-study modules and trained school colleagues to support UUTs in class, training is also likely to be more cost-effective.

Training in a cost-effective and pedagogically sound way involves trainees teaching at the same time, that is, remaining in post and integrating new learning with their classroom practice.

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Key considerations for successful interventions for policymakers and users

1. Interventions should clearly prioritise their aims to differentiate between those of improving pupil learning, of enhancing teacher subject knowledge or of granting certification. Interventions designed with unclear goals or outcomes make it difficult to appraise accurately their success, impact or causes of failure.
2. The success of interventions depends on a set of factors located within the school, the education system and society, indicating that it is better to target school clusters and individual schools, as well as individual teachers, to eliminate the effects of some of these variables.
3. Interventions which are based on analysis of the knowledge, experience and needs of UUTs in the contexts in which they work are more likely to result in positive outcomes. The active involvement of teachers and their mentors in the design of any intervention is similarly more likely to have positive outcomes.
4. Interventions should involve frequent, regular engagement with self-study materials, and/or taught sessions, and/or discussions with peers, and/or the opportunity to apply new learning and skills in the classroom, to give the greatest opportunity to improve performance.
5. Proximity of the site of inputs to the UUTs' classroom supports engagement and application of learning and affects availability of support from local tutors, peers or experienced teachers. Options that might be considered here include housing taught sessions in nearby teacher resource centres or a key school within a geographic cluster, or planning how best to facilitate easy access to materials or mentor/tutor support.
6. Initially, workshops can be most effective when they are used for specific purposes, such as introducing tutors and other students to each other, presenting a programme structure, and/or explaining the purpose of self-study modules or the use of new technology within them. Once a programme is up and running, workshops used to discuss teaching methods in the reality of the UUTs' classrooms and critical reflection with smaller numbers of participants may be more effective than the more traditional use of workshops to transmit subject knowledge in a lecture mode.
7. Well planned and produced self-study materials focused on subject knowledge but including practical activities can support teacher learning at a distance; new technology shows much potential but should only be used where realistically and reliably accessible to users. Print-based materials are otherwise more reliable. However, many governments are committed to improving ICT provision and it is likely to become an integral part of many interventions in the near future.
8. The quality of trainers is important, so interventions should include plans for their training. Briefing, resourcing and capacity building of other stakeholders such as teacher colleagues, headteachers, administrators and community members might create conditions to support interventions more effectively. The effectiveness of such support is maximised when there is closer proximity to the contexts where UUTs are working, greater familiarity with the languages they use, and understanding of the need for sensitivity in one-to-one contexts in terms of gender relations.

9. Demands on the time and resources of UUTs must be balanced with their daily commitments to their jobs, families and community responsibilities, in particular for women, for whom the burden of care and training can be most onerous.
10. There needs to be recognition of the constraints to classroom improvement, including developing more learner-centred pedagogies and critical reflection, within the specific contexts in which the UUTs work. Sustainable change to professional practice occurs slowly over a substantial amount of time.

Implications for further research

1. Research is needed which has a sufficiently rich data set to back up its claims. For example, claims about improvement should take into consideration both baseline and post-intervention data on teacher and pupil learning.
2. Evaluation studies need to be clear about the characteristics of those UUTs involved in an intervention (background details, qualifications, gender, urban/rural, length of experience as untrained teachers, language(s) spoken), and about the intervention's purpose.
3. Research is called for which takes place over a timescale allowing evaluation of both the sustainability of interventions and the continued development of those who have taken part in them.

1. Background

1.1 Aims and rationale for the current review

The 1990 World Conference on Education for All, followed later by the promise of universal primary education in the Millennium Development Goals (MDG), promoted greater access to education in lower- and middle-income countries. However, this growth in turn occasioned greater attention to be paid to the quality of that education, as the effect of such strategies as massive recruitment of untrained and less-educated teachers to meet vastly expanded demand quickly became plain: they were leading to poorer learning and teaching outcomes. Hence governments, NGOs and donors have sought in recent years to intervene, through such means as in-service education, subject-specific training and curriculum reform programmes, to improve the performance of these teachers. A variety of approaches have been taken to the problem, in contexts as diverse as Brazil, Lao PDR, Malawi and Namibia. The purpose of this review, then, is to identify what has been effective in these different settings and to draw lessons as to ‘what works’ for more general application.

This review will look specifically at the strategies that have been used to improve performance in the classroom in this context; it will examine the evidence base for the success or failure of such strategies, and identify the factors that have been found to be contributing to these outcomes.

1.2 Definitional and conceptual issues

1.2.1 *Untrained and under-trained teachers (UUTs)*

Teachers’ lack of training may be one major reason for low-quality teaching and poor student outcomes. However, as well as the lack of specific pedagogical training, another reason advanced for poor teacher performance is the lack of adequate education in relevant subject knowledge. This applies not only to untrained contractual teachers and teachers recruited by the community, but also to teachers trained under previous systems where entrants were accepted having completed primary school education only. Thus, alongside ‘untrained’ and ‘under-trained’ teachers are ‘less-educated’ teachers whose lack of schooling may lead to a poor grasp of the concepts they need to teach.

This gives rise to a typology of the terms that may be applied in different contexts to teachers who are the subject of efforts to improve the quality of schooling and are therefore relevant to this review question (Table 1.1).

Table 1.1: Typology of targeted teachers

	Educated	Less educated
Trained	1. (ET) Teachers who have at least the requisite minimum basic education and the requisite formal training or more.	2. (TL) Teachers who have a formal initial training but whose general education is below current minimum requirement.
Under-trained	3. (EU) Teachers who have at least the requisite minimum basic education but whose formal training has been short.	4. (LU) Teachers who do not have the requisite minimum basic education and whose formal training has been short.
Not trained	5. (EN) Teachers who have at least the requisite minimum basic education but no formal training.	6. (LN) Teachers whose general education is below the required minimum and who have received no formal training.

(E=Educated; T=Trained; U=Under-trained; N=Not trained; L=Less educated)²

1. (ET) Teachers who have at least the requisite minimum basic education and the requisite formal training or more.
2. (TL) Teachers who have a formal initial training but whose general education is below current minimum requirement. For example, in Pakistan, the current minimum requirement is ten years of schooling for a one-year teacher training course; there are many teachers in place who were accepted as trainees under previous requirements for as little as six years schooling for a one-year course.
3. (EU) Teachers who have the requisite minimum basic education but whose formal training has been short. For example, contractual teachers in Mali follow a 90-day course of training compared to colleagues who receive a full four years of residential training. ‘Short’ in this context refers to the reduced training period offered to contract teachers rather than the lengthier training offered to standard civil servant teachers. For the purposes of this review, training lasting less than six months in total will be considered to fall into this category.
4. (LU) Teachers who do not have the requisite minimum basic education and whose formal training has been short. For example, in Malawi, people were accepted for short training courses with only primary education.
5. (EN) Teachers who have the requisite minimum general education but no formal training. For example, para-teachers in India have slightly higher general

² While these distinctions provide a broadly useful schema for classifying the nature of problems in the level of teachers’ learning, it is worth noting that the mere fact of having received training and/or education does not guarantee that the teachers concerned necessarily benefited from them. Indeed, research on the performance of untrained and less-educated teachers as compared with those with the requisite training and education is not conclusive (Mulkeen 2010). Some possible reasons why training and/or education may not have been fully effective include the poor quality of institutional instruction, the inappropriateness of the teacher education curriculum, or changes in school curriculum, class sizes and pupil backgrounds. However, for the purposes of this review it was necessary to develop a classification that could be easily and consistently applied; hence we have used duration of training and education to guide the typology.

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educational qualifications than fully trained teachers (Kingdon and Sipahimalani-Rao 2010).

6. (LN) Teachers whose general education is below the required minimum and who have received no formal training.

Although these conceptual distinctions are useful in identifying the kind of teacher that the review was concerned with, in practice it was often difficult to identify the characteristics of the teachers involved in the interventions reported. Teachers involved were frequently from several different categories and the authors of the research were not able or did not choose to disaggregate their findings or specify different responses from different types of teacher.

1.2.2 Interventions

Interventions initiated by national, international, state and non-state actors seek to address the needs of different groups of untrained, under-trained, and less-educated teachers, sometimes alongside their fully trained colleagues. We identify the following types of programme:

- General in-service education of teachers (InSET) or continuing professional development (CPD) programmes to improve the quality of teachers generally, often state-run from teacher centres or colleges, or school based (e.g. communautés d'apprentissage, Mali; 'lesson study' following the Japanese model, China, Indonesia);
- Specific subject-based programmes with pedagogic content, often organised and/or provided by NGOs or development partners with a particular curricular aim (e.g. Project to Improve Mathematics Teaching, Honduras; Literacy Booster Toolkit, Malawi, Mozambique, Nepal, Save the Children);
- Subject knowledge programmes without specific pedagogic content and often focusing on ICT (e.g. several programmes available through SchoolNet, South Africa);
- Curriculum reform programmes aimed at initiating the whole teaching workforce into new arrangements and systems of provision (e.g. Teacher Training and Material Development Cell and Primary Education Programme-Improvement of Learning Environment (TIMDC/PEP-ILE), Pakistan);
- Programmes providing (initial) training for untrained or under-trained teachers who remain in post (e.g. Teacher Upgrading Project, Lao PDR).

All of these approaches came within the scope of this review and, when identified in the literature, were included within it.

1.2.3 Teacher performance

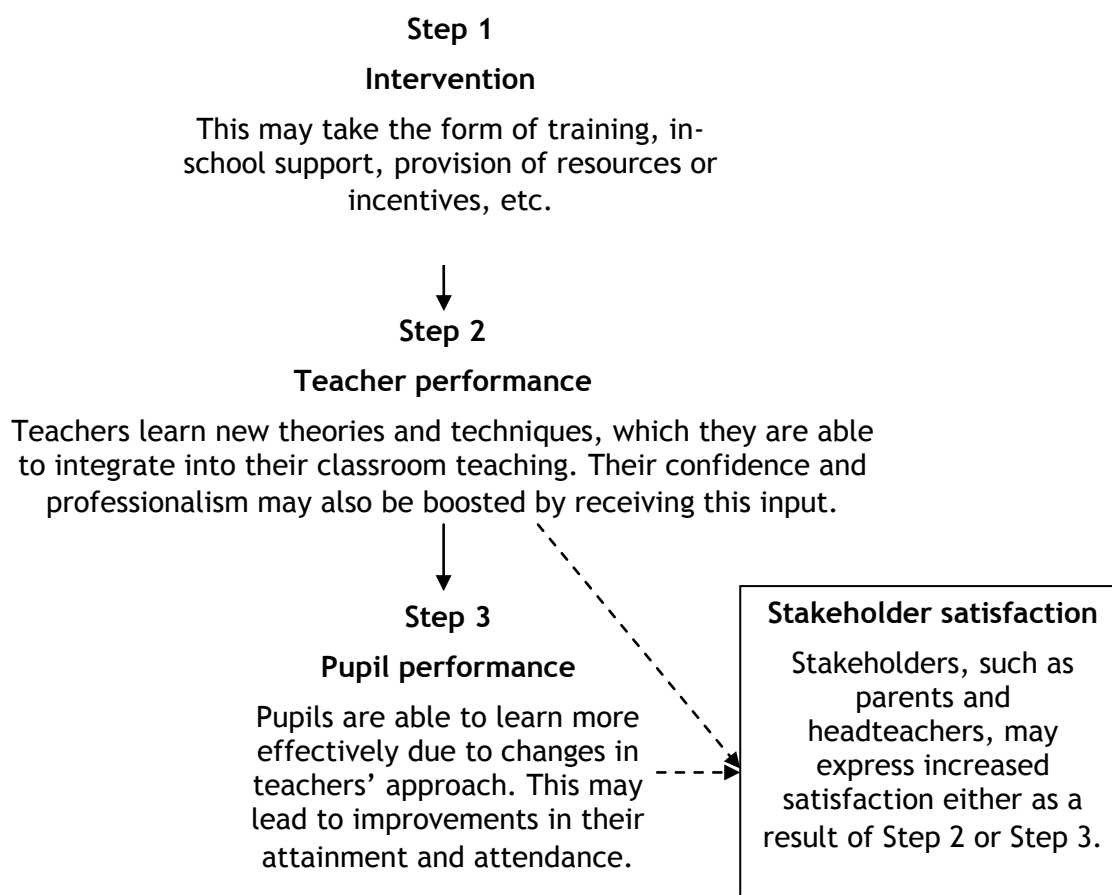
Like the variety of strategies that may be employed to improve teacher performance, 'classroom performance' itself is a wide category and may take different forms, from systematic use of specific pedagogies whose efficacy might be assessed through assessment of student attainment, to strategies to increase motivation, enabling better attendance and greater students' time on-task (Bennell and Akyeampong 2007). Interventions may impact on teacher performance by affecting teachers' knowledge, practice, motivation or satisfaction, or by removing material constraints on their ability to do their job effectively (e.g., provision of suitable accommodation near schools to reduce teacher absenteeism). These outcomes may be measured in the literature through: assessment of declarative

knowledge (testing teachers on their learning from the intervention); observing changes in teachers' use of resources or specific pedagogical practices; obtaining feedback from teachers through surveys or interviews to indicate changes or increases in their declared motivation or job satisfaction; staying in post or promotion; or obtaining reports on teachers' attendance and punctuality from headteachers.

Furthermore, teacher performance may be assessed through indirect outputs in two ways, one or both of which may be covered in a given study. The first is through its effects on pupils, which may be manifested in changes in their knowledge (attainment level), levels of participation and engagement in lessons, reported satisfaction, increased attendance and retention from year to year or a drop in repetition rates. The second is through its effects on other stakeholders, such as headteachers or parents, and here it is likely to be largely limited to reported satisfaction. The review sought to take all of these into consideration to answer the review question.

This schema is represented diagrammatically in Figure 1.1.

Figure 1.1: Assessment of teacher performance



Outcomes were sometimes conceptualised or discussed in the research literature in ways that differed from this. Furthermore, interventions may not only have positive outcomes leading to improved performance on any or all of these indicators, but may also result in no change or negative outcomes. Due attention was paid to these considerations when evaluating and coding the literature, and they have informed the findings of this review.

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Studies of strategies and/or performance were of interest only if they concern untrained, under-trained, and/or less-educated teachers (UUTs), either as the only group under discussion or in conjunction with their more trained or qualified counterparts. Frequently studies did not clearly state whether UUTs comprised a significant proportion of those dealt with; such references were not included, as they did not allow any conclusions to be drawn specifically about this group.

1.2.4 Cost-effectiveness

Precisely because so little research is available that addresses issues of cost-effectiveness, the review needed to be open to whatever ways this was presented. Quantified data on cost are especially difficult to come by, as within this field, opportunity costs are often a major consideration, e.g., important salaried staff may be detailed to work on interventions, which then precludes their involvement in other activities, though no additional salary costs are incurred by the sponsor. Moreover although all the studies reviewed took place in low-resourced situations, availability of funds varied greatly and so what was expensive and what cheap was context-specific. Rather than being something fixed and quantifiable, cost-effectiveness, and with it the notion of what is worth doing, emerged from the individual cases within the review based on what data were available and what claims were made about inputs and outcomes.

1.3 Policy and practice background

The 1990 World Conference on Education for All gave major impetus to education policies in lower- and middle-income countries aiming to maximise enrolment in primary schooling. However, the last twenty years have seen a gradual shift in emphasis from preoccupation with the quantity of children attending school to concern with the quality of schooling, and from an interest in primary education to a focus on an extended basic cycle including lower secondary provision. Teachers and teacher training are central to aspirations for quality improvements in schools (Akyeampong and Lewin 2002; Akyeampong 2003; Kunje et al. 2003; Little 2006), but in the rush to enrol as many pupils as possible, many teachers have been engaged with no formal training. Dissatisfaction with the cost and outcomes of teacher training has also acted as a rationale for very short or accelerated programmes such as has happened in Senegal since the early 1990s. In many schools, such untrained, volunteer or contract teachers or para-teachers have joined other untrained or under-trained teachers, the largest group being those who were provided by local communities as an approach to cost sharing during the 1970s and 1980s or as part of policies of community involvement in education.

Against this background, there was an urgent need to understand better the processes and outcomes involved in the classroom performance of these kinds of teachers and to investigate the various ways in which such teachers get a belated training or upgrading. With initial teacher education (ITE) seen as expensive and not always effective, there has been a greater focus on CPD programmes that would enhance the practices of trained teachers but also scoop up untrained teachers (e.g. orientation to the new thematic curriculum in Uganda) or more cost-effective ways of screening entrants to teacher training by employing untrained teachers to teach alongside trained teachers prior to formal initial teacher education (e.g. primary schools in Antigua). It is envisaged that in order to reflect properly this policy background, many of the studies will cover both trained teachers and those we have identified in the typology above.

1.4 Research background

Various large-scale studies have compared the performance of UUTs with those who have a full qualification, for example in Africa the SACMEQ and PASEC studies (Schwille and Dembélé 2007; Bernard et al. 2004). The results of the comparisons have been mixed, inconclusive and variable. A number of interventions have been carried out in low- and middle-income countries to improve the performance of UUTs, some of which have drawn on the findings of previous research projects to do so. These include the Proformação project in Brazil, the Malawi Integrated In-service Teacher Education Programme (MIITEP) and the Teacher Upgrading Project, Lao PDR, for example. As far as we are aware, however, there has been no systematic review of these interventions to date, and so the evidence base remained scattered.

1.5 Authors, funders, and other users of the review

1.5.1 Authors

The principal investigators of the review are based at the School of Education and Social Work at the University of Sussex, mainly in the Centre for International Education (CIE). Adu-Yeboah is affiliated with the University of Cape Coast, Ghana. The review was carried out by this team, with the help of the advisory e-user group. The EPPI-Centre, at the University of London, Institute of Education, was responsible for quality assurance of the review and the final report.

The experience and expertise of the team are extensive and complementary. Pryor has longstanding experience of educational research in sub-Saharan Africa, specialising in qualitative research. Westbrook is a teacher educator and researcher with expertise in reading and research experience in both sub-Saharan Africa and South Asia. Sebba has extensive educational research experience and is prominent in the field of systematic reviews. Orr is an anthropologist with South American experience and substantial expertise in systematic reviewing, having worked on several reviews in the fields of education and social care. Durrani's doctorate investigated teacher education in Pakistan and she has published research on a number of different issues, including teacher identity. Adu-Yeboah works at the main centre for teacher education research in Ghana and has taken part in international studies.

1.5.2 Funders

The study was funded by the Australian Agency for International Development as part of a joint call for systematic reviews with the Department for International Development (DFID) of the UK.

1.5.3 Users

Potential users of the research will be ministries, teacher educators, NGOs, foundations and development partners. The Centre for International Education (CIE) at the University of Sussex has a range of links with government officials, international development organisations and international donor agencies, as well as practitioners working on the ground in education. Relevant organisations and ministries will be provided with the review, subject to the agreement of the sponsors. Beyond this, a wider audience will be engaged via public lectures and dissemination in the media, in particular the CIE website, newspapers and magazines, and other development-oriented websites. Communication with academics will include the delivering of conference papers at the United Kingdom

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Forum for International Education and Training (UKFIET), the British Association for International Comparative Research and the Comparative and International Education Society (CIES). It will also include articles in journals, involving co-authorship across countries.

1.6 Review questions

This review explored the following research question:

What are the impacts and cost-effectiveness of strategies to improve performance of UUTs in the classroom in low- and middle-income countries?

This was done through the following sub-questions:

How do UUTs perform in the classroom, and what factors affect their performance?

What forms of intervention have been used to attempt to improve the performance of these teachers?

How have these interventions affected these teachers' methods, skills and motivation, the performance of their pupils, and the satisfaction of parents, headteachers and other stakeholders?

What is the available evidence for the effectiveness and cost-effectiveness of such interventions, and what are the factors that may influence these in different settings?

The review had a broad scope, considering interventions with untrained or under-trained schoolteachers from Latin American, Caribbean, African, Middle Eastern, Asian and Oceanian countries which qualified as low- or middle-income settings. Setting, contextual factors, barriers, facilitators and reported views of stakeholders were taken into account in order to better situate these strategies and their range of applicability.

2. Methods used in the review

Outline of the chapter

This chapter describes the methods used in completing the review. Initially it outlines the questions, and describes the approach and methods of involving users; it later considers the detail of each of the steps of the review process.

2.1 User involvement

The e-user group was selected for their relevant academic and/or practice expertise, to provide a geographical spread of experience, and in order to represent the likely audience for the review findings. The group was composed of seven members, selected to reflect a range of stakeholders according to the following plan:

Two representatives with responsibility for educational policy development:

- Mr Attaullah Khan, Director, Directorate of Curriculum and Teacher Education (DCTE) Mandian, Abbottabad, Pakistan;
- Mr Eric de Silva, former Secretary Ministry of Education, Sri Lanka.

Two representatives of international organisations making educational interventions:

- Dr Cesar Guadalupe, Head of the Learning Outcomes Section, UNESCO Institute of Statistics;
- Dr Amy Jo Dowd, Senior Advisor, Education Research, Save the Children.

One teacher educator (also formerly policy director of teacher development for Punjab province):

- Dr Rukhsana Zia, Director, Centre for Learning and Teaching, Forman Christian College Chartered University, Lahore, Pakistan.

Two academic specialists in education issues in developing countries:

- Mr Anthony Somerset, Visiting Research Fellow, Centre for International Education, University of Sussex, UK;
- Dr Martial Dembélé, Associate Professor, Department of Educational Administration and Foundations, Faculty of Education, Université de Montréal, Canada.

The group was consulted at certain moments in the course of the review, primarily:

- on drafting the protocol;
- on searching for relevant literature;
- on the draft report.

Individual members generously shared their expertise, and their contributions are gratefully acknowledged by the review team.

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2.2 Identifying and describing studies

2.2.1 Defining relevant studies: inclusion and exclusion criteria

The literature identified for the mapping stage included empirical studies of all designs (both quantitative and qualitative), peer- and non-peer reviewed research papers, research syntheses, unpublished and grey literature, and theoretical papers (to inform the conceptual framework for the synthesis of findings). It was decided not to restrict the papers included at this stage of the review to studies of interventions only, as it was felt that useful background information could be gathered from studies that examined the performance of untrained teachers in the absence of external interventions. This inclusive approach to the research literature has informed the systematic map described in Chapter 3.

Inclusion criteria were designed for application to the references obtained through searches (Appendix 2.1). Only papers meeting all of these criteria were considered for the systematic map. A sub-set of these were then included within the in-depth review.

The inclusion criteria for the map were the following:

- **Must have been published after 1990:** The year 1990 was significant for the Jomtien World Conference on Education for All, and the impetus this gave to educational development in low- and middle-income countries. It therefore seemed to place a suitable date limit on the literature considered, providing a manageable scope for the review while ensuring that enough studies would be found to inform its conclusions. Searching for earlier studies seemed inappropriate, given the changing context, aims, technologies and cost implications.
- **Must not consist of an entirely secondary source only (i.e., not a book review, policy document or textbook which adds nothing to the research it summarises):** Although literature reviews, theoretical papers and secondary analysis were included within the review, it was necessary to introduce a criterion to ensure that time was not wasted considering papers which added nothing new. Book reviews and textbooks, whose entire purpose is to report faithfully other research, were prime examples of this. Policy documents which were limited to laying out procedures, regulations or planning were also excluded under this criterion.
- **Must focus significantly³ on a low- or middle-income country setting or settings:** Low- and middle-income countries were included within the review, with the exception of Eastern European and former Soviet states. Although some of these countries would fall into this category, their educational systems mostly face very different issues from those of other countries at a similar economic level, as a consequence of both the former communist educational system and current European Union membership. It was therefore decided to exclude them from the review.

³ Here and thereafter in the exclusion criteria, a document is deemed to 'focus significantly' on a topic where it deals with it more than simply in passing. In practical terms, this generally means devoting more than two paragraphs within the document to discussion of the topic in question.

- **Must focus significantly on pre-school, primary, secondary or senior school-level education.**
- **Must focus significantly on a factor, or factors, affecting the classroom performance of those teachers:** Studies which reported the prevalence of UUTs within an educational system or gave historical accounts of how such a situation had come about were not of interest to the review as they did not provide information on classroom performance.
- **Must focus significantly on teachers who are untrained, under-trained and/or less-educated (categories 2-6 in the typology presented in Table 1.1).**

2.2.2 Identification of potential studies: search strategy

Electronic databases, key journals (handsearching), websites, citation tracking and personal contacts were all used to identify relevant literature for the review.

Pilot searching suggested the use of a three-element strategy, consisting of the concepts ‘Teacher’, ‘Unqualified/Untrained’ and ‘Low- and Middle-Income Countries’, for use in exploring the electronic databases. The first specified the population of interest, while the second specified a characteristic limiting the search to a sub-population, and the third specified the setting. The idea of specifying interventions was rejected at this stage of the review, as it was felt that useful background information could be gathered from studies that examined the performance of untrained teachers in the absence of external interventions. Similarly, no methodological limits were set at this stage, as the review sought to gain a broad overview of the subject for the systematic map. Both of these criteria were only applied to studies at the later stage of moving from the systematic map to the in-depth review.

In many databases, it proved to be more efficient to carry out a two-element search, with only the concepts ‘Teacher’ and ‘Unqualified/Untrained’, and then to apply the inclusion criteria to all the ‘hits’ identified in this way. The third element, ‘Low- and Middle-income Countries’ setting, was therefore only applied when, after reading through the first 100 titles and/or abstracts, it seemed that nothing relevant was obtained, and it was necessary to make the numbers manageable. Some other databases did not have the capacity to facilitate complex or lengthy search strategies, requiring the use of simpler searches. Strategies also varied in order to make use of the available descriptors specific to a particular database.

English-language electronic searching returned studies in English, French, Spanish and Mandarin, which were included within the review if they met the inclusion criteria. Supplementary searching was carried out on Google using search terms in French, Spanish and Portuguese, to attempt to compensate for the potential bias towards English in the indexing of the databases used.

A full list of the final search strategies used is provided in Appendix 2.2.

Because databases may be poorly indexed, relevant research may not be included within the databases searched, and indeed because articles may discuss UUTs without making this clear in the keywords they choose, it was important to supplement the results of database searching with other methods of identifying relevant literature. Seven prominent journals in the field of international educational development were handsearched for relevant content published between 2002 and 2011 that may have been missed by other searching methods (Appendix 2.3). Apparently relevant references cited in the literature obtained

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were followed up and included where they met the inclusion criteria. The members of the e-user group were consulted about any relevant studies they might know of within their fields. Contact was made with education ministries in low- and middle-income countries to ask for information on any in-country studies of which they might be aware (Appendix 2.4), and a selection of significant websites maintained by educational government ministries, NGOs and charitable foundations was searched (Appendix 2.5). These approaches helped to identify additional literature, particularly grey literature; however, it was not possible to obtain all of these within the time-scale of the review (Appendix 3.1).

2.2.3 Screening studies: applying inclusion criteria

When databases offered the option to export search results, these were imported directly into the EPPI-Reviewer systematic review management software before screening. When this was not possible, the results were screened against the inclusion criteria, before inputting only the relevant references into EPPI-Reviewer. In EPPI-Reviewer, duplicate references were identified and set aside; the remaining references were then screened against the inclusion criteria, based on reading of the title and abstract. Where there was insufficient information on which to base a judgement, full-text copy was retrieved and the same criteria applied to it. Not all full-text copies could be retrieved in time for the review's conclusion; this may have been due to the lateness of identification, to the difficulty of obtaining a copy, or in some cases the reference itself may not have been quite accurate. The list of references not obtained in time is provided in Appendix 3.1.

The full screening process is presented diagrammatically in Figure 3.1.

2.2.4 Characterising included studies

Studies were coded for the systematic map in order to produce a broad characterisation of the current state of the literature. The rationale behind this stage of the process was to identify the predominant geographical areas, methods and intervention strategies that have come in for research or discussion, even though the studies concerned may consist solely of theoretical analysis without any empirical element, or may not have been carried out or reported to a standard that meets the inclusion criteria for the synthesis. By doing so, the review conveys a fuller picture of the field, allowing the identification of particular gaps and showing where foundations exist that could be usefully built upon, without compromising the exacting methodological review that takes place in the later in-depth review stage. This is important because of the likelihood that methodological and reporting standards may vary widely in this field, particularly in the grey literature, and the undesirability of excluding such material from all consideration. No methodological quality appraisal was carried out at this stage, as the intention was solely to capture themes and trends.

The codes applied to each study to provide the basis for the systematic map can be seen in Appendix 2.6. They were devised by the review team to provide an overview of the body of work assembled for this stage of the review.

2.2.5 Identifying and describing studies: quality assurance process

Two members of the review team, working independently, applied the inclusion criteria to the studies in EPPI-Reviewer that were obtained through searching the electronic databases. Their decisions were then compared, and full-text copy was sent for if at least one of the reviewers had not explicitly excluded the study. It was considered worthwhile to send for studies when there might be any doubt,

because so many of the abstracts were unclear about the levels of training or qualifications of the teachers concerned.

All members of the review team piloted the codes used to produce the systematic map, and their decisions were compared and a consensus reached. Ten per cent of the studies were coded independently by two reviewers to ensure reliability; the results were compared and consensus reached on any disagreements. In addition, an independent quality assessor at the EPPI-Centre applied codes to 8 percent of the included studies as a further check on reliability.

2.3 In-depth review

2.3.1 *Moving from broad characterisation (mapping) to in-depth review*

The in-depth review considered a sub-set of the studies included in the systematic map. These were selected in accordance with their suitability to answer the review's main research question, on grounds of relevance, reporting and method.

In addition to the inclusion criteria applied to references for the mapping stage, studies therefore needed to meet the following criteria to be included in the in-depth review:

- Must describe an intervention designed to improve the classroom performance of teachers (i.e., should not just describe some aspect of their performance without seeking to affect it through intervention);
- Must describe the intervention in enough detail that its component elements (e.g., workshops, in-school support, etc.) can be identified;
- Must report on how data informing the evaluation of the intervention were gathered and on whether any attempt was made to guard against observation or anecdotal bias (e.g., where teachers or other stakeholders are quoted, it should be specified how these quotes were obtained; where classroom observations are reported, it should be specified how these were systematised);
- Must provide information on either the impact or cost-effectiveness of the intervention, or both. Impact here is broadly defined (see Section 1.2.3), and includes data gathered through both quantitative and qualitative methods, i.e. the review is interested in the 'fit' between interventions and setting, as well as the 'effectiveness' of the interventions discussed. Likewise, cost-effectiveness had to be defined broadly (see Section 1.2.4).

In the research proposal, it was anticipated that 20-40 papers would be included in the in-depth review. As it happened, 35 papers were included, of which 23 reported independent studies. Hence three of the studies were represented in the in-depth review by multiple papers written by the same authors,⁴ and in order to weight their findings equally with other studies, these were treated as one paper for the purposes of the review.

⁴ These were studies of interventions with UUTs in Sri Lanka (Nielsen 1991; Tatto et al. 1991; Tatto and Kularatna 1993; Tatto et al. 1993), in Namibia (O'Sullivan 2000, 2001a, 2001b, 2002a, 2002b, 2003, 2004b) and in Malawi (Stuart and Kunje 1998, 1999; Kunje 2002; Kunje et al. 2003).

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2.3.2 Assessing quality of studies and weight of evidence for the review question

An adapted version of the data extraction tool developed by the EPPI-Centre was used for the data extraction of studies selected for in-depth review. This tool assists reviewers to summarise content and make quality assessments in a systematic way, and is presented in full in Appendix 2.6.

This process informed the rating of each study according to two overarching criteria. The first, methodological trustworthiness (Weight of Evidence A, or WoE A), is the degree to which the study was clearly reported; the extent to which the reliability and validity of the tools used, research methods and analysis were given consideration in the study; and the degree to which the authors' conclusions appear justified by the findings reported. Where all these points were addressed, a study was rated High; where some of these points were addressed, a study was rated Medium; and where only one or none of these points was addressed, a study was rated Low. The second, robustness of contextualisation (Weight of Evidence B, or WoE B), is the degree to which contextual detail given about the intervention, the educational setting and the level and backgrounds of the teachers in the sample enables a judgement of the study's relevance to a given setting and of the extent to which conclusions could be made about the research question. Where all of these were accounted for, a study was rated High; where some of these were accounted for, or only partial detail was provided, a study was rated Medium; and where only sketchy details were provided, a study was rated Low.

Both of these values were taken into account when judging the weight to place on the evidence a study supplied to answer the review's research question, and are referred to accordingly in the in-depth review and in the summary details of the included studies (Appendix 4.1).

2.3.3 Synthesis of evidence

Synthesis of evidence took the form of an empirical structured narrative bringing together the findings of the selected studies. As these treated questions of impact and cost-effectiveness in varying ways, and considered interventions with UUTs across a range of national and educational settings, the synthesis of necessity has also had to take account of different approaches to the problem. The scope for direct comparison of outcomes was therefore limited. The approach taken instead has been to extract factors which have commonly been shown to affect the success of interventions, and use these to identify implications for policy and research.

The narrative synthesis is supported by Table 4.1, which provides a concise summary of the findings and the weight of evidence of each study in the in-depth review, and by Appendix 4.1, which provides a more detailed description of these studies.

2.3.4 In-depth review: quality assurance process

Data extraction and quality assessment of all the studies included in the in-depth review were done independently by two members of the research team. The results were compared, and any differences resolved through discussion between the raters and the other members of the team. The data extraction of 6 of the 35 reports (17 percent) was also checked by an independent assessor at the EPPI-Centre.

2.3.5 In-depth review: deriving conclusions and implications

It has not proved possible to derive a definitive and prescriptive formula for intervention from the evidence identified. Rather, a number of key considerations for policy and practice have been identified from across the 23 studies selected for in-depth review, based on what has proved significant in the literature. These are drawn from the empirical findings reported in this literature, and are discussed with the intention of informing future work with UUTs.

3. Identifying and describing studies: results

Outline of chapter

This chapter describes the results of the first stage of the review: the systematic map. The map was produced by drawing on the results of the coding (Appendix 2.6) applied to those studies which met the inclusion criteria (Appendix 2.1).

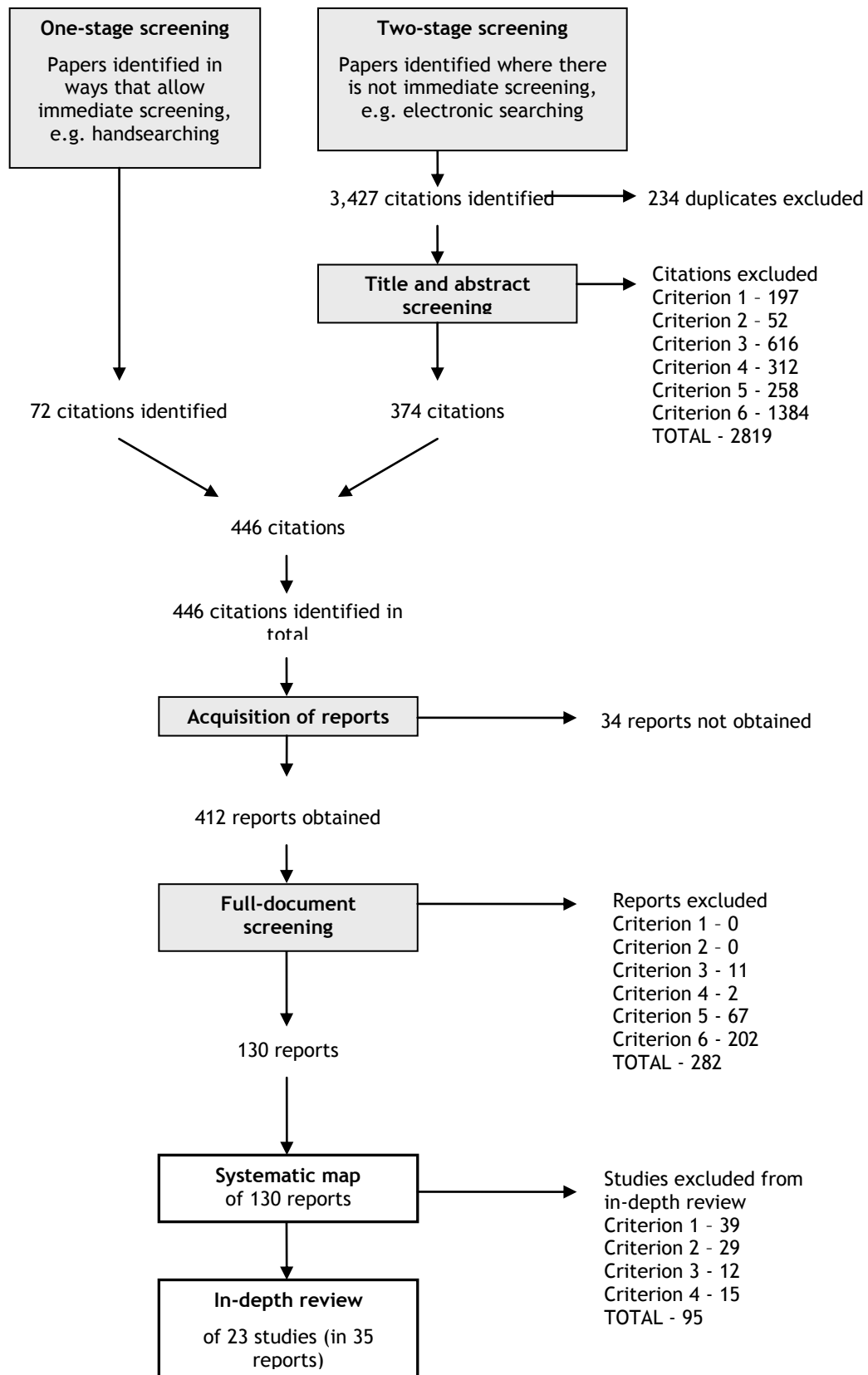
Section 3.1 describes the flow of studies through different stages of the review. Section 3.2 then presents the characteristics of the studies included in the systematic map. First, a description of groups of teachers considered as unqualified, untrained and under-trained within the literature is provided; next, UUTs are compared to their qualified and trained counterparts. This is followed by a discussion of outcome measures used to assess the effectiveness of interventions. Factors identified as facilitating or presenting barriers to effective classroom performance are described next, and an overview of the main intervention strategies reported in the literature is provided. The final section assesses what is known about the cost-effectiveness of these interventions.

3.1 Studies included from searching and screening

The 130 papers that were included in the systematic map examined a number of different aspects of the classroom performance of UUTs. At this stage, no systematic quality appraisal was undertaken, whether of method, reporting or conclusions, and the account given of these papers should therefore not be taken as a full endorsement of particular views. The function of this section is rather to provide a broader overview of the field than is feasible in the necessarily restricted scope of the in-depth review, and to convey a sense of the body of work from which the reports selected for in-depth review emerge. Theoretical contributions, narrative accounts and commentaries are included here alongside empirical evaluations. The themes identified respond to the review's sub-questions.

Thirty-four studies could not be obtained within the time available for the review, and are listed in Appendix 3.1.

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



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3.2 Characteristics of the included studies (systematic map)

3.2.1 Who are considered within the research to be unqualified, untrained or under-trained teachers?

This review did not include studies that restricted their focus to reporting the prevalence of UUTs in the workforce, i.e. those that measured the extent of the 'problem'. Such enumeration did not fall within our research aims, and consequently, we do not offer a survey of the level of training of the teaching workforce within low- and middle-income countries. Rather, we consider which groups of teachers have been considered within the research literature dealing with classroom performance in the absence of full professional qualifications and training.

Many of the studies identified for the review provided little detail on the backgrounds, qualifications or levels of training of the teachers, making it difficult to draw firm conclusions about the significance of certification. Where studies may have investigated UUTs alongside their trained and qualified colleagues, but did not distinguish the former in some way within their discussion, they were excluded on the grounds that there was no significant focus on UUTs (Criterion 5); the lack of specific mention of UUTs meant that they failed to offer insight into the issues affecting the review's population of interest. This is not to say, however, that it was always straightforward to distinguish between our various groups when reading the literature; many studies dealt with populations of teachers where the lines were blurred.

The most common grouping of teachers within the studies reviewed was those who had the requisite basic education, but lacked formal teacher training (n=74). Teachers who had the requisite basic education but whose formal teacher training had been short also appeared frequently in the literature (n=45). The predominance of such teachers very likely reflects both a historical tendency to seek to overcome the unavailability of trained teachers by recruiting those who had completed school regardless of their knowledge of teaching, and the fact that it is less demanding to research and intervene with those who lack only pedagogical knowledge than with those who have neither pedagogical nor subject knowledge. However, a significant - though smaller - number of the studies identified also dealt with this latter type of teacher (n=28). Frequently, there was considerable overlap between these classifications within a single study. Table 3.1 shows the figures for all types of teachers.

Table 3.1: Frequency of types of teachers within the studies included in the map

Types of teachers	No. of studies
Group 1 (ET)	32
Group 2 (TL)	22
Group 3 (EU)	45
Group 4 (LU)	25
Group 5 (EN)	74
Group 6 (LN)	28
Not specified clearly	20

Note: because some studies focused on more than one type of teachers, the total number of studies comes to more than 130.

Furthermore, what was meant by ‘unqualified’ and ‘untrained’ could vary significantly, not only between but within countries and regions. On the one hand, for example, Edwards (2005) worked with teachers in Malawi who had either received no further education beyond secondary level or had completed only two years of the four-year secondary cycle; 17 percent of teachers in a sample from Southern Sudan had less than 8 years of education (Save the Children 2008). Dembélé (2005: 11) makes the claim that in sub-Saharan Africa, most teachers have less than 10 years of education, and that this is furthermore likely to be of poor quality. On the other hand, a proportion of the contract teachers studied in India (Duthilleul 2006: 26; Kingdon and Sipahimalani-Rao 2009) who had no teacher training - and were therefore considered to be ‘untrained’ - nevertheless held university degrees.

In many countries, previously low requirements for entry into teaching had been considerably tightened, giving rise to the need to provide upgrading opportunities to those teachers already practising, who were now considered ‘under-qualified’ (Ngidi et al. 2010; O’Sullivan 2002a). In South Africa, black teachers who under apartheid had been denied opportunities to obtain as advanced qualifications as their white counterparts, were now considered poorly qualified, even though they had achieved the norm at the time (Modiba 1997), and even though they were excellently qualified in comparison with many African teachers described in this review. In some cases, however, teachers did not have the prescribed qualifications even when it was not mentioned that there had been any change in requirements (e.g., Govinda and Varghese 1993: 242). Often, as in this case, this seemed to reflect the difficulties in recruiting sufficiently qualified teachers to rural postings (ibid.: 274).

There was a clear preponderance of studies from sub-Saharan Africa among those identified by the review (n=69), as can be seen in Table 3.2. Studies taking place in the Indian sub-continent (South Asia, n=28) and the countries of south-east and east Asia (n=11) were also prominent. Both teachers without teacher training and those with low general education were discussed in studies from both regions; neither was unique to one or the other area. Fewer studies were identified that addressed the problem of unqualified or untrained teachers in Latin America (n=9).

Table 3.2: Frequency of geographical regions within the studies included in the map

Region	Number of studies
Sub-Saharan Africa	69
North Africa and Middle East	2
Central Asia	3
South Asia	28
South-east and East Asia	11
Oceania	0
South America	6
Central America	3
Caribbean	1
Other	12

Note: because some studies focused on more than one region, the total number of studies comes to more than 130.

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This geographical distribution of studies may accurately reflect the extent of the problem in different regions, or at least the degree of scholarly attention that has been paid to different areas, but there is also the possibility that it could indicate unintended factors skewing the review search strategy toward certain countries. However, those studies providing an international overview of the topic also largely focused on Africa and Asia in their discussions of relevant teachers (Nielsen 1991; Effective World Bank Schools and Teachers Thematic Group 2000; MacNeil 2004; Dembélé 2005; Duthilleul 2006; Akiba et al. 2007; Mpokosa-Chikondi et al. 2008), which may boost confidence in this aspect of the review's findings.

Most of the studies identified focused on primary school teaching, reflecting the priority given to this area during the timespan covered by the review (from the declaration of the 1990 Jomtien World Conference on Education for All, to the Millennium Goals target of universal free primary education by 2015). In many countries, this meant a dramatic expansion in enrolments, and the consequent increases in class sizes put huge demands on untrained and unprepared teachers, especially where qualification requirements had been relaxed in order to deal with the influx. Attention to upgrading or developing these teachers' skills thus became urgent in order to help them to cope (e.g., Aguti 2002; Edwards 2005; Mohono-Mahlatsi and van Tonder 2006). Some (n. = 29) of the studies which looked at primary school teaching also incorporated junior secondary, senior secondary, or both school phases.

3.2.2 How is performance assessed?

The studies identified employed a variety of types of outcome measure to assess the effectiveness of interventions. The most commonly occurring measure was observation of the regularity with which teachers used certain practices classed as desirable. These varied from study to study, but most commonly included such practices as the use of lesson plans, the use of group work, appropriately reinforcing pupils' answers, or improved use of classroom layout.

Changes in pupil assessment results were also often used as an indicator of teaching success. Sometimes these were assessments specifically targeted to evaluate the effects of a specific local intervention (e.g., O'Sullivan (2003) evaluated the reading abilities of pupils whose teachers had received long-term InSET training on teaching methods in this specific subject); other times, regional level (Wang 2001) or national level (Carr-Hill 2011: 253-254) general examination results were cited as evidence for the effectiveness of training interventions.

Some studies reported changes in the results of assessments of teacher knowledge (Maheshwari and Raina 1998; Kunje et al. 2003) following training; a study by Tatto et al. (1993) was one of very few to report on evaluation of both teachers' and pupils' knowledge. Some studies reporting on teacher upgrading interventions did, however, take teacher attainment of certification through successful performance on examinations as an indicator of training success in itself, not discussing how exam performance might translate into classroom performance (e.g., Amaragunasekara 1992; Daniels and Halamandaris 1992; Joia 2001; Aguti 2002; Bof 2004). This begs many questions, often not addressed by the studies themselves, regarding the extent to which the attainment of qualifications makes a real difference to teachers' classroom performance (see Section 3.2.3).

As common as studies evaluating success based on assessment results were those that reported stakeholder satisfaction. As is perhaps to be expected, most frequent among these was use of surveys or interviews with the teachers who had received the intervention (70 percent of the studies reporting stakeholder satisfaction). Headteachers (33 percent) and the teacher educators (33 percent) were the next

most frequently consulted for their feedback, followed by parents of the school pupils (22 percent). Pupil (7 percent) satisfaction was seldom systematically investigated. Studies also occasionally obtained some form of satisfaction feedback from community leaders, women's groups, youth groups or professional teachers' associations, although details are not often given on how these groups were identified or selected. Measures of stakeholder satisfaction do not necessarily tell us much about the direct effects of interventions on teachers' classroom performance, as a number of other factors may influence responses to such surveys; however, they are important considerations in assessing the feasibility of the interventions themselves (e.g., if teachers are dissatisfied with an intervention, they are unlikely to be committed to it and its effectiveness may therefore be attenuated; if headteachers are dissatisfied with an intervention, they are unlikely to give their teachers support to take part and its effectiveness will also suffer). However, this distinction was not always clearly drawn in the studies themselves.

Very few studies (n=10) specifically mentioned the use of teaching resources as an outcome of interest, although it is possible that some looked at this aspect of teaching without reporting that they did so. In part this no doubt reflects the impoverished conditions within which many of the schools operated, and the consequent difficulty of obtaining and maintaining such resources. Nevertheless, some studies did point out how training interventions had encouraged teachers to make use of visual aids, such as word lists on charts, to assist learning (O'Sullivan 2003: 138), the use of commonplace objects for practical demonstration or to illustrate teaching content (Holmes et al. 1991: 35), or work cards and the use of displays (Siraj-Blatchford et al. 1997: 36). This might also extend to involving pupils in participating in making such displays (ibid.).

Among the other outcomes reported by the studies were the effects of training on teachers' self-esteem, professional attitudes, quality of life and/or status within the community (Binns and Wrightson 2006; Bof 2004; Totto et al. 1993; O'Sullivan 2004a: 596), more recruitment of female teachers (UNESCO 2000; Anzar 1999), and school enrolments (Anzar 1999; Earnest 2004). Stuart and Kunje (1998) tackled an overlooked aspect of this topic by investigating changes in the attitudes and collegiate responsibility assumed by the trained colleagues of UUTs following intervention.

Lastly, it is worth noting that a proportion of studies did not explicitly state the outcomes on which they were basing their judgements about impact. This confirms MacNeil's contention that too often interventions in this field suffered from unclear and/or overambitious goals (2004: 22).

3.2.3 How do unqualified and/or untrained teachers compare with their qualified and trained counterparts?

What seemed to emerge from the mapping stage is that unqualified or untrained teachers are not necessarily worse than qualified, trained teachers, although as ever much depends on what is meant by 'unqualified', 'untrained', 'qualified' or 'trained'. Nannyonjo (2007) found that in Uganda, untrained teachers who held degrees in their subject tended to do better at facilitating pupil performance than those who were qualified in education, but he noted that there was considerable intra-group variation, showing that the relationship between training and performance is not a simple one. He put forward the suggestion that teachers' commitment to teaching might diminish as their qualifications increased, echoing concerns voiced by Navarro and Verdisco (2000) that additional training makes teachers more likely to move on to other posts. Khurshid (2008) too found that

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well-educated but untrained teachers in Pakistan actually facilitated better pupil performance than their colleagues with B.Ed. or M.Ed. qualifications, but the sample size of this study was so small that little store can be placed on these findings. On the other hand, Govinda and Varghese (1993) reported that the level of teacher education positively influenced learner achievement in all four localities they studied in India, and Tatto et al. (1991) found that there was a correlation between level of teacher training and pupil performance in Sri Lanka.

At the other extreme of training levels, Bourdon et al. (2010) reported that contract teachers taken on after very short or negligible pre-service training in Mali, Togo and Niger were found overall to facilitate better pupil performance for weak pupils than civil service teachers did. Though little is said about what level of training these civil service teachers had, Bourdon et al. may well be correct in their suggestion that the contract teachers were more effective in communicating with their classes because they shared a community, class and educational background with the pupils they were teaching, to a much greater extent than did the civil service teachers. Duthilleul and Allen (2005) also found that the effect of training on teacher performance varied according to the characteristics of the pupils; in mathematical learning, the levels of teacher training and subject competency were closely linked to performance for low socio-economic status pupils, whereas pedagogical practices assumed more importance for high socio-economic status pupils. Clearly these variables are unlikely to be entirely independent of each other, but the point is reinforced that not all pupils respond in the same way to either trained or untrained teachers.

Snyder et al. (1991) provide a nuanced account of the differences in classroom performance between trained and untrained teachers in Botswana; interestingly, they found that although graduate teachers presented material in a more structured and logical way, unqualified teachers made greater use of open questions and were more learner-centred. Their suggestion, that graduate teachers take a teacher-centred rather than a learner-centred approach to their work because the lower demands it places on them outweigh its negative pedagogic implications, recalls Nannyonjo's notion that teachers may become less committed to their teaching as their qualifications improve. Abdoullah et al. (2009) add a further detail to the puzzle with the finding that the benefits teachers obtained from training in Namibia were mediated by their levels of professional and personal self-esteem.

Studies such as these, which delve further into the factors shaping how teachers benefit (or not) from training, help to see behind such large-scale findings as those of Akiba et al. (2007) or Bonnet (2008). While the former, in a 46-country survey, found that higher student achievement in mathematics is correlated with a higher percentage of teachers who are fully certified, many of the countries it included would be considered high-income and so would not fall within the scope of this review; this also raises the possibility that some of the correlation might be attributable to additional, independent factors. Bonnet, on the other hand, examined PASEC and SACMEQ data from sub-Saharan Africa and found that neither educational level of teachers nor duration of in-service training accounted for much of the variance in student performance (6-7 percent was found to be due to teacher qualifications (2008: 343)). He hypothesises that the effects of teacher education are masked by the dramatic influence of variations in delays to the start of the school year and teacher absenteeism (ibid: 340-341). He further points out that the validity of the data on which PASEC and SACMEQ are relying is highly questionable.

It appears that UUTs may, under certain circumstances, be equally as effective as trained teachers; however, this may not always be the case, and it must equally be noted that in many of these educational settings both perform at a low level. Much depends on what form the training takes; as Moloji et al. (2008) point out, trained and untrained teachers may struggle with many of the same difficulties and weaknesses. As this review's conclusions underline, a number of conditions must be met before training can be viewed as effective, and this may apply as much to certified as to unqualified teachers.

3.2.4 What factors have been found to facilitate or hinder classroom performance and training?

The teachers described in the studies of this review had to face and overcome significant challenges to carry out their roles. These challenges not only arose from their own lack of preparation and training, as a consequence of which they might lack knowledge, pedagogic skills, confidence and job security, but from external factors located in their schools, educational systems, and wider societies. It is important to recognise this, as a significant barrier to the success of interventions may lie in the tendency to target individual teachers for intervention rather than their school as a unit (Siraj-Blatchford et al. 1997; Fairhurst et al. 1999: 198).

At the macro-level, many of the studies described educational settings and teaching workforces which had been severely affected by specific national factors, such as HIV/AIDS epidemics (Kunje 2002; Robinson 2002) or conflict situations (Earnest 2004; Courtney 2007; Save the Children 2008). Interventions had to reckon with the workforce attrition and disruption to training that these had produced. National and/or regional poverty also meant that teachers had to manage sometimes very large class sizes with inadequate resources and infrastructure (Govinda and Varghese 1993; Croft 2002; Gidey 2002: 4; O'Sullivan 2002a: 528; Robinson 2002: 47; Tekleselassie 2005; Mtahabwa and Rao 2010: 233). Although these factors place heavy demands on all teachers, not just the unqualified, they may impact significantly on those who have had less preparation for their role, and must be taken into account when planning interventions.

Some studies highlighted what might be thought of as the 'teacher-environment fit' as an important element in determining how successfully unqualified teachers performed. Among the factors argued to facilitate more effective performance in the classroom was recruitment from among local populations, thus ideally decreasing the social distance between teachers and pupils, and improving the former's attendance and commitment (Kingdon and Sipahimalani-Rao 2009; Atherton and Kingdon 2010; Bourdon et al. 2010: 114; Mulkeen 2010). One study suggested that in some cases, this could make unqualified teachers more effective than their qualified colleagues, although this might depend partly on the phase of teaching and the subject. Jagannathan (1999) even reported on an attempt to develop this familiarity with unqualified primary teachers from outside the community in the slums of Jaipur, India, by providing three-month training that placed a heavy emphasis on the 'concerns and worldview' of children and their families. Another prominent 'teacher-environment' theme in some papers is the contribution made by community involvement in recruitment and monitoring of contract teachers in the local schools (Bourdon et al. 2010; Duthilleul 2006: 62).

The school ethos was also seen as vital if the teachers were to perform well. An institutional commitment to ongoing CPD or upgrading was reported to be linked to better classroom performance by teachers (Guzman et al. 2000: 67; Duthilleul 2006: 61; Akiba et al. 2007: 381; Mulkeen 2010); where this was lacking, teachers were more likely to experience uncertainty and precariousness in their jobs. It was

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also suggested that school-centred development should not be allowed to become inward-looking, but must remain linked to the wider educational frameworks within which the school operates (MacNeil 2004: 21). Any intervention with teachers should try to ensure the involvement of school directors, both to allow teachers to benefit from their experience (often they seem to be the staff with most training in teaching) and so that teachers are facilitated in taking the time to participate (Earnest 2004; Stuart and Kunje 1999; Edwards 2005; Courtney 2007: 327; Baba and Nakai 2009: 60).

Turning to more individual factors (though of course these are still influenced by the social environment), it is suggested that factors such as self-esteem (Abdoullah et al. 2009), insecurity of tenure (Kirk and Winthrop 2008), and the availability of opportunities for career growth and development (Tanaka 2012) may all influence the responsibility and commitment to their work that UUTs may feel. As well as its direct impact on teachers' motivation to devote more effort to their classes, this may also affect their levels of absenteeism and punctuality, a problem in many schools (Bonnet 2008). Low levels of subject knowledge are a commonly cited problem in the literature (Iredale 1996: 14); many teachers depend heavily on textbooks in the classroom because they themselves do not understand what they are teaching (Halai 1998; Courtney 2007: 335).

It is frequently recommended that training interventions take into account teachers' existing experience and knowledge in their design. While addressing gaps in knowledge is clearly important, drawing on existing knowledge and experience also needs to be a component of training programmes (Halai 1998: 305; Akyeampong et al. 2010). Even if they do not have specifically teaching-related knowledge and experience, they will have other experiences and skills on which they may be able to draw (Kruijer 2010). Pre-course classroom observations are sometimes suggested as a way of understanding the local issues confronting teachers (O'Sullivan 2001b; Courtney 2007: 329), so that training can be tailored to suit relevant problems and be appropriate to the local context (O'Sullivan 2004a; Devereux and Amos 2005: 279); multigrade teaching is cited as an example of something that many unqualified teachers must regularly do, and yet is rarely discussed in their training (Butt and Shams 2007: 27). Close integration of the training with classroom practice is regularly recommended (UNESCO 1993; Iredale 1996: 15; Jagannathan 1999: 36). Criticisms have been made of training programmes which are delivered entirely in English, even though it is not the first language of the teachers receiving training and at times interferes with comprehension (Brumfit and Hikmany 1997; Kruijer 2010: 98; Mulkeen 2010).

The importance of appropriate learning materials which have been checked to eliminate cultural assumptions was highlighted by Ebbutt and Elliott (1996). O'Sullivan (2002a, 2004a: 594) made the point that it may be important to take into account teachers' preconceptions about their professional identity, as the tenets of constructivist and child-centred teaching might at first sight appear to be at odds with cultural expectations of schooling and of teachers' authority (see also Dembélé 2005); similarly, reflective practice might clash with entrenched ideas that there is a single 'right way' to teach. She argued that expectations placed on the teachers receiving training must be realistic, taking into account what they bring to the programme (O'Sullivan 2000). The importance of this approach becomes clear on reading accounts where it is reported that teachers did not understand the relevance of what they were taught (Modiba 1997; Robinson 2002: 55). Moreover, if teachers are to become actively involved in their own training (Gidey 2002), an environment must be established that is safe (Harvey 1999a: 202) and allows teachers to make mistakes and take risks (Ashraf and Rarieya 2008; Halai 1998: 305). Devereux and Amos wrote of an 'affirmation process' within an

intervention carried out in the Eastern Cape in South Africa, through which the work done by teachers receiving training was exhibited as a way of reinforcing and valorising their learning experiences (2005, p. 281). Culturally-sensitive awareness of local gender issues may also be helpful in enhancing equitable access to training for both male and female teachers, particularly if residential workshops and/or travel are required (Anzar 1999; Hossain 2000; UNESCO 2000).

The importance of structural issues in underpinning the interventions has been highlighted. Where a cluster model is followed, the school clusters must be sensibly planned (Butt and Shams 2007). Interventions are reported to be weakened by the lack of involvement of stakeholders - including the teachers themselves - when they are being planned (Edwards 2005; Moon et al. 2006; MacNeil 2004: 22), and a lack of ownership of the project by relevant institutions may present significant obstacles to its efficacy (Holmes et al. 1991: 51; Effective World Bank Schools and Teachers Thematic Group 2000; Bof 2004: 12; Courtney 2007: 335). Programme sustainability is frequently mentioned, and it is considered highly desirable that support structures be put in place to ensure that any benefits provided should be maintained (Tatto et al. 1991; Jagannathan 1999: 36; O'Sullivan 2002b: 194; Robinson 2002; Hamid 2010). It is commonly reported that a lack of planned and regular follow-up often results in whatever learning teachers gain soon being lost (MacNeil 2004: 22-23; Butt and Shams 2007). In accordance with these points, careful identification of the precise goals of the intervention is suggested (APEID 1993: 35; MacNeil 2004: 21; Moon et al. 2006).

3.2.5 What interventions have been used to improve performance?

Many of the studies identified focused on training interventions designed specifically to upgrade the qualifications of these teachers. Almost as common were those discussing general InSET or CPD training, which did not necessarily lead to a certificate. Subject-based teaching programmes set within a specific pedagogic curriculum were also common, but programmes designed to improve subject knowledge without pedagogic content were much rarer (despite a number of studies mentioning that teachers' subject knowledge was very low). Where these did occur, in some cases they were actually intended to bring unqualified teachers up to a level where they could start to follow qualifying courses (e.g. Buckley 1992; also the Guyanese example discussed in Binns and Wrightson 2006). Only six studies in total discussed the issue of unqualified/untrained teachers within the context of a wider curriculum reform (APEID 1993; Brumfit and Hikmany 1997; Anzar 1999; O'Sullivan 2001a, 2005; Robinson 2002).

Other strategies related to the improvement of unqualified teacher performance included school management training (e.g., Welford and Mosha 2002; Carr-Hill 2011), improvements to school infrastructure (e.g., Khaniya 1997; Carr-Hill 2011), experimenting with teacher mentoring on a small scale (e.g., Halai 1998, 2006), and the introduction of a career ladder structure to motivate untrained teachers (e.g., Tekleselassie 2005).

Most interventions made use of a combination of methods in intervening with unqualified/untrained teachers. Use of a 'cluster' model for provision of support to schools was widespread, often through the establishment of a resource centre for use by these groups. Most frequently, training interventions relied on a series of workshops in combination with distance education, sometimes with some form of in-school support from more highly trained colleagues or headteachers (e.g., Kai-ming 1996: 196; Tatto 1997; Stuart and Kunje 1999; Njenga and Kabiru 2001; Kunje et al. 2003; Bourdon et al. 2010). Occasionally, the unqualified teacher trainees were explicitly encouraged to mutually provide such in-school support themselves

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(e.g., Leach 2008; Miti and Herriott 1997; Ebbutt and Elliott 1996). Usually, the teachers would be given written assignments to complete at regular intervals in order to monitor their progress. This model was widely considered to strike the best balance between providing teachers with sufficiently regular guidance without exceeding the available budgets, while allowing them to continue fulfilling their teaching duties during their training.

Stand-alone workshops, or shorter series of workshops, were less often used. In many of the settings described in the literature, the amount of training that teachers needed was greatly in excess of what could be provided in this short space of time. Consequently, where such workshops featured, they might serve the purpose of obtaining feedback from the teachers on the implementation of an intervention (e.g. Potter and Naidoo 2006) rather than of delivering training as such. In other cases, they were intended to provide orientation training in a specific, focused area, e.g., the use of iPods on which training material was stored (Shohel et al. 2010), or more occasional updating CPD workshops for comparatively experienced teachers (e.g., Martinez de Olivé 2008). More commonly, these shorter workshops were used to train teacher educators, who would then implement the intervention (e.g., Robinson 2002; Butt and Shams 2007).

Use of the 'cascade' model of training is occasionally reported (e.g., Miti and Herriott 1997; Robinson 2002; Suzuki 2008). Although there are still proponents who argue that it is an approach with the potential to reach large numbers of teachers at limited cost (Suzuki 2008), they seem to be outnumbered by its critics. For example, Jagannathan (1999: 36) claimed that educational NGOs in India had found it 'not very effective', a sentiment echoed by Harvey (1999a: 203) in South Africa, and Navarro and Verdisco (2000: 4) in Latin America. Robinson enumerated the problems with the 'cascade' approach, which include 'the dilution or misinterpretation of the information, lack of confidence, knowledge and understanding on the part of the trainers' and often a further disconnection between those providing the initial training and the realities of the classroom for the eventual recipients who received the training at second, third, or fourth-hand (2002: 53 - authors' translation from the French).

Some studies described efforts to enhance teachers' reflective capacity. This was sometimes done through intensive coaching (Halai 1998, 2006; Ashraf and Rarieya 2008). Alternatively, action research methods could be used (Stuart and Kunje 1998, 1999; O'Sullivan 2002a). Particular challenges were often reported with taking this approach, arising both from cultural expectations of knowledge and teaching which might not encourage reflection, and from the capacity of untrained teachers to achieve substantial reflection without the theoretical knowledge on which to base it. In order to overcome these challenges fully, intensive time and resource inputs would sometimes be necessary (O'Sullivan 2002a: 537-538), but in many educational contexts these might not be feasible on a large scale. Certainly, such measures as structured forms to guide reflection might initially be required (*ibid.*). Some authors have suggested that lesson study may offer a way of realising this approach (Kimura 2007; Odani 2007); Baba and Nakai (2009) and Ono and Ferreira (2010) reported on initial attempts in Zambia and South Africa respectively, suggesting that it holds some promise. However, both of these were at the early stages, and take-up seems to have been mixed. Further rigorous studies are needed to determine how successful the method may be in low-income settings and with teachers who have received little training.

Where resources were provided to assist teachers' learning, these usually took the form of printed materials. Although Leach (2008), Ebbutt and Elliott (1996) and Akyeampong et al. (2010) have argued for the potential of ICT to facilitate

learning, little use had been made of it in interventions with the UUTs discussed here. In part this reflects the time period covered by this review; it is unsurprising that on-line and mobile technology did not feature heavily in the 1990s, although television and radio interventions were reported to be of use (Holmes et al. 1991; Calderoni 1998; Thurab-Nkhosi 2000). However, even in more recent times, the conditions in many schools - where even desks may be unobtainable and electricity supplies erratic - have meant that print has often been considered more reliable than electronic media (Moon et al. 2006; Moon 2007; Wolfenden 2008).

The provision of specific incentives for UUTs to develop their knowledge and qualifications was often not explicitly discussed; rather, certification or skills development were assumed to be sufficient motivators in themselves. In some settings where major upgrading programmes were underway, achievement of certification may have been a requirement of continuing to teach, but again studies do not often dwell on this point. However, a few studies mentioned alternative forms of incentive. For example, Mulkeen (2010: 99) wrote of a system where teachers gained credits for in-service activities, which would then count towards study leave, promotion or enrolment for future courses. The account by Holmes et al. (1991) of radio-based training in Nepal mentioned that as part of the intervention, the untrained teachers concerned were able to obtain a radio at well below market cost, but that this did not appear to detract from their commitment to learning. However, few of these alternative incentives have been trialled more widely. Regarding more directly financial rewards, performance-related payments have not on the whole been investigated specifically with unqualified and/or untrained teachers,⁵ with whom upskilling and certification have been more pressing concerns than motivational measures. Yet a number of studies expressed concern that the costs of participation in an intervention could discourage those teachers whom the intervention was meant to reach (Tatto et al. 1991; Akyeampong et al. 2010; Kruijer 2010). These authors therefore warned against assuming that the teachers would be willing to shoulder the burden of time away from home, travel and subsistence costs, and direct contributions towards training and resource costs, if they felt that insufficient effort was being made by the programme directors to assist them in doing so.

3.2.6 What are the associated costs?

Most studies were considerably more concerned with efficacy than with assessment of cost-effectiveness; cost-effectiveness was specifically addressed in only 16 percent (n=21) of the studies included in the mapping, though costs were briefly mentioned in a further 23 percent (n=30). This often took the form of simply providing indicative costing figures, without further analysis. More advanced discussion of this question is presented in the in-depth review, although some of the more common themes can be identified here.

Where the question was addressed, distance education was - as alluded to earlier - generally considered to be the most cost-effective approach to training unqualified and/or untrained teachers (see Banks et al. 2007; Mashile 2008). Akyeampong et al. (2010) and Tatto et al. (1993) found it to be considerably cheaper than

⁵ An interesting study by Muralidharan and Sundaraman (2010) asserted that performance-based pay incentives for teachers could lead to significant improvements in student performance, even when those teachers were untrained. However, although these teachers made up a significant percentage of those studied, they were not disaggregated from the overall statistical results, and a number of them, although untrained as teachers, held college degrees (hence the study's exclusion from the mapping). This makes it difficult to judge how far these findings might generalise to our population of interest.

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residential training, while still providing acceptable levels of benefit. Kunje (2002) argued that MIITEP, a programme incorporating limited residential study but relying mainly on distance education, was 3-4½ times cheaper than standard teacher training in Malawi, and was the only realistic option to train the numbers needed, although he noted that there were aspects of the intervention which could be made significantly more efficient. He suggested that a course of this kind was preferable for the initial training of primary teachers, while more intensive training might follow some years later for selected teachers only (Kunje et al. 2003: 107). Nielsen (1991), meanwhile, pointed out that the cost-effectiveness of distance education might vary depending on other factors, as he found it to be greater for training in languages and pedagogy than for mathematics, which appeared to be more difficult to teach through distance education.

Moon et al. (2006: 41) claimed that relative inattention to careful costing for open and distance learning (ODL) projects was not unusual, which might account for the relative scarcity of detailed analysis and discussion. They provided a short discussion of relevant considerations when scoping the budget for an intervention of this kind (ibid.: 41-46), which warned planners not to underestimate the cost of preparing teaching materials (which in their discussion might be television programmes or on-line modules), distinguished between fixed and variable costs, and considered the unit of cost comparison. They argued that this last was more appropriately thought of as cost per module or cost per graduate rather than cost per student, due to the likely high rate of non-completion. They also advised that opportunity costs should be carefully accounted for (ODL offers savings over residential training not only by avoiding room, board and travel costs, but also by not disrupting the UUT's employment). On this point, Nielsen (1991) mentioned that making teacher trainees bear these costs reduced the bill for funders or government, but both Kruijer (2010) and Akyeampong et al. (2010) argued that careful thought should be given to providing expenses or subsistence to teachers attending training events to facilitate them in persisting with the programme. However, this should not be such that teachers' primary motivation for attendance became the financial benefit (Akyeampong et al. 2010).

Duration is also an important consideration; accreditation of prior learning, apart from serving to engage teachers more effectively in learning, can help to shorten the amount of time that needs to be spent on training (Banks et al. 2007). Similarly, the integration of traditionally shorter courses into a larger course can also help to compress training time and reduce expenditure (ibid).

Another point made by Moon et al. was that although mobile and information technology implementation can sometimes be rejected out of hand as impractical in low- and middle-income countries, many governments were committed to improving ICT provision and it was likely to become an integral part of many interventions in the near future (2006: 38). This is an argument reiterated by Leach (2008) and also accepted by Akyeampong et al. (2010), although the latter recognise that the intervention which they evaluated in fact did not make as much use as planned of ICT due to cost constraints (ibid: 43). Leach (2008) provided a reminder that costs in this area were changing so rapidly that what was only recently prohibitive might quickly become much more feasible.

Finally, some authors questioned the goals of many interventions in terms of cost-effectiveness. Mulkeen (2010: 103) pointed out that major upgrading projects usually led the teaching wage bill to rise in uncontrollable ways, bringing into question whether this was always a desirable approach to upskilling unqualified teachers. Nannyonjo (2007) too queried whether it was truly cost-effective, given that pupil performance might not benefit directly from the educational attainment

of their teachers. This has led a number of authors to argue that better value is obtained by employing contract teachers, who are not necessarily qualified as teachers, rather than regular civil service teachers (Duthilleul 2006; Atherton and Kingdon 2010; Kingdon and Sipahimalani-Rao 2010). Under certain circumstances this may well be so (see earlier discussion of closeness to the community), but it must be remembered that many of the teachers discussed by these authors had high levels of education even though they were not trained as teachers. Bourdon et al. (2010) demonstrated that contract teachers were not always more effective than trained teachers by comparing outcomes across three francophone West African countries which obtained varying results from such a programme. Furthermore, Jagannathan pointed out that while voluntary teachers had frequently been taken on in India as a way to save on salary costs, there had been little thought given to the future integration of these para-teachers (1999: 34-35). It is just this situation that has given rise in the recent past to so many large-scale upgrading programmes (e.g. Kai-ming 1996; Kunje 2002; Mukamusoni 2006), as qualification requirements rise or the workforce makes demands for regularisation, stability and recognition. Duthilleul and Allen (2005) have argued that best use can be made of contract teachers when they are integrated into career and training structures, and treated as part of the wider teaching profession rather than separately (see also Tanaka 2012). It follows that use of contract teachers or para-teachers should be thought through rather than implemented as a stopgap or short-term measure, as there may be long-term implications to such a move.

3.3 Summary of results of map

The 130 papers included in the systematic map examined various aspects of the classroom performance of UUTs; however, many studies were not explicit about these UUTs' qualifications or levels of training. How UUTs performed compared to their trained counterparts varied. While in some cases, UUTs were found to be as effective as trained teachers, this was not entirely consistent across different settings. Additionally, both groups may struggle with the same issues and many training needs may be equally applicable to both types of teachers.

A range of measures were used to evaluate the effectiveness of interventions. Often these included observations of the frequency with which certain pedagogic practices were used following training, such as lesson planning, the use of group work and positive reinforcement, and better use of classroom space. Other common indicators consisted of changes in pupil assessment results, changes in trainee knowledge and attitudes, and reported stakeholder satisfaction. Much of the success of interventions was reported to depend on factors located within the school, education system or society. For example, UUTs were reported to perform more effectively when they had been recruited from the local area, when the wider community was involved in recruitment and in monitoring their performance, and when there was institutional commitment within schools to their professional development. The interventions described took a range of forms, among the most common of which was the use of a series of workshops in combination with distance education. The use of school 'clusters', usually with a resource centre, was also widely discussed. Although cost-effectiveness was less commonly discussed than the effectiveness of interventions, there was some support for the value obtained from distance education and cluster models. However, it was also recognised in the literature that many evaluations did not accurately calculate the full costings for distance learning models, and that more careful attention should be paid to this.

4. In-depth review: results

Outline of chapter

This chapter describes the results of the in-depth review of the studies selected for data extraction. Section 4.1 describes the basis for their selection. Section 4.2 clarifies the criteria of methodological trustworthiness (WoE A) and robustness of contextualisation (WoE B) used to evaluate the studies in addressing the review question within the in-depth review, and provides a summary of those studies in tabular form (Table 4.1). Section 4.3 begins by presenting the outcomes of the synthesis of evidence contained in the studies for in-depth review. It continues by analysing the different strategies adopted by the interventions described by the studies. Section 4.3.3 is a discussion of conceptual distinctions arising from the in-depth review which constitute issues to be considered in the design and implementation of interventions to improve the performance of UUTs. Section 4.4 is a summary of the results of the synthesis.

4.1 Selecting studies for the in-depth review

Selection of studies for the in-depth review followed the second-stage inclusion criteria listed in Appendix 2.1. Hence all studies included evaluated an intervention and provided at least a minimal account of both the components of that intervention, the study's own methodology, and impact and/or cost-effectiveness. Both qualitative and quantitative studies were included, provided they met these criteria, and there were no restrictions of scale. Hence the data-extracted studies range from evaluations of large-scale, national upgrading schemes to small-scale, within-school reflective coaching interventions.

4.2 Further details of studies included in the in-depth review

The data extraction and quality assessment tool (Appendix 2.6) was applied in full to the studies that met the inclusion criteria for the in-depth review, to ensure that the reviewers followed systematic guidelines in assessing the study aims, design, sampling, recruitment, methods, data collection and analysis, conclusions, reporting, ethics and generalisability. This process then informed the rating of each study according to two overarching criteria. The first, methodological trustworthiness (Weight of Evidence A), is the degree to which the reliability and validity of tools, research methods and analysis were given consideration in the study, and the degree to which the authors' conclusions appear justified by the findings reported. The second, robustness of contextualisation (Weight of Evidence B), is the degree to which contextual detail given about the intervention, the educational setting and the level and backgrounds of the teachers in the sample enables a judgement of the study's relevance to a given setting and of the extent to which conclusions could be made about the research question. By rating each study on both criteria, the team aimed to inform the review's findings with such 'hard' data on effectiveness as could be found, but also to complement these with ethnographic or other research that could potentially shed light on process and underlying factors, without laying claim to the same degree of methodological controllability as the former type of research.

Data were extracted for the in-depth review from 23 studies, reported in 35 different publications.⁶ Of these, few came close to the kind of methodology that might have been designed to answer the review question. A similarly small proportion were rated as contextually robust, perhaps due to the fact that many were written for a national rather than international audience. As a result the authors often seem to have assumed knowledge of the local context and so did not go into the levels of detail that might have facilitated a clearer assessment of the scope and nature of the intervention. For example, the qualifications and level of general education of teachers involved in the interventions were often not reported, and even where an overview of this was given, it was often unclear whether there was a differential response from teachers with different levels of training. Similarly, methodological details which would have enabled the review to gauge the trustworthiness of studies were often absent, also in some cases possibly because this was not deemed necessary for the study's original audience.

Due to these widespread problems, ultimately only two studies were both highly methodologically trustworthy and contextually robust (Harvey 1999a; Tatto et al. 1991). Hardman (2009) also scored highly on methodological trustworthiness, though provided little contextual information. O'Sullivan (2003) and Stuart and Kunje (1999) were contextually highly robust, while achieving acceptable levels of methodological trustworthiness. Higher reliance is therefore placed on these studies in the discussion. Four studies presented acceptable levels of methodological trustworthiness and robustness of contextualisation, despite some weaknesses in each (Shohel et al. 2010; Bof 2004; Guzman et al. 2000; Binns and Wrightson 2006), and also inform the discussion, despite some reservations. The remaining studies were weak in at least one of the ratings, and no more than acceptable in the other. Limited reliance is therefore placed on their findings, but they may be referred to when their data seem relevant, with due caution about the claims they make. The general weaknesses that affect these studies are discussed within the findings.

Table 4.1 provides a concise summary of these studies for rapid reference. More detailed description is provided in Appendix 4.1.

⁶ Where multiple publications resulted from the same study, they have been grouped together for data extraction and quality assessment. This was to simplify the review reporting and to ensure that no study would appear to have greater weight simply because the same findings were reported in several separate outputs.

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Table 4.1: Summary description of the studies included in the in-depth review

Study	Aims	Study Data	Key Findings	WoE A	WoE B
Akyeampong et al. (2010)	To assess an ICT-enhanced open and distance learning strategy	Survey of trainees Classroom observations	Improvement in pedagogy Trainees identified some aspects of the programme that impeded understanding and attendance Programme provided affordable training, though some costs were borne by trainees	Low	Medium
Andre (2008)	To identify effects of a national upgrading programme on classroom practice	Classroom observations Interviews with trainees and educators Trainee test results Student test results Analysis of trainee reports	Improvement in pedagogy and preparation Improved teacher awareness of facilitator role in learning	Low	Low
Ashraf and Rarieya (2008)	To explore process of developing teachers' reflection through coaching	Classroom observations Transcripts of reflective conversations Diary entries	Reflective development reached a certain level, but did not progress to questioning own beliefs Institutional commitment lacking to establishing reflection as standard	Low	Medium
Binns and Wrightson (2006)	To study community views on effects of distance education of teachers	Structured questionnaires Semi-structured interviews	Improved teacher performance reported by educators, colleagues, headteachers and community leaders	Medium	Medium
Bof (2004)	To evaluate a national upgrading programme	Statistical analyses of trainee performance Surveys of trainees Classroom observations	Successful certification of most trainees Improved pedagogy Little change in subject content knowledge	Medium	Medium

Study	Aims	Study Data	Key Findings	WoE A	WoE B
Guzman et al. (2000)	To evaluate an upgrading project's effects on skills and knowledge	Interviews Survey of trainees and educators Classroom observations	Project teachers better than graduates of teacher training colleges Higher pupil achievement and retention rates Shortages of resources and educator availability	Medium	Medium
Halai (1998)	To evaluate effect of mentoring on teacher learning	Classroom observations Discussions with trainees Reflective journal entries	Some evidence that mentoring facilitated professional development Difficulty sustaining time and resource input	Medium	Low
Hardman et al. (2009)	To investigate effect of school-based training on pedagogic practice	Classroom observations Interviews with stakeholders Pupil performance	Improvement in pedagogy Cascade aspect of intervention was unsuccessful	High	Low
Harvey (1999a)	To assess the impact of classroom-based coaching on teaching practice	Classroom observations	Improvement in some aspects of pedagogy Limited evidence of sustainability of changes Classroom coaching entailed high costs	High	High
Holmes et al. (1991)	To review the use of radio for teacher training	Trainee test scores Retention data Questionnaires	Some improvement in trainee test scores Lower retention than face-to-face training Cheaper than face-to-face intervention, but higher proportion of costs paid by government	Low	Low

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Study	Aims	Study Data	Key Findings	WoE A	WoE B
Johnson et al. (2000)	To gather teachers' perspectives on special training received abroad	Trainee interviews Classroom observations	Trainees had not gone beyond mechanical learning Learning mostly not applied in the classroom	Medium	Low
Kruijer (2010)	To evaluate impact of an upgrading initiative	Semi-structured interviews	Large numbers of teachers upgraded Headteachers satisfied with trainees Programmes were cost-effective when making use of local teacher development centres	Low	Medium
Kunje (2002); Kunje et al. (2003); Stuart and Kunje (1998); Stuart and Kunje (1999)	To investigate effects in schools of in-service teacher education programme	Interviews with educators Focus groups with trainees Observations of training	Little evidence of systematic mentoring within schools Learning not integrated by trainees Students showed little progress in learning Training programme was affordable, but concerns around efficacy	Medium	High
Maheshwari and Raina (1998)	To evaluate video training of primary teachers	Trainees' self-ratings Trainee test results Observations of training	Training rated as effective Interactive video technology is a feasible alternative to cascade model	Low	Medium
Mehrotra and Buckland (2001)	To compare teacher training costs with effects on access and quality	Review of primary statistical data	Employment of unqualified teachers was justifiable for cost-effectiveness and quality Costs of this option rose over time Community participation a critical factor in success of programmes	Low	Low
Njenga and Kabiru (2001)	To assess impact of in-service training on early years children, and	Pupil progress data Interviews	Training of teachers reduced repetition rates among pupils, and facilitated transition from pre-school to primary	Low	Medium

Study	Aims	Study Data	Key Findings	WoE A	WoE B
	compare with children taught by teachers who had not received this intervention	Focus groups Classroom observations	school		
O'Sullivan (2000); O'Sullivan (2001a); O'Sullivan (2001b); O'Sullivan (2002a); O'Sullivan (2002b); O'Sullivan (2003); O'Sullivan (2004b)	To investigate the effectiveness of action research strategies to help the teaching of reading skills	Classroom observations Pupil test results Interviews Trainee attendance at workshops	Improvement in pedagogy Improvement in pupil reading ability Importance of keeping ambitions realistic: had to accept a certain level of teacher-directedness, rather than aim unsuccessfully for an entirely learner-centred approach	Medium	High
Sampong (2009)	To evaluate distance teacher education programme	Trainee questionnaires Educator questionnaires	Trainees and educators both positive about training Improvements needed to feedback processes on trainees' work	Low	Low
Shohel et al. (2010)	To evaluate mobile technology to assist teachers	Questionnaire Classroom observations Semi-structured interviews	Teachers were able to advance using self-study on the materials provided	Medium	Medium
Siraj-Blatchford et al. (1997)	To evaluate training project to make teaching more child-centred	Semi-structured questionnaires Classroom observations Trainee interviews	Practice became more child-centred, though observations showed that the effect was less than the questionnaire responses indicated Teachers did not grasp the educational objectives of child-centred approaches within the timespan studied	Low	Low

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Study	Aims	Study Data	Key Findings	WoE A	WoE B
Tatto et al. (1991); Tatto and Kularatna (1993); Tatto et al. (1993); Nielsen (1991)	To compare cost-effectiveness of training through colleges of education, teachers' colleges and distance education	Trainee test results and attitude measures Classroom observations Questionnaires Pupil performance measures Interviews with programme directors	The pupils of distance education-trained teachers achieved better than untrained teachers, but lower than the other two groups Pedagogy showed more improvement after training than subject knowledge Trainee test results were high on completion of training, but were not sustained Distance education worked best when there was regular face-to-face contact with educators Distance education was the most cost-effective form of training, but this depended on economies of scale	High	High
Welford and Mosha (2002)	To evaluate primary schools school-based training project	Interviews Focus groups Classroom observations Observations of training	Improvement in pedagogy Positive feedback from stakeholders	Low	Low
Wilson (2000)	To describe effectiveness of a rural schools in-service training project	Trainee interviews Trainee assignments	Improvement in pedagogy	Low	Low

4.3 Synthesis of evidence

4.3.1 *Outputs and outcomes*

The in-depth review confirmed that there is no one type of intervention or training practice which on its own is clearly successful in promoting improved classroom practice by UUTs. Almost all of the studies show several strategies being used in various combinations, with varying degrees of emphasis placed on each. There is thus little way of determining with confidence which, if any, single aspect of an intervention was the most or least successful. We can, however, conclude that successful interventions include a range of strategies and that it is the way that they interact that contributes to the professional learning of UUTs.

A particular obstacle to comprehensively answering the review's research question was that few studies had in fact defined classroom impact explicitly or measured it empirically. Many focused on measuring whether UUTs had incorporated into their teaching specified methods that they had been taught to use by the interventions. However, the problem of observer effects (the likelihood that teachers may make extra efforts to employ these methods if they know they are being observed) was rarely discussed, and in some cases, teachers' use of these methods was measured by self-report rather than empirically.

4.3.1.1 *Changes in pupil performance*

Only four studies (Tatto et al. 1991; O'Sullivan 2003; Stuart and Kunje 1999; Binns and Wrightson 2006) reported some form of objective measures of the effects of changes in teacher practice on pupil performance, albeit measured in different ways. This makes it difficult to assess and compare the ultimate impact of most of the interventions. Of these four, O'Sullivan's (2003) study of a three-year cycle of training circuits, which used action research to train UUTs in reflective methods, presented the most fine-grained description of the advances and setbacks of the teachers' learning process, resulting in WoE B being rated as High (WoE A Medium). Pre- and post-intervention assessments of pupils' reading ability showed a marked improvement, particularly in comprehension, word study and ability to read connected text for meaning. Some less ethnographically detailed reports describe similar findings: Binns and Wrightson (2006) too reported marked improvement in primary leaving examination results following the NITEP distance education project to train Ugandan primary schoolteachers. These findings are remarkable for having been achieved in chronically under-resourced and degraded schools, as the authors' descriptions make clear (although WoE A and B are both Medium in this study); Tatto et al. (1991), meanwhile, found that the impact of teacher training strategies on pupil performance in Sri Lanka varied with the socio-economic status of the school. They noted that distance education of UUTs produced less (though still significant) improvement than full-time residential education, a finding with some strong support (WoE A, B both High). Stuart and Kunje (1999) reported negative findings following Malawi's MIITEP distance education programme, showing that pupil performance in mathematics and English remained static over the time between a pre-and post-intervention test (WoE A Medium, B High). Of these, only Tatto et al. (1991) and Stuart and Kunje (1999) reported comparison with a control group of trained teachers; the other two were within-group studies only.

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4.3.1.2 Pupil retention

A further two studies used pupil retention as a measure: Guzman et al. (2000) mentioned the reduction in pupil 'drop out' that followed a Laotian UUT upgrading project using the 'cluster schools' model, while Njenga and Kabiru (2001) reported higher pupil retention following short periods of residential training for pre-school teachers, with repetition rates in Standard 1 in the latter study almost twice those of pupils cared for in pre-school by trained teachers. However, the statistical analysis carried out by Njenga and Kabiru has a number of acknowledged flaws (WoE A Low), and so it is debatable how much store can be set by this finding. The data on retention collected by Guzman et al. also seems to have been gathered unsystematically and its reliability may be open to question.

4.3.1.3 Certification

That impact on pupil performance is so seldom thoroughly examined suggests that at times the primary intention of interventions may have been to solve the lack of qualification rather than lack of effectiveness of UUTs. This means that some interventions were mainly evaluated by the way that participants completed the course and gained the qualification, often as the result of passing a written examination (e.g. Sampong 2009; Bof 2004). Although many studies reported that the improvement of teacher subject knowledge was an aim of the intervention, this often proved problematic: Totto et al. (1991), Stuart and Kunje (1999), Bof (2004) and Akyeampong et al. (2010) found that gains failed to meet expectations. Mathematical learning seemed to be particularly difficult to improve through distance education (Stuart and Kunje 1999; Bof 2004; Akyeampong et al. 2010).

4.3.1.4 Use of pedagogic methods

The most frequently described impact was the increased use of more interactive and learner-centred pedagogic methods in the classroom. It proved easier to show positive change on these measures, with most studies detecting some improvement (Harvey 1999a; Stuart and Kunje 1999; Guzman et al. 2000; O'Sullivan 2003; Bof 2004; Binns and Wrightson 2006; Hardman 2009; Akyeampong et al. 2010). However, there may be some concerns over the sustainability of these changes, as noted above (and see Harvey 1999a: 201; O'Sullivan 2002b: 198), and concerns were noted by some authors. For example, Welford and Mosha (2002), noted increased use of group work within the classroom, but pointed out that the groups were large, sporadically used, and did not assist learning particularly well, while Johnson et al. (2000) noted that Egyptian teachers remained at a mechanical stage of learning after training, did not reflect much on the use of the new pedagogic practices they had learned, and soon reverted to traditional methods of teaching. Although these studies were not rated strongly on the strength of the evidence they presented, their observations should nevertheless serve as a caution; it is not always clear that the adoption of these techniques has been as thorough as sometimes assumed, or that their use has translated into measurable impact on pupil learning.

4.3.1.5 Confidence, motivation and status

Twelve of the studies measured or noted as an outcome, though not always specifically intended, the positive impact of the interventions on the professional confidence and motivation of the teachers within their schools and communities. Bof (2004), Guzman et al. (2000), Kruijer (2010) and Binns and Wrightson (2006) reported that this was substantial and found a domino effect whereby teachers' awareness of new methods and desire to transfer their learning to the classroom led to more positive attitudes towards their students, with high numbers of

teachers passing their examinations and getting qualified and promoted. This took place in Bof's study of Brazil's Proformação upgrading intervention even without significant changes in teachers' content knowledge or higher reported rates of pupil attainment (WoE A, B both Medium). For Binns and Wrightson (2006), whose study focused primarily on the impact of the distance education of unqualified teachers on the community, the training led to an increase in self-esteem, greater participation in schools, sharing of teacher knowledge in a new professionalism and greater participation in the community, gaining respect - and increasing teacher motivation and parental support (WoE A, B both Medium). Totto et al. (1991) reported positively on the integration of the Distance Education programme's curriculum within the community, suggesting that increased community involvement was important for the sustainability of the intervention (WoE A, B both High). This was echoed by Siraj-Blatchford et al. (1997) (WoE A, B both Low). Bof (2004) directly linked the rise in teacher self-esteem with the change in particular classroom pedagogies, but it is worth noting a possible connection between these two most frequently recorded impacts that emerged from the studies. There may be a bootstrapping effect whereby improved pedagogic strategies in the classroom attest to their success in being fully trained and hence certified, recognised in the wider school environment and spilling out into the community, and so increasing teacher satisfaction and motivation to continue to use those methods.

4.3.1.6 Summary of outputs and outcomes

Overall the evidence for the impact of interventions on pupil performance is quite sparse, although there are indications that it is possible. The studies indicate that detectable changes can be reliably made in UUTs' pedagogic practice, but it is harder to show how meaningful the underlying reasons for these practices are to teachers, how sustainable they may be once direct support is withdrawn, and what impact these practices have on pupil performance. There are also widespread reports that training interventions can increase UUTs' self-esteem and status within their school and community, which may lead to improved punctuality and more professionalism, though again the effects of this on pupil performance have not been conclusively demonstrated. There is thus a clear need for future studies to prioritise the measurable *and sustainable* effects that interventions have on pupil performance; while such outputs as teacher learning, certification, satisfaction, self-esteem and status are certainly of interest in informing intervention planning, it is how successfully they can be translated into pupil outcomes that is the ultimate measure of intervention success or failure.

4.3.2 Strategies

Turning now to the strategies employed in interventions, the great majority of studies used distance learning/education, drawing on either a combination of workshops, independent or self-study and in-class support in which the trainee remained teaching full time in post, or a form of school-based training whereby tutors or more experienced teachers, mentors or external coaches, worked on a one to one basis with the trainees.

Training workshops, either in a series or at the beginning of interventions, were used in all but two of the studies, and in 17 of the 23 studies these were in combination with in-class support. A third strategy that was used in 15 of the studies was independent study. These three strategies of workshops, in-class support and independent study, used in combination, appear to be the most effective strategies and were implicated in the studies most highly rated for robustness of contextualisation and methodological trustworthiness, in those conducted on a large scale and, in those that were most cost-effective. Two

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further strategies appeared to support these more frequent combinations: in-school support, which did not involve the analysis of teaching, and school clusters.

These are shown in Table 4.2, alongside reference to the sub-section where each strategy is discussed.

Table 4.2: Types of strategies by studies extracted for in-depth review

Strategy		Key studies		Literature synthesis
Training workshops	Orientation Workshop	Akyeampong et al. (2010)	Induction	4.3.2.1
		Hardman et al. (2009)	Week-long induction	
		Harvey (1999a)	Orientation workshop	
		Kruijer (2010)	Week-long introductory sessions	
		Shohel et al. (2010)	Orientation workshop	
	Shorter training	André (2008)	Training sessions for 10 days in a centre	
		Binns and Wrightson (2006)	Two-week residential course; fortnightly weekend tutorials	
		Bof (2004)	Fortnightly tutorial meetings	
		Guzman et al. (2000)	Two short residential training sessions	
		Harvey (1999a)	Seven one-day workshops per year	
		Njenga and Kabiru (2001)	One- and two-day workshops	
		O'Sullivan (2003)	3-5 days training workshops in a 4-year circuit of training	
		Tatto et al. (1991, 1993)	Training sessions in regional centres	
	Longer training	Akyeampong et al. (2010)	Up to 10 weeks residential face-to-face meetings organised three times a year	
		Guzman et al. (2000)	Two long residential training	
		Stuart and Kunje (1999)	One-term residential course before in-class teaching	
		Njenga and Kabiru (2001)	Three-week residential training during school holidays, with teachers attending six residential training sessions over the two-year period	

Strategy	Key studies		Literature synthesis
Independent study	André (2008)	Self-study module	4.3.2.2
	Akyeampong et al. (2010)	Self-study with printed materials for exam preparation	
	Binns and Wrightson (2006)	Written assignments based on self-study	
	Bof (2004)	Self-study over 4 modules including workbook exercises and journal entries to record progress	
	Guzman et al. (2000)	Self-study using teaching kit consisting of the curriculum, sample lesson plans, multigrade teaching advice and examples of low-cost resources	
	Hardman et al. (2009)	6-month self-study	
	Harvey (1999a)	Use of low-budget science kit for self-study	
	Holmes et al. (1991)	Daily radio lessons with self-instructional materials	
	Kruijer (2010)	2 hours daily self-study on subject content and child-centred methods	
	Stuart and Kunje (1999)	Self-study programme of assignments and projects	
	Mehrotra and Buckland (2001)	Self-study with support materials	
	Sampong (2009)	Self-study modules	
	Shohel et al. (2010)	Self-study using a multimedia format (iPods)	
	Tatto et al. (1991, 1993)	Self-study modules	
Wilson (2000)	Self-study involving written assignments and reflective practice file		
In-class support	Akyeampong et al. (2010)	Lesson observations by tutors but not used to full potential	4.3.2.3
	Ashraf and Rarieya (2008)	Reflective conversations between the coach and teachers and classroom observations	
	Binns and Wrightson (2006)	An experienced teacher assigned as personal tutor to each trainee for providing professional development advice	
	Guzman et al. (2000)	Classroom experience monitored by trainers	

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Strategy	Key studies		Literature synthesis
	Halai (1998)	Observation of lessons followed by analysis	
	Hardman et al. (2009)	Trainees were to have regular fortnightly visits from their TAC tutors to observe lessons, review progress and deal with assignments	
	Harvey (1999a)	Eight day-long 'classroom support' visits spread over one year by the coach	
	Stuart and Kunje (1999)	Guidance from trained teachers, and occasional visits by college tutors	
In-school support	Akyeampong et al. (2010)	Headteachers asked to provide in-school support but tended to be ineffective	4.3.2.4
	Halai (1998)	Peer observation	
	Hardman et al. (2009)	Those receiving the training were to train other untrained colleagues but found they had no time to do so in a systematic manner	
	O'Sullivan (2002b)	The trainees shared workshop handouts, diaries, self-evaluation forms and peer coaching to compensate for the lack of opportunity to provide more intense trainer support	
	Shohel et al. (2010)	UUT pairs meet to discuss their progress with the iPod-based learning	
	Tatto et al. (1991)	Group of teachers get together in one school to discuss among themselves	
	Welford and Mosha (2002)	Trainees were trained to organise and conduct workshops for other teachers in their schools; Once trained, the teachers cascaded the training to their colleagues through school-based subject-focused workshops	

Strategy	Key studies	Literature synthesis	
School clusters	Akyeampong et al. (2010)	Cluster meetings but not well attended due to transportation costs	4.3.2.5
	Ashraf and Rarieya (2008)	School leadership unsupportive in encouraging reflection and critique	
	Guzman et al. (2000)	The project worked with school clusters, whereby core school held a resource centre for cluster schools	
	Hardman et al. (2009)	Cluster meetings	
	Holmes (1991)	There was a 'Resource Teacher System' with the opportunity to meet once a month with fellow trainees as a cluster	
	Kruijer (2010)	Meeting tutors and working in groups	
	Shohel et al. (2010)	Cluster meetings	
	Tatto et al. 1991)	Group meetings in regional centres organised by tutor	
Management structures	Akyeampong et al. (2010)	Support from teacher training colleges and district directorates but the latter not seen as helpful	4.3.3.7
	Bof (2004)	Detailed implementation plan and supportive integrative communication network created	
	Harvey (1999a)	Network of subject interest committees	
	Hardman et al. (2009)	Trainees supported by zonal-based advisory system of tutors and headteachers	
	Kruijer (2010)	Capacity building of educational stakeholders seen important	
	Sampong (2009)	Little monitoring or reading of tutor reports by University	
	Welford and Mosha (2002)	Headteachers and Teacher Resource Centre staff trained	
Materials and resources	Akyeampong et al. (2010)	Though designed to provide support material through ICT, in practice this was print-based	4.3.3.3
	Bof (2004)	Videos and workbooks for trainees; toll-free telephone facility for trainees to seek guidance from tutors	

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Strategy	Key studies		Literature synthesis
	Guzman et al. (2000)	Teachers working in remote areas found in need of a teaching kit with the curriculum, sample lesson plans, examples of how to create low-cost materials	
	Harvey (1999a)	Low budget kit of science apparatus	
	Holmes (1999)	Radio lessons with self-instruction materials	
	Mehrotra and Buckland (2001)	BRAC developed support materials	
	Sampong (2009)	Poorly edited self-study materials, not distributed in time	
	Shohel et al. (2010)	Teachers given iPods preloaded with video and audio language learning resources	

4.3.2.1 Training workshops

Training workshops of various kinds were used by all the programmes, with two exceptions (Halai 1998; Ashraf and Rarieya 2008). Both of these were based in Pakistani schools and were sufficiently small-scale that individual mentoring alone was sufficient. Workshops were seen almost universally as an effective means of initiating a training programme, introducing the programme structure, the modules, tutors and other students. In those few interventions where technology was used, such as the iPods in the study by Shohel et al. (2010) of English language teachers in Bangladesh, workshops were essential to orient trainees to the equipment.

There was much variation in length and frequency. Some longer residential courses replicated elements of conventional teacher training programmes. Where these consisted of lectures to large groups they were evaluated as a less effective part of the intervention. Kunje (2002) (WoE A Medium, WoE B High), Akyeampong et al. (2010) (WoE A Low, WoE B Medium) and Kruijer (2010) (WoE A Low, WoE B Medium) all criticise them as involving transmission models of learning that do not prompt critical reflection on the practice of teaching nor allow trainee UUTs to raise questions regarding difficulties in the classroom. Kruijer (2010) concluded that training workshops were better used to discuss teaching methodology in the reality of large often multilingual classrooms than to transmit subject knowledge and to teach critical reflection on issues from the classroom.

Shorter workshop sessions in the form of more regular meetings with trainers held in regional or district centres were more positively evaluated. Bof (2004) in Brazil described tutors and trainees meeting every fortnight for discussion, viewing videos and gaining an introduction to the next self-study module content. Binns and Wrightson (2006) in Uganda saw the possibility for a strong pastoral focus as a strength of this kind of workshop, as it offered the possibility of meaningful engagement with UUT learners; this could facilitate the trusting relationships with tutors that would enhance effective learning.

4.3.2.2 Independent study

Fifteen of the studies reported the use by individual UUTs of structured independent distance study, which was a required feature of those interventions in which they aimed to acquire a qualification. In these cases, it consisted of written assignments which might then be assessed (Kunje 2002; Binns and Wrightson 2006) or preparation for tests and examinations (Bof 2004; Akyeampong et al. 2010). Self-study modules were mostly print-based. The use of information and communication technology to support distance learning was highlighted in five of the studies only (Holmes et al. 1991; Maheshwari and Raina 1998; Bof 2004; Akyeampong et al. 2010; Shohel et al. 2010). Although enthusiastic claims were often made for its potential, the actual evidence seems to be more mixed; outcomes seem to depend on how well prepared the materials were (Bof 2004; Sampong 2009), though rigorous studies of this aspect of intervention are lacking. Although Shohel et al. (2010) reported success in improving the performance of language teachers in Bangladesh through iPods preloaded with video and audio language learning resources, Akyeampong et al. (2010) found in Ghana that on-line learning was never actually implemented and was replaced by print materials. Provision of resource materials alongside self-study materials, such as the low-budget science kit reported by Harvey, (1999a) were positively evaluated (WoE A, B both High). Guzman et al. (2000) recommended a teaching kit consisting of the curriculum, sample lesson plans, multigrade teaching advice and examples of low-cost resources (WoE A, B both Medium).

4.3.2.3 In-class support

The review found it important to distinguish between in-class support and in-school support, although this was not always done by the authors of the original reports. In-class support is provided by a trainer or mentor who visits trainees in their classrooms, and observes and discusses their teaching. This was a very positively evaluated feature of the most highly rated studies, and where several strategies were deployed, it was considered an important element. It consisted of frequent visits from tutors with supervised teaching on an individual basis (Tatto et al. 1991; Stuart and Kunje 1999; Guzman et al. 2000; Bof 2004; Binns and Wrightson 2006; Akyeampong et al. 2010; Shohel et al. 2010). In the interventions reported by Harvey (1999a) and by O'Sullivan (2001a), this was extended to include other activities such as the trainee modelling and demonstrating practice: this might be termed coaching. Harvey (1999a), whose study was rated as highly methodologically trustworthy, found that UUTs who had participated in coaching changed teaching methods more readily than those who only attended workshops. Halai (1998) and Ashraf and Rarieya's (2008) studies reported on coaching focused on trainee reflection and found that it produced positive effects. However, these were limited by the lack of commitment to such reflective coaching by school management, who were unable or unwilling to protect work time to continue such a time- and personnel-intensive activity. The study by Siraj-Blatchford et al. (1997) claimed that the effect of trainees watching - and criticising - model lessons in their own classes given by external project staff was very powerful; however, this study was rated Low on both WoE A and B, limiting the reliance that can be placed on this claim.

The effectiveness of in-class support depended on the trainers. The coaches involved in the studies by Harvey, O'Sullivan, Halai, and Ashraf and Rarieya were all highly educated and experienced teachers. However Stuart and Kunje (1999), Akyeampong et al. (2010) and Sampong (2009) reported that where tutors were of poor quality and in-class visits were infrequent, too short, poorly managed or not used to their full potential, the impact on the trainee could be negative. Guzman

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et al. (2000) concluded that trainers themselves needed ongoing training. Drawing on mentoring by qualified teachers working with their untrained colleagues in the same school was seen to be most effective when the mentor was briefed or trained to work in the classroom (Stuart and Kunje 1999; Mehrotra and Buckland 2001; Kruijer 2010).

4.3.2.4 In-school support

In-school support describes interaction with UUTs that did not involve observation and analysis of lessons. Such support was often received from colleagues, as groups or pairs of UUTs met to discuss or share their learning, sometimes facilitated by a tutor (Tatto et al. 1991; O'Sullivan 2002b; Hardman et al. 2009). This was sometimes associated with cascade teaching, a model widely seen as less effective. Hardman et al. (2009), for example, described a cascade intervention which took place in Kenya, in which those receiving the training found they had no time to pass it on to untrained colleagues. Welford and Moshia (2002), meanwhile, reported that cascade training proved to be divisive in their Tanzanian study, as those teachers who had not attended the workshops felt excluded (WoE A, B both Low). Shohel et al. (2010) found that a more sustainable approach to effecting change was for UUT pairs to meet to discuss their progress with the iPod-based learning (WoE A, B both Medium).

Headteachers were sometimes asked to provide in-school support. This tended to be ineffective, however, as they either lacked time or were unsure as to what they were meant to do (Akyeampong et al. 2010). Overall it seemed that mutual support between UUTs receiving the same training inputs led to most positive learning experiences.

4.3.2.5 School clusters

Several studies reported group activities and peer learning in school clusters through study circle meetings (Akyeampong et al. 2010) or pairings of teachers or groups (Kruijer 2010; Shohel et al. 2010), sometimes facilitated by a tutor (Tatto et al. 1991), to work on specific modules or to discuss practice. In Lao PDR, one school acted as a teacher resource centre for a cluster (Guzman et al. 2000). Those studies describing this approach viewed it as a rational and effective approach to maximising the effective use of resources.

4.3.3 Key considerations in planning interventions

Although the state of evidence in this field is not such as to support a definitive formula for effective intervention, a number of recurring themes could be identified through the studies selected for in-depth review which seemed to play a significant role in determining the degree of success of interventions. These are discussed below under nine headings, which it is recommended be considered carefully in planning projects to train UUTs.

4.3.3.1 Regularity

It appeared that it was the regularity of the engagement in the intervention rather than the length of that training that was most important. The frequency of inputs was highlighted as important in many studies, including those that were highly contextually robust. The combination of workshops and coaching visits meant that Harvey's (1999a) intervention in South Africa involved support every two or three weeks, whereas the fortnightly tutorials in Uganda reported by Binns and Wrightson (2006) were supplemented by visits from field tutors to solve particular problems and in-school support from trained colleagues. Tutors and trainees on the

Proformação programme in Brazil met every fortnight for discussion, with monthly school visits from tutors. Trainee UUTs were also supplied with a toll-free telephone number to call when they needed to consult tutors (Bof 2004; Andre 2008). By contrast, Stuart and Kunje (1999), Akyeampong et al. (2010) and Sampong (2009) all recorded infrequent visits as a weakness in their studies and O’Sullivan (2003) suggested that more trainers would have increased the effectiveness of her intervention in Namibia by allowing more frequent contact. Self-study modules formed part of the intervention in many of the contextually robust studies (see below) and also served as a means of keeping UUTs in touch with training, some requiring considerable amounts of time on a weekly basis. In Sri Lanka, Tatto et al. (1991) reported that this averaged out at eight hours per week, with trainees allowed to study the modules at their own pace. The Teacher Upgrading Project (TUP) in Nigeria specified two hours a day of individual study (Kruijer 2010). Proformação in Brazil had bi-monthly tests to assess progress (Bof 2004).

However, it was the social nature of face-to-face tutorials, peer learning, workshops and in-class support that appeared to have the most positive impact. Harvey (1999a: 201) maintained that the ‘social network, promoted through teachers’ committees and workshops, reinforced new norms of practice’. Binns and Wrightson (2006) also ascribed the impressive retention of UUTs in Uganda to personal contact and rapid response to difficulties. One of the strongest claims of Tatto et al. (1993: 3) was that distance education worked best ‘when there is constant face-to-face interaction among trainees and tutors’.

4.3.3.2 Proximity of training to classroom; transferability of instruction

All nine of the more robust studies noted that proximity of the site for the workshops or tutorials, whether teacher training college, teacher resource centre or a school centrally positioned within a cluster, supported both regularity of engagement between trainee and tutor, peer or trainer and availability of instruction in school. Proximity was also influential in ensuring follow-up of learning.

An emphasis on directly applying in the classroom what was learnt in workshops or through self-study was significant in changing or enhancing teacher performance. Guzman et al. (2000), in Lao PDR, pointed to the importance of the practical application of developing skills and knowledge in the classroom. They recommended that this should be monitored by trainers, and thus fed back into ongoing training on teaching strategies and curriculum, in a cycle of learning and applying. Binns and Wrightson (2006) described how the Ugandan UUTs applied their learning from workshops or self-study modules in the classroom on a daily basis, using to advantage their positions as working teachers in post in order to integrate theory with practice. In keeping with this focus on direct application of learning, the majority of the studies used observable changes to pedagogic practice to assess outcomes, and recorded positive changes in teaching methods, away from transmission and rote learning, towards more child-centred or learner-centred methods. The more robust studies were, however, also more circumspect in their analysis of these changes in teaching methods, indicating that shifts in pedagogic practice tended to be partial rather than dramatic; they described limited moves towards more learner-centred pedagogy or some increased use of group work, or indicated that a mix of traditional and more child-centred methods was used. However, Bof (2004), in Brazil, also found use of refined teaching strategies, including games and reasoning activities, and Guzman et al. (2000) pointed to strong child-centred pedagogies used in practice in the rural classrooms of Lao PDR.

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O'Sullivan (2003) pointed to the importance of following up the learning from workshops into schools in order to support transfer into practice with UUTs in Namibia. While in-class support was the most frequently described follow-up, she also discussed more independent strategies which did not rely on external tutors or coaches, such as workshop hand-outs, diaries, self-evaluation forms and peer coaching, but, as noted above, scarcity of personnel to follow up trainee learning limited the amount of continued improvement.

School clusters provided a supportive local environment for meetings of UUTs and were frequently stated as contributing to trainee learning and enhancement of classroom performance. This contribution was greater than in-school support from headteachers, more experienced teachers or peers. Studies described group activities and peer learning facilitated by a tutor in a school that is part of a cluster or a resource centre in Sri Lanka (Tatto et al. 1991), study circle meetings in Ghana (Akyeampong et al. 2010) or pairings of teachers or groups in Tanzania and Bangladesh (Kruijer 2010; Shohel et al. 2004) to work on specific modules or to discuss practice. The cluster system was central to the study by Guzman et al. (2000) in Lao PDR, where a core school held the resource centre for the others, but these authors also warned that resource centre managers who also carried a full teaching load were less effective in the role. Supported by the professional development activities organised by the Teacher Upgrading Project in Lao PDR, schools involved in the training programme was seen as more effective than schools operating outside such a cluster. Guzman et al. also pointed to the importance of school clusters in providing support and easing networking. The Kenyan key resource teachers (KRTs) were supported by a zonal-based advisory systems of tutors and headteachers, an important part of the country's regular or existing in-service mechanisms (Hardman et al. 2009). In Harvey's (1999a) highly rated study in South Africa, a network of subject-interest committees was formed which appeared to be self-sufficient. All these studies point towards the utility of some sort of cluster system in enabling teachers to make close links between the training they receive and its application.

4.3.3.3 Content of workshops and self-study modules

In the context of distance education, the more robust studies discussed how relatively short face-to-face training workshops of a week provided a central meeting point and an appropriately supportive environment in which to launch a programme orienting UUTs to its demands and expectations or introducing the next self-study module or specific technology. For example, Proformação in Brazil used vacation time to introduce each module's content and activities at such a gathering (Bof 2004); Shohel et al. (2010) took a similar approach when introducing the iPod learning resources and demonstrating their use. Kruijer (2010), looking at Tanzania, Malawi and Nigeria, concluded that workshops focused on the practical application of subject knowledge, emphasising critical reflection and attuned to the specific difficulties of the classroom, were more effective than those that were imparting subject knowledge in a more traditional manner (WoE A Low, B Medium). The study by Hardman et al. (2009) of school-based teacher education in Kenya pointed to the need for the content of workshops, tutorials and self-study modules to reflect the realities of the often multilingual, large and resource-constrained classes in which the UUTs taught.

Positive outcomes were recorded in six of the most methodologically trustworthy studies, where different or more productive uses were made of teaching and learning aids. Other studies may well have included the use of such aids within general pedagogic strategies, but did not highlight these. Four studies provided specific resources as part of their content or suggested that this should be a key

part of content: Guzman et al. (2000) concluded that UUTs in Lao PDR needed extended workshops focusing on content knowledge, but specified these as practice-based, with further input on working in multigrade classrooms, and specific self-study modules on Working and Communicating with Parents and on Teaching Lao as a Second Language. To this end, a key recommendation made for the UUTs working in very remote rural areas was for a teaching kit consisting of the curriculum, sample lesson plans, multigrade teaching advice and examples of low-cost resources. Kruijer (2010) echoed this recommendation, suggesting that providing teaching and learning materials for UUTs avoided having to rely on their as yet poorly developed ability to improvise, and Harvey (1999a) provided his science UUTs in South Africa with low-budget science kits for immediate use. Similarly, Shohel et al. (2010) provided iPods preloaded with video and audio English language learning resources for home listening to mainly female Bangladeshi UUTs, and also gave them speakers to use the iPods as teaching aids in the classroom. Hence the specific context in which the UUTs worked was recognised and supported through the content of the training and resources provided.

Issues appeared to arise when workshops became the dominant mode of learning rather than one mode out of several, as Akyeampong et al. (2010: 41), pointed out: 'The residential face-to-face has become de facto the main avenue for learning and not it would appear the study materials'. Self-study modules were seen as a more effective means to teach subject knowledge than traditional transmission of content via lectures. Modules that were not overly factual (Kruijer 2010) and included a balance of subject knowledge and pedagogy or methods that were learner-centred appeared the most effective.

Significantly, however, the impact of such modules in terms of increase in UUTs' own subject/content knowledge appeared limited or less apparent (Tatto et al. 1991; Stuart and Kunje 1999; Bof 2004; Akyeampong et al. 2010). Some teachers continued to have problems with mathematics and English/language (Stuart and Kunje 1999; Bof 2004) while Tatto et al. (1991) in Sri Lanka found that for untrained teachers taught through distance education, changes in subject knowledge were not deep enough to impact on teachers' practice in any significant way post-programme. Despite these findings, three studies (rated respectively Medium, Low, and Medium on WoE A) also indicated that the UUTs had drawn on their improved content knowledge, together with the modules on pedagogy, to improve their teaching methods, and it is possible to conjecture that UUTs' pedagogical content knowledge, that is, their ability to explain and represent concepts to pupils, may be enhanced through self-study subject content modules. For example, Bof (2004) noted greater use of reasoning activities with pupils and Akyeampong et al. (2010) stated that trainees engaged their pupils more actively and flexibly. Binns and Wrightson (2006) in Uganda noted that positive improvement in trainee subject knowledge, with better planning, improved teaching methods and class management, was connected to higher pupil performance, particularly in the primary leaving exam. The two studies in Pakistan that explored intensive coaching also were reported to be effective in facilitating trainees to identify their subject knowledge gaps. The authors suggested that this might have longer lasting effects on teacher attitudes to their teaching, albeit through a gradual and time-consuming reflective process (Halai 1998; Ashraf and Rarieya 2008).

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Mehrotra and Buckland (2001) gave details of the way in which trainees in BRAC⁷ schools in Bangladesh were taught both content and methodology:

the methodology used in all teacher training mirrors the teaching methodology to be used in the classroom. In this way teacher training incorporates content and methodology at the same time. New subject matter is delivered to the teacher in exactly the same format that she in turn is expected to use in the classroom (p. 4577)

Thus there was no separation of subject content and methodology; rather, trainee teachers were taught both content and methodology as pedagogical content knowledge, and through a child-centred approach that teachers could directly copy or take over as their own. Though their study provided little evidence for or against this approach (WoE A, B both Low), there are similarities to the structured, prescribed lesson plans modelled to teachers in Namibia for them to use for themselves, O'Sullivan's (2000; 2001a; 2001b; 2002a; 2002b; 2003; 2004b) studies of which were rated somewhat higher. The key link in the studies included in the in-depth review is the immediacy of applying the learning in the classroom, with expert support.

4.3.3.4 Means of delivery

Subject content knowledge was often addressed through self-study print-based materials, seen as the easiest and most reliable for distance education purposes. The quality of the materials was not easy to gauge but ranged from poorly edited and printed and overly factual materials (Akyeampong et al. 2010; Kruijer 2010) to a well-prepared variety of activities, use of videos, workbook exercises and journal entries such as described by Bof (2004) for Proformação in Brazil.

Information and communication technology was apparent in only five of the studies, but its potential emerged in others. In Bangladesh iPods preloaded with video and audio language learning resources with speakers for direct use in classrooms were seen as effective (Shohel et al. 2010) while Proformação in Brazil used videos to accompany workbooks and activities for home use and toll-free telephone to contact tutors for advice. In the study by Akyeampong et al. (2010), the lack of internet access for half the large sample of teachers effectively made the use of ICT impossible and the majority of self-study modules were via print-based materials. Less robust studies in Nepal (Holmes et al. 1991) and India (Maheshwari and Raina 1998) also made use of radio and television, respectively, to reach distant UUTs.

The language in which the self-study modules were written was an important consideration. Use of a familiar language as Language of Instruction supported

⁷ BRAC schools enjoy a high reputation internationally and employ minimally trained teachers. DeStefano and Schuh Moore (2010: 513) conclude on the basis of studies carried by the Education Quality Improvement Program 2 that:

Bangladesh Rural Advancement Committee (BRAC) primary schools have completion rates 30 per cent higher than public schools, and their students are almost three times as likely to meet basic competencies as public school students. BRAC schools are more than seven times as cost-effective as public schools.

This suggests that they provide an environment which is supportive of the teaching of teachers with minimal training. However, although there are studies of the schools' effectiveness, we did not identify studies which directly addressed our research question about strategies to improve the performance of UUTs.

teachers, whereas use of an official or even foreign language could weaken teacher learning and hence performance, as Kruijer (2010) found in Nigeria.

4.3.3.5 Trainers

Who delivered the training and who was involved in the follow-up learning in class made a difference to UUTs' classroom performance. The quality of the tutors and teachers involved made an impact on in-class support in particular; those who were specifically trained or at least briefed to give adequate support made a greater impact, as well as those who were knowledgeable about the very specific, local context in which the UUT taught, and could work with the UUT regularly and over a substantial length of time. Sharing the same language was helpful, as with the study materials; for example, tutors in the MUKA upgrading project in Tanzania all used Kiswahili (Kruijer 2010).

Few studies specified who the workshop trainers were, with teacher educators on the traditional pre-service programmes most often cited as those who delivered content. In Uganda in Binns and Wrightson's (2006) study, NITEP tutors were specialists in distance education and uniquely for any study staff, included student support counsellors. Trainers in Lao PDR, in the study by Guzman et al. (2000), were specifically trained for the programme, with the recommendation that such trainers needed ongoing training themselves. Both of these studies reported positive changes in teaching methods, higher pupil attainment and greater professionalism felt by the UUTs. Awareness of the particular needs of the UUT group seems significant in enhancing the quality and nature of the impact. This was very evident in evaluations of who supervised or supported UUTs in class.

In several of the studies rated at least moderately contextually robust (WoE B Medium or High), in-class support was given by college tutors who visited approximately twice a year (Tatto et al. 1991; Akyeampong et al. 2010; Kruijer 2010) or made only occasional visits (Stuart and Kunje 1999). Bof's study (2004) in Brazil drew perhaps more sustainably on local tutors evaluating teaching in the classroom directly following on from the self-study modules, even while she also found that 44 percent of the 87 percent of tutors whose salary was paid by the municipality did not have funding for transportation to the school, so limiting frequency of visits. Similarly, tutors from the local teacher training college on the Nigerian Teacher Upgrading Project in Kruijer's study (2010) were supposed to observe trainees twice a year, but their costs were underestimated by the project management. As a result, they focused just on summative assessment of the trainees, leaving the substantive in-class support to trainees' colleagues in schools. Where tutors were untrained or visits were poorly managed and too short, the impact on the trainee could be negative, as noted by Stuart and Kunje (1999) and Akyeampong et al. (2010). The four studies whose authors were themselves the coaches (Harvey 1999a; O'Sullivan 2003; Halai 1998; Ashraf and Rarieya 2008) illuminated both the greater impact on UUTs in their teaching methods, but also the higher costs and levels of dependency of UUTs on a closer model of classroom support.

More sustainable and cost-effective ways of securing in-class support appeared to be through employing experienced teachers from the UUTs' own school. Those in Binns and Wrightson's (2006) study in Uganda received a briefing by the intervention team so that they could better support their colleagues in class and in-school but unless this partnership is planned for, its impact is limited. Examples of how this approach can go wrong include Kruijer's (2010) study in Malawi and the study by Hardman et al. (2009) in Kenya, in both of which over-optimistic reliance on experienced colleagues to provide help left the UUTs without any in-class

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support at all. Njenga and Kabiru (2001) reported more positively on the ‘multiplier effect’ of fully trained teachers helping untrained teachers by including them in local teacher panels and training events; however, the limited WoE A of their study means that it is hard to know how much store to place on this argument.

4.3.3.6 Duration

All of the studies included in the in-depth review acknowledged that interventions to improve UUTs’ classroom performance needed considerable time. However, the longer programmes were generally those through which participants could acquire a qualification, and thus the duration was to some extent determined by the desire to show equivalence to conventional teacher training programmes. Amongst these interventions the longest were the distance education programmes in Sri Lanka (Tatto et al. 1991) normally of three but with an extension to as much as five years, and in Ghana (Sampong 2009; Akyeampong et al. 2010) of four years. The other contextually robust studies concerned programmes of two years in Brazil - Bof (2004), Kenya (Njenga and Kabiru 2001) and Malawi (Kunje et al. 2003) - or three years in Namibia (O’Sullivan 2002a), Uganda (Binns and Wrightson 2006) and Tanzania (Kruijer 2010), but even within this, they specified a large number of hours to be spent on study or practice: Proformação in Brazil, for example, specified 3,200 hours of directed study or activity over two years (Bof 2004; Andre 2008). One of the recommendations of the Guzman et al. (2000) study was for the shortening of the programme in Lao PDR from three to two years. Harvey’s work with coaching in South Africa was carried out over a year.

The only shorter periods in this range were those programmes that were experimental: the use of interactive video in India reported by Maheshwari and Raina (1998) seems not have been continued in that form, whilst the six-month period over which the study by Shohel et al. (2010) tested the use of mobile technologies to support UUTs’ learning was considered to be the pre-pilot phase of an ongoing development. Neither study is therefore very helpful in providing evidence about the outcome of such shortened interventions.

4.3.3.7 Administrative commitment and headteachers

The issue of how to ensure that the infrastructure of the school system is supportive of the intervention is raised in many of the studies. Where there were strong administrative support structures for interventions, this was seen as an important contributor to programmes’ success. Bof (2004) pointed to the detailed implementation plan and supportive integrative communication network created that supported the Brazilian programme. Her study, as well as those of Kruijer (2010), Welford and Mosha (2002), Sampong (2009) and Stuart and Kunje (1999), considered that capacity building of stakeholders in the form of training for participants other than the UUTs was desirable. Close monitoring of the system was important (Bof 2004).

Conversely, lack of support from administrators, tutors and headteachers was identified as limiting the effectiveness of interventions. Supporting UUTs may conflict with other duties; the study by Hardman et al. showed that the training received by key resource teachers produced great benefits in their classrooms, but their role in supporting colleagues was not achieved because headteachers did not give them release from their own teaching. Similarly, resource managers in Lao PDR were less effective because they still carried a full teaching load (Guzman et al. 2000). A similar situation existed with MILTEP in Malawi (Kunje et al. 2003). Lack of active involvement of headteachers was also noted in the study by Akyeampong et al. (2010), where instead of the extensive guidance envisaged by the intervention, they only gave help with lesson planning. Ashraf and Rarieya (2008)

also reported that the critical reflection that was the focus of their study was undermined by lack of support from the school leadership.

A further infrastructural issue noted was the need for transportation issues to be solved: Bof noted that in Brazil some tutors could not visit schools as intended because transport costs were not paid, an issue which also occurred in Ghana (Akyeampong et al. 2010).

4.3.3.8 Teacher burden

The effectiveness of interventions was linked to the considerable amount of effort demanded from the UUTs who took part in them. However, the amount of time and resources required of teachers must be balanced with the risk of overburdening them, potentially leading to demotivation and drop-out (Akyeampong et al. 2010). In particular, where there were self-study modules, a great deal of time was specified for them. The 25 modules to be studied over three years for MUKA in Tanzania were problematic and the two hours daily in the TUP in Nigeria were reported to be impossible for busy teachers (Kruijer 2010). In Ghana, Akyeampong et al. (2010) found that UUTs responded to overburden by non-attendance at many of the regular district level meetings, and Sampong (2009) reported that UUTs there found that participation in the distance education programme was expensive financially. Other studies either did not report this as problematic, or the demand was seen as manageable (e.g. the six months of self-study in the Kenyan study by Hardman (2009)). The incentive of qualification and therefore a better salary helped to sustain UUTs' efforts, but the studies also noted some intrinsic satisfaction, the 'immense sense of pride and boosting of self-esteem on the part of the trained teachers' (Binns and Wrightson 2006: 54).

Residential work was also problematic in many situations. Family life was disrupted when students on residential courses had less time to spend at home. Guzman et al. (2000) suggested that tutors might need to be recompensed for time away from home.

The role of the community is important. The added prestige within the community of being a trained rather than an untrained teacher was another incentive noted by Bof (2004) and Binns and Wrightson (2006) and, as noted above, was a major overall finding. The provision of food and housing as incentives for the untrained teachers to remain in post was suggested by Guzman et al. (2000). This study also saw community involvement as one reason why distance-trained UUTs were more effective than conventionally trained teachers.

Gender issues are also relevant. Stuart and Kunje (1999) pointed out that the demands placed on untrained teachers within their community were seen as particularly excessive for women, while Binns and Wrightson expressed concern that tutoring and mentoring could be threatening if they involved spending time alone with colleagues or tutors of the opposite sex (2006: 27). However, Kruijer (2010) suggested that a feature of the School Teacher Upgrading Program in Nigeria was that rural women in the north benefited from its compulsory nature. Because all untrained teachers had to take the programme, women could not be excluded, and its part-time structure and free tuition ensured their participation. This level of awareness of the needs of UUTs is commendable.

4.3.3.9 Level of ambition and the degree of structure offered

An intervention's level of ambition relates to the notions of good teaching that it seeks to impart to UUTs, which in most cases can be denoted as constructivist, pupil-centred and activity-based. The assumption underlying many studies is that this requires reflection on practice. The extent to which UUTs can be brought to

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reflect seems to depend on effort expended on facilitating reflection. This was apparently strongest in interventions that involved frequent in-class support (e.g. Halai 1998; Ashraf and Rarieya 2008) (or at least this received most attention in the evaluations of this type of study). Stuart and Kunje (1999: 165) concluded that ‘a large majority of Malawian primary school teachers are willing and able to reflect on their practice when given encouragement and support to do so’; O’Sullivan (2003) offered similarly encouraging sentiments. However, neither study made such claims without caveats.

Although evaluations of interventions did not often claim outright that the programmes were overambitious, where adoption of particular pedagogic practices was seen as a success criterion, cautions about partial success attested to this. Johnson et al. (2000) suggested that the slow rate of change of classroom practice noted was attributable to the mismatch between the expectations of the inputs and the level of the UUTs. All the studies that were rated more contextually robust and methodologically trustworthy involved in-class support, enabling the tailoring of that particular input to the needs of the individual UUT. However studies varied in the extent to which this was possible over the programme as a whole. It was strongest in O’Sullivan’s studies and those by Harvey (1999a), Ashraf and Rarieya (2008) and Halai (1998), programmes where the trainer had a great deal of executive autonomy. O’Sullivan’s studies discussed most clearly the levels of the UUTs involved. Her project in Namibia involved an intensive needs analysis based on lesson observation, starting from the particular needs and strengths of the trainee. This enabled her to provide specific in-class support with the trainee through giving demonstration or model lessons, a very tailored form of support and a form of one-to-one coaching that directly tackled the particular context in which the trainee taught. It also enabled her to provide more focused group sessions. Her intervention was further adjusted when she found that assumptions about reflection on practice were not met and regulated her approach, developing structured, prescribed lesson plans for her trainees in recognition of the limits within which they were working. Structured reflection following a lesson, as seen in O’Sullivan’s studies and in the two Pakistani studies (Halai 1998; Ashraf and Rarieya 2008), offered trainees skills that impacted on their practice through their ability to identify subject knowledge gaps, and had a long-lasting effect. These, however, were also time-consuming and the effect was gradual. Such close involvement between trainee and tutor/coach failed to develop independence of reflective practice unless there was continued support or progress through a more technical level of reflection. Harvey’s (1999a) study confirmed this and he ascribed to careful scaffolding through coaching, the ability of UUTs to reflect and problem solve so as to develop local models of good practice and to work independently. However both he and O’Sullivan (2002b) pointed out that changes observed in teaching methods were not fully sustained after classroom support was withdrawn, partly through scarcity of teaching personnel within the school.

Kruijer (2010: 7) suggested that overly ambitious training interventions might be tempered by a more inclusive design, emphasising that ‘involvement of both teachers and mentors in the curriculum design is essential to make the upgrading programme effectual in adapting to local circumstances’. This echoes O’Sullivan’s (2000) call for comprehensive needs assessment carried out at school level during the design stage of any major intervention.

4.3.4 Cost-effectiveness

Cost-effectiveness requires consideration of both costs and outcomes, and the capacity to draw comparisons between studies is limited by the variation in the ways in which they measured costs and outcomes, if indeed they gave

consideration to this question at all. Of 24 studies in the in-depth review (including the two analyses of secondary data that dealt specifically with cost-effectiveness), 7 (29 percent) specifically addressed cost-effectiveness though a further 8 (33 percent) mentioned it as an issue to be taken into account.

4.3.4.1 Variations in methods of assessing cost-effectiveness

Seven of the studies (Holmes et al. 1991; Tatto et al. 1991, 1993; Siraj-Blatchford et al. 1997; Harvey 1999a; Bof 2004; Akyeampong et al. 2010) that mentioned or addressed cost-effectiveness gave figures of what it cost to train or up-skill a teacher using whichever approach was described. However, each was reporting on different types of costs so comparability is limited. For example, in Tatto et al. (1991) the cost-effectiveness of the programmes in fulfilling their goals of teacher preparation was assessed, but not the cost of teacher training against the effectiveness of their classroom teaching. The basic unit of analysis in this study was total cost per trainee per year. In contrast, Harvey (1999a) reported on the cost of keeping one implementer in the field for coaching purposes, including salaries, transport and operating expenses. Hence, the costs identified are disparate across the studies. Cost-effectiveness requires some measure of quality of outcomes against costs of the programme. Some studies (e.g. Bof 2004) provide costs (\$1100 per trainee per two-year course) but no details of related outcomes. Eighteen studies did not provide figures for the costs, thus any conclusions drawn must be treated cautiously.

4.3.4.2 Challenges in assessing cost-effectiveness

There are many challenges in assessing cost-effectiveness of educational interventions discussed in detail in the literature (e.g. Levin 2001). In this review, some costs, for example study materials or travel, are more accessible whereas costs such as missed earnings while participating in training or development activities are harder to assess. Smaller-scale interventions are inevitably more proportionately expensive because of the lack of economies of scale, and most activity described in the studies is small scale. However, some (e.g. Tatto et al. 1991, 1993) are both larger scale and address cost-effectiveness in detail. The overall trustworthiness of the studies is potentially compromised where the intervener was also the researcher, as was frequently the case. Finally, longer-term sustainability of the outcomes was rarely assessed, limiting the judgements that can be made about cost-effectiveness.

4.3.5 Types and combinations of intervention that emerge as most cost-effective

4.3.5.1 The relative cost-effectiveness of distance learning and college-based courses

Six of the studies (Tatto et al. 1991, 1993; Holmes et al. 2001; Sampong 2009; Akyeampong et al. 2010; Kruijjer 2010) that provided details on cost-effectiveness noted that distance education/learning programmes were the cheapest, though not usually the most effective. Akyeampong et al. (2010) commented on the very low cost of distance learning routes to qualification, reporting that it cost US\$88 per teacher in Ghana for a five-year distance-learning teacher training programme, which compared very favourably with, for example, the \$133 per year it cost to educate a primary school pupil. However, it was noted by both Akyeampong et al. (2010) in Ghana and Binns and Wrightson (2006) in Nigeria and Uganda, that considerable costs were borne by the trainees, including books, materials, board and lodgings, travel and missed earnings. Similarly both Kruijjer (2010) and Nielsen (1991) noted that distance education cost much less than traditional campus-based

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training, but that this was so partly because of the costs borne by the trainees themselves.

An alternative form of distance learning was described by Holmes et al. (1991), in which radio was used to transmit teacher training in Nepal. These authors suggested that this was a less expensive method of training teachers on a per-teacher, unit cost basis than the face-to-face alternative, provided more than 3,000 teachers were enrolled and the course was successfully managed. Taking into account opportunity costs (lost teaching time) and subsistence costs borne by trainees, the radio programme worked out cheaper, but they noted that it was unlikely to be cost-effective if limited to the Basic Teacher Training Course, perhaps because of the numbers involved. This study lacked detail on sampling, there were no comparative data and there was no attempt to assess whether the learning had translated into the classroom, so it was rated as both methodologically and contextually weak (WoE A, B both Low).

In two of the most rigorous studies reviewed, Tatto et al. (1991, 1993) noted that institutional costs were the lowest for the distance education programme and it was 4.5 to 6 times more cost-effective in preparing teachers for their roles than the other approaches assessed in this study. However, pupils taught by teachers from the colleges of education and teachers' colleges did better than those taught by distance education or by untrained teachers. Colleges of education were the most expensive, but were more effective in the longer term in producing high-quality teachers. Furthermore, the cost-effectiveness of the distance education programme depended on the economies of scale produced. These authors noted that as the backlog of untrained teachers was reduced, the cost-effectiveness of distance education would decrease, provided no new untrained teachers entered the system.

In their later paper, Tatto et al. (1993) suggested that as a ratio of change in skills and knowledge to total costs, while distance education might be cheaper, it was not as cost-effective as pre-service or in-service training. Traditional residential programmes were noted to be less cost-effective. The authors concluded that in the context of the Sri Lankan model, pre-service education was effective if its goal was to recruit and educate a small number of elite teachers, but unsustainable if large numbers of teachers were to be recruited in this way (due to cost); that in-service training was effective at continually updating (rather than further developing) the skills and knowledge of small numbers of in-service teachers; and that distance learning was effective in educating large numbers of untrained teachers at low cost and so might be suitable in other contexts where resources were limited, but where there were large numbers of untrained teachers.

Kruijer (2010: 98-99), in a less robust study (WoE A Low), similarly commented that distance education was a practical solution to the need to upgrade many teachers simultaneously, without incurring the costs of taking them out of the classroom. However, he went on to point out that distance education might impose significant opportunity costs for teachers who must study in their spare time. Measures to increase the cost-effectiveness of upgrading programmes, such as holding them in school holidays or not paying teachers during residential courses, shifted the financial burden to the student teachers.

4.3.5.2 Cost-effectiveness of school-based models

Some cost-effectiveness analyses were of programmes that were predominantly school-based mentoring or that combined this with a residential component as in MIITEP in Malawi. Investment costs like training trainers and development of materials were borne by loans from World Bank and the grant aid under the Malawi

Schools Support System Programme (MSSSP). The German national development partner, GTZ, financed MIITEP activities for pedagogic support, such as zonal meetings and school-based supervision. Kunje et al. (2003) showed that the recurrent cost of training a student in the existing programme at that time was about US\$593. If the bulk of the non-college costs were covered through other projects that provided collateral inputs, this might be reduced to US\$370. In contrast, the cost per trainee of the conventional full-time pre-career course was estimated to be between 3 and 4.5 times as expensive per student (Kunje 2002). Kunje et al. (2003) judged that it was the only affordable approach to training the necessary numbers of teachers.

However, noting the centrality of economies of scale to Kunje's (2002) analysis, programmes such as MIITEP might not always remain a cost-effective way to train large numbers of untrained teachers. If the cohorts of teachers who remain untrained diminish over time, the economies of scale might be lost (MacNeil 2004). The large start-up and recurrent costs, and the reliance on foreign assistance, of programmes in Lao PDR (Guzman et al. 2000) and Sri Lanka (Tatto et al. 1993) also raised questions about sustainability.

Harvey (1999a) in a rigorous and relevant though small-scale study of coaching in science in South African primary schools, noted that the high effectiveness of the classroom support (coaching) needed to be balanced against its high cost. The article argued that there might be cheaper ways of providing coaches but suggested that they would need to possess the same attributes as an effective implementer in this project. He concluded that coaching was expensive and labour-intensive. At 1994 prices, it cost GB£21,000 (approx. US\$32,000) per year, including all salaries, transport and operating expenses, to keep one implementer in the field. Given the sheer number of schools in need, it was impossible to envisage this model reaching more than a small proportion of schools nationwide. Harvey concluded that it was therefore necessary to find cost-effective alternative ways of delivering support.

Kruijer (2010) in sub-Saharan Africa argued that it was more cost-effective to train teachers without taking them out of the classroom, using a training centres model, and Sampong (2009) similarly commented on the costs of taking teachers out of school. Kruijer noted the need to include the frequently neglected budgets for mentors' salaries, management support and teaching materials. He suggested that an efficient solution could combine effective support from mentors while students were teaching in schools, alternated with short periods of residential education not far from the workplace. In this model, the larger part of the costs lay in the financing of organisation, learning materials, and salary payments for support and mentoring.

4.3.5.3 Cost-effectiveness of employing unqualified or less qualified teachers

Mehrotra and Buckland (2001) provided a secondary analysis of existing data showing that increasing the proportion of trained teachers increased average teacher earnings and thus might not be sustainable in many low-income countries. However, employment of unqualified or less qualified personnel must be accompanied by strategies to provide ongoing support in the form of curriculum materials, in-service training and guidance, involving costs that must be considered when estimating the savings in employing less-qualified teachers. They suggested that in-service programmes, using a combination of distance and contact education, were far more cost-effective than institutional pre-service training, if the benefits of teaching service during training were taken into account. Where there was community support in meeting employment costs of untrained teachers

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and teacher aides, supplementing the salaries or non-salary costs, or relieving the state of other costs such as school construction or teacher housing, this was reported to have made a significant contribution to cost-effectiveness. Nevertheless, expansion of the teaching force, using unqualified teachers who underwent training to become qualified, could impose serious and unaffordable cost consequences as the teachers qualified for higher salaries. Their review was rated Low for WoE A and B, however, bringing into question the strength of evidence informing their argument.

Kruijer (2010) warned of the effects on particular groups of teachers of decisions relating to cost-effectiveness. He noted that the charging of fees for upgrading programmes was a huge stumbling block for the enrolment of vulnerable groups and individuals and would also exacerbate gender inequality.

Ultimately, no firm conclusions on this question could be drawn from the studies included in the in-depth review. As emerged in our earlier discussion (see 3.2.3), findings in different countries and regions were contradictory, and much may depend on what is covered by the catch-all term 'unqualified teachers' in a given setting; the difference between unqualified and qualified teachers may well vary dramatically depending on the length and quality of official teacher training locally, or the average educational attainment of the unqualified teachers recruited, and hence the levels of the two groups being compared in a given place may also vary. Many studies discussing this question did not meet the inclusion criteria for in-depth review, suggesting that they did not address in adequate detail how an intervention based on the widespread employment of unqualified teachers might be implemented, or provided little data on the classroom performance of these teachers. However, one finding that is consistently highlighted in the literature is that attention to certification *alone* is unlikely to have an effective impact on pupil performance, pointing to the importance of giving strong consideration to the other factors highlighted in the recommendations of this review in designing training, whether for certified or uncertified teachers.

4.3.5.4 Longer-term cost implications of particular interventions or strategies

Strategies that emerge that might reduce the longer term costs, such as the use of ICT for distance learning are sometimes seen as prohibitive because of the potential start-up costs involved, such as those associated with the infrastructure needed to support it (Akyeampong et al. 2010). Maheshwari and Raina (1998: 98-99) similarly noted:

once the necessary infrastructures for interactive video technology are set up, the unit training cost using this mode will be favourable in comparison to that of the traditional face-to-face training methodology. In terms of its impact, this alternative strategy can substantially reduce training loss at successive levels, which invariably accompanies multi-tier cascade training. In addition, the use of interactive video technology is well-suited to the distance education of remotely located teachers, a situation common in countries such as India and Bangladesh.

Binns and Wrightson (2006) reminded us that costs of training for rural areas were much higher than in urban areas, and the temptation to cut small amounts must be seen in the light of the extreme disruption that can result. Kunje (2002) also argued that MIITEP was not only cheaper but more effective, especially if followed by intensive in-service development for selected teachers - however, depending how selective this was, it would increase costs once again.

4.4 Summary of the results of the synthesis

- No one strategy was shown to be directly related to impact on teacher performance; rather, interventions included different combinations of strategies which were applied and evaluated as a package. This makes it hard to disaggregate the significant elements of the overall intervention. Successful interventions in the studies rated as more robust and trustworthy each included several strategies: training workshops, independent study and in-class support were most frequently applied in these studies, followed by in-school support and school clusters.
- Eight of the studies showing at least a medium level of methodological trustworthiness and robustness of contextual detail found change in teaching methods towards those advocated by the interventions (Harvey 1999a; Tatto et al. 1991; Stuart and Kunje 1999; Guzman et al. 2000; O'Sullivan 2003; Bof 2004; Binns and Wrightson 2006; Shohel et al. 2010). All of these included face-to-face workshops and classroom support, with all but one also including self-study. Two further studies where such improvement was found were less convincing on methodological grounds (Akyeampong et al. 2010; Kruijer 2010) and one on the grounds of poor robustness of contextualisation (Hardman et al. 2009).
- Two studies very convincingly demonstrated that coaching by highly qualified, experienced and expert coaches was effective in changing UUTs' teaching methods (Harvey 1999a; O'Sullivan 2003). Harvey, however, concluded that coaching was very expensive and labour-intensive.
- It is difficult to make claims about the effect of interventions on pupil learning. Of the four studies that convincingly reported some form of objective measures on pupil performance, three showed improved attainment (Tatto et al. 1991; O'Sullivan 2003; Binns and Wrightson 2006) and one showed no improvement (Stuart and Kunje 1999).
- Although many studies reported that the improvement of teacher subject knowledge was an aim of the intervention, this often proved problematic: Tatto et al. (1991), Stuart and Kunje (1999), Bof (2004) and Akyeampong et al. (2010) found that gains failed to meet expectations. Mathematical learning seemed to be particularly difficult to improve through distance education (Stuart and Kunje 1999; Bof 2004; Akyeampong et al. 2010).
- The in-depth review synthesis also found nine considerations key to successful interventions identified in those studies rated highly contextually robust. These were: the regularity of UUTs' engagement in the strategies; the proximity to the classroom of the sites where strategies took place; the extent to which workshops and self-study modules were focused on discussion of practice and enhancement of subject and pedagogical content knowledge; the importance of well-produced resources and appropriate use of ICT; the quality of tutors and their briefing or training, including where

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possible and more cost-effectively, employing competent experienced teachers from the UUTs' own schools in a mentor role; recognising that effective interventions might need to last for several years; gaining support for the interventions from school management and external administration; balancing the burden of study and workshop attendance with the UUTs' work, family and community commitments; and recognising the constraints to classroom improvement, including critical reflection, within the specific contexts in which the UUTs worked.

- Engagement in training activities can have a positive impact on the professional confidence and motivation of the teacher within their school and community. This was reported in twelve studies.
- The figures presented in the studies reviewed strongly suggest that distance education methods are cheaper than conventional methods (Tatto et al. 1991, 1993; Holmes et al. 2001; Kunje 2002; Sampong 2009; Akyeampong et al. 2010; Kruijer 2010). However, they may not necessarily be the most effective.
- One of the most trustworthy and robust studies Tatto et al. (1991, 1993) noted that distance learning was effective in educating large numbers of untrained teachers at low cost and might be suitable in other contexts where resources were limited, but where there were large numbers of untrained teachers. As the backlog of untrained teachers was reduced, provided no new untrained teachers entered the system, the cost-effectiveness of distance education would decrease.
- One study (Mehrotra and Buckland 2001) argued that increasing the proportion of trained teachers increased average teacher earnings and thus might not be sustainable in many low-income countries.

5. Implications

Outline of chapter

This chapter begins with a brief evaluation in section 5.1 of the strengths and limitations of the systematic review, focusing on the how the team conceptualised ‘untrained’ and ‘under-trained’ teachers in order to answer the review question and how this informed the procedures for the review in terms of quality assurance. Section 5.2.1 lays out the implications for policy and practice while section 5.2.2 lays out the implications for research.

5.1 Strengths and limitations of this systematic review

5.1.1 Conceptualisation of the issue to answer the research question

The initial conceptualisation of how to define ‘untrained’ and ‘under-trained’ teachers in order to answer the research question produced the typology of six groups of teachers according to their level of education and length and quality of initial training (Table 1.1). Although these conceptual distinctions were useful in identifying the kind of teacher that the review was concerned with, in carrying it out, we found that it was often difficult to identify the characteristics of the teachers involved in the interventions reported. Teachers involved were frequently from several different categories, and the authors of the research were not able or did not choose to disaggregate their findings or specify different responses from different types of teacher. Therefore, it is quite possible that the review excluded from consideration studies that in fact dealt with UUTs, either because this was not evident, or because the findings relating to this specific group of interest could not be identified among results relating to the wider group of teachers. This is in many ways regrettable, but was unavoidable if the scope of the review was to remain manageable. It also suggests that greater attention on the part of researchers to the characteristics of the UUTs they study, such as differing levels of experience, general educational attainment and level of teacher training, might strengthen the developing knowledge base in this area.

However even when studies came through the inclusion filters, it was not possible to tease out directly the position teachers occupied along the continuum of having received no training, through to those who had received sufficient training to be deemed qualified within particular settings. As outlined in section 3.2.1, this was often because of a lack of specificity from the authors of studies about who was targeted by the intervention, some stating only that they included untrained teachers amongst their sample. In these cases the organisers of the intervention may not have been clear themselves about the background of the teachers involved. However it was also a question of variation in the meaning of the terms. Categories such as ‘contract teacher’ or ‘para-teacher’ may denote those who have received training which is significant but shorter or has different entry requirements from those who are deemed fully qualified; it may also include those who have had no training at all. This can vary between countries, but also within countries. Clarifying this position might have been possible by following up each study with further research in each context. It was not possible within the scope of this systematic review.

As a result, it was not possible to use the evidence from the in-depth study to address the issue of whether formal qualification leads to improved practice and

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therefore whether certifying the whole workforce is cost-effective⁸ (see also Section 3.2.2). The recruitment of UUTs may be a way of saving on salary costs in the short term. It may be sustained by a strategy of leaving teachers partially trained so that the system costs are manageable. However, having large numbers of UUTs is often seen as a characteristic of low-quality education, and many of the interventions in the review seemed to result from a decision to eliminate or reduce the numbers of UUTs rather than from a decision to improve directly the quality of learning of pupils in schools. Once they have received training, teachers are likely to expect to be rewarded for this, and indeed the extra rewards are part of the incentive to participate in the training (Akyeampong et al. 2010).

The different forms of intervention, identifying and categorising 'classroom performance', and the direct and indirect ways in which these are measured in studies, necessitated a broader focus, rather than a narrow one that might well have excluded studies that were of significance and relevance to the review question. In addition, interventions that resulted in no change or negative outcomes were also evaluated and coded, adding to the rigour and veracity of the findings. Studies addressing issues of cost-effectiveness in fixed and quantifiable terms were rare, so the review also needed to remain open to whatever ways cost-effectiveness was presented.

A strength of the review therefore is that both qualitative and quantitative studies were included and there were no restrictions of scale. The studies in the in-depth review range from evaluations of large-scale, national upgrading schemes to small-scale, within-school reflective coaching interventions.

5.1.2 Searching and screening

The question of grey literature posed a particular challenge for this review. Although the review search strategy did return a considerable quantity of grey literature from the electronic databases, further material certainly exists which was not indexed there. Relevant studies may have been carried out at national or regional level in low- or middle-income countries, with no thought of wider publication or international dissemination. In such reports, the authors could assume that their readers would be familiar with local conditions, and they may therefore have omitted significant details about the characteristics of the teachers studied. Such omissions make it less likely that these studies would come to the attention of the review, as it would not necessarily be clear whether or not they met the inclusion criteria, thus compounding the already well-known challenges in obtaining international grey literature.

The review team was conscious of this problem, and sought to deal with it through consultation with e-user group members, inquiries from the ministries of education of low- and middle-income countries, searching websites and checking the bibliographies of reports obtained from database searching (see Section 2.2.2). This returned further government and NGO reports not identified in the electronic searches. However, despite these efforts, relevant grey literature may have

⁸ Bernard et al. (2004), in a review of sample testing of pupils in francophone countries, reached the conclusion that formal teacher preparation often had little effect but cautioned against the conclusion that initial teacher education should be confined to very short courses rather than costlier long training courses. Instead they concluded that 'on the contrary, these studies ought to provoke the kind of questions that might lead to a change in training practices' (p.18 - authors' translation from the French).

escaped notice. If so, this would clearly limit the comprehensiveness of this review to some extent.

In systematic reviewing, a tightly framed review question and explicit inclusion criteria are crucial in providing focus. The sheer number of potential texts means that without some way of providing a boundary, the process would become unmanageable and the written report would be liable to lack coherence. Nevertheless, to those doing the review as well as to potential users, the means by which this focus is achieved can also be frustrating, since they are liable to result in a review which does not seem to cover all the ground or to yield the kind of evidence that one might expect. At each stage of screening, mapping and selection for the in-depth review, and also in appraising the weight of evidence at the stage of the final synthesis, issues are excluded which may be of great interest. This can be seen as a weakness of systematic reviewing which has been pointed out by critics of the method (see for example Torrance 2004). In this review, we have addressed this in part by including a detailed discussion of the studies included at the mapping stage, in order to bring out aspects that might otherwise be lost in the screening.

However, the frustration also results from the characteristics of the research texts and evaluations. Thus, in addressing this review, ideally we would have identified and synthesised a series of studies which: presented baseline data about the practices in UUTs' classrooms and pupils' achievement before the intervention; which described the schools and the pupils involved; clarified the background of the UUTs and differentiated them from any others involved in the project; described the intervention in detail, including who was responsible for implementing it and how long it lasted; and presented data about practices in UUTs' classrooms and pupils' achievement after the intervention, and preferably at a point when the improvements had had a chance to be fully incorporated. However, only two or three of the studies in this review approached meeting all these conditions. This may in part be attributed to the low quality of research in this area. Indeed, within this review, we encountered some texts where the research, whatever its methodological orientation, was not of a quality that would have satisfied examiners in postgraduate or even undergraduate degrees. However, in many more cases, the problem is not so much poor work from the authors of studies, as the limitations of their access to data on the intervention and their brief for doing the evaluation or research. While limited time and access might be a problem for outsider researchers (e.g. Kruijer 2010), limited experience and expertise might be a problem for those on hand at all stages.

More direct answering of the question also relates to the design of the interventions. As already stated (Sections 3.2.2, 4.3.1.3), it is clear from the studies that many interventions were concerned with providing training rather than with directly improving pupils' learning. Thus, monitoring pupils' learning was not part of the evaluation of the interventions, which instead focused on whether the inputs were made and the extent to which participants considered the intervention to be useful. A broader search for interventions aimed specifically at improving pupil learning would have yielded a very large number of studies, and it is likely that some would have related to UUTs, even though their involvement may not have been highlighted in the keywords or abstracts.

5.1.3 Quality assurance

Two members of the review team, working independently, applied the inclusion criteria to the studies that were obtained through searching the electronic databases. The adapted version of the data extraction and quality assessment tool

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(Appendix 2.6) was applied in full to the studies that met the inclusion criteria for the in-depth review. This ensured that the reviewers followed systematic guidelines in assessing the study aims, design, sampling, recruitment, methods, data collection and analysis, conclusions, reporting, ethics and generalisability.

Reviewers also then rated each study according to two overarching criteria specifically developed to meet the particular demands of the review question. The criteria for assessing the quality of studies in systematic reviews are often those of reliability and validity, and implicit assumptions may be made about the transferability of findings from one setting to another. Such criteria privilege quantitative studies based around hard data. In this review we retained a criterion of methodological trustworthiness, that is, the degree to which the reliability and validity of tools, research methods and analysis were given consideration in the study, and the degree to which the authors' conclusions appear justified by the findings reported. However we were anxious not to exclude case studies, where transferability is not claimed, but which depend on providing a level of contextual detail that enables the informed reader to make a judgement about the extent to which aspects of a study might be applicable elsewhere. The second criterion, that of robustness of contextualisation, was therefore applied as a useful way of giving due weight to case studies. We defined this as the degree to which contextual detail given about the intervention, the educational setting and the level and backgrounds of the teachers in the sample enables a judgement of the study's relevance to a given setting and of the extent to which conclusions could be made about the research question.

By rating each study on both criteria, the team aimed to inform the review's findings with such 'hard' data on effectiveness as could be found, but also to complement these with ethnographic or other research that could potentially shed light on process and underlying factors, without laying claim to the same degree of methodological controllability as the former type of research. References to these two criteria in the in-depth review ensured overall rigour in the findings. Since these two criteria provide a fit with different research approaches representing different and often competing epistemological positions, it is therefore not surprising that in this review only two studies, both using mixed methods, were assessed as strong in both criteria.

The number and type of study that came through the in-depth review stage justified this approach. Few came close to the kind of methodology that might have been designed to answer the review question. A similarly small proportion were rated as contextually robust, perhaps because many were written for a national rather than international audience. As a result, the authors often seem to have assumed knowledge of the local context and so did not go into the levels of detail that might have facilitated a clearer assessment of the scope and nature of the intervention. For example, the qualifications and level of general education of teachers involved in the interventions were often not reported, and even where an overview of this was given, it was often unclear whether there was a differential response from teachers with different levels of training. Similarly, methodological details which would have enabled the review to gauge the trustworthiness of studies were often absent, also in some cases possibly because this was not deemed necessary for the study's original audience. Higher reliance is therefore placed on those studies in the discussion rated both highly methodologically trustworthy and contextually robust. Only two (Tatto et al. 1991; Harvey 1999a) were rated high on both criteria.

The synthesis of necessity also had to take account of different approaches. Measuring or even inferring a direct relationship between an intervention and a

specific outcome was difficult to gauge, with few randomised controlled trials or use of baseline pre- and post-tests to measure, for example, pupil attainment as an outcome. Meta-analysis of data also was not possible, due to the wide variety of settings and frequent lack of detail about the characteristics of the UUTs. The scope for direct comparison of outcomes was also limited. The approach taken instead has been to extract factors which have commonly been shown to affect the success of interventions, and use these to identify implications for policy and research.

5.2 Implications

5.2.1 Policy and practice

1. Interventions should clearly prioritise their aims to differentiate between those of improving pupil learning, enhancing teacher subject knowledge and granting certification. Interventions designed with unclear goals or outcomes make it difficult to appraise accurately their success, impact or causes of failure.
2. The success of interventions depends on a set of factors located within the school, the education system and society, indicating that it is better to target school clusters and individual schools, as well as individual teachers, to eliminate the effects of some of these variables.
3. Interventions which are based on analysis of the knowledge, experience and needs of UUTs in the contexts in which they work are more likely to result in positive outcomes. The active involvement of teachers and their mentors in the design of any intervention is similarly more likely to have positive outcomes.
4. Interventions should involve frequent, regular engagement with self-study materials, and/or taught sessions, and/or discussions with peers, and/or the opportunity to apply new learning and skills in the classroom, to give the greatest opportunity to improve performance.
5. Proximity of the site of inputs to the UUT's classroom supports engagement and application of learning, and affects the availability of support from local tutors, peers or experienced teachers. Options that might be considered here include housing taught sessions in nearby teacher resource centres or a key school within a geographic cluster, or planning how best to facilitate easy access to materials or mentor/tutor support.
6. Initially, workshops can be most effective when they are used for specific purposes, such as introducing tutors and other students to each other, presenting a programme structure and/or explaining the purpose of self-study modules or the use of new technology within them. Once a programme is up and running, workshops used to discuss teaching methods in the reality of the UUTs' classrooms and critical reflection with smaller numbers of participants may be more effective than the more traditional use of workshops to transmit subject knowledge in a lecture mode.
7. Well-planned and -produced self-study materials, focused on subject knowledge but including practical activities can support teacher learning at a distance; new technology shows much potential but should only be used where realistically and reliably accessible to users. Print-based materials

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are otherwise more reliable. However, many governments are committed to improving ICT provision, and it is likely to become an integral part of many interventions in the near future.

8. The quality of trainers is important, so interventions should include plans for their training. Briefing, resourcing and capacity building of other stakeholders such as teacher colleagues, headteachers, administrators and community members might create conditions to support interventions more effectively. The effectiveness of such support is maximised when there is closer proximity to the contexts where UUTs are working, greater familiarity with the languages they use, and an understanding of the need for sensitivity in one-to-one contexts in terms of gender relations.
9. Demands on the time and resources of UUTs must be balanced with their daily commitments to their jobs, family and community responsibilities, in particular for women, for whom the burden of care and training can be most onerous.
10. There needs to be recognition of the constraints to classroom improvement, including developing more learner-centred pedagogies and critical reflection, within the specific contexts in which the UUTs work. Sustainable change to professional practice occurs slowly over a substantial amount of time.

5.2.2 Research

1. Research is needed which has a sufficiently rich data set to back up its claims. For example, claims about improvement should take into consideration both baseline and post-intervention data on teacher and pupil learning.
2. Evaluation studies need to be clear about the characteristics of those UUTs involved in an intervention (background detail, qualifications, gender, urban/rural, length of experience as untrained teachers, language (s) spoken), and about the intervention's purpose.
3. Research is called for which takes place over a timescale allowing evaluation of both the sustainability of interventions and the continued development of those who have taken part in them.

6. References

6.1 Studies included in map and synthesis

[Studies selected for in-depth review are marked with asterisks]

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Appendices

Appendix 1.1: Authorship of this report

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Conflicts of interest

Potential conflicts of interest arose in the course of the review as a result of work authored by members of the research team that met the criteria for inclusion for in-depth analysis. Adu-Yeboah is co-author of research on the Ghana Distance Education programme (Akyeampong, Mensah and Adu-Yeboah 2010), which was included in the in-depth review. This was addressed by ensuring that the inclusion criteria were transparent and subject to approval by the e-user group and the commissioning bodies. No review team member was involved in screening, coding or rating any study which they had authored or with which they had been associated.

Appendix 2.1: Inclusion and exclusion criteria

Inclusion criteria for mapping

The following criteria were applied to title, year of publication and abstract of each reference to determine whether or not it was suitable for inclusion at the mapping stage:

Criterion 1 - must have been published after 1990;

Criterion 2 - must contain some element of new findings, theory or synthesis of existing research (i.e., not a book review or textbook which adds nothing to the research it summarises);

Criterion 3 - must focus significantly on a low- or middle-income country setting or settings;

Criterion 4 - must focus significantly on pre-school, primary, secondary or senior school education;

Criterion 5 - must focus significantly on teachers who are untrained, under-trained and/or less-educated (categories 2-6 in the typology presented in Table 1.1);

Criterion 6 - must focus significantly on a factor or factors affecting the classroom performance of those teachers.

Inclusion criteria for in-depth review

In addition to the inclusion criteria applied to references for the mapping stage, studies must meet the following criteria to be included in the in-depth review:

Criterion 1 - must describe an intervention designed to improve the classroom performance of teachers (i.e., should not just describe some aspect of their performance without seeking to affect it through intervention);

Criterion 2 - must describe the intervention in enough detail that its component elements (e.g., workshops, in-school support) can be identified;

Criterion 3 - must report on how data informing the evaluation of the intervention were gathered and on whether any attempt was made to guard against observation or anecdotal bias (e.g., where teachers or other stakeholders are quoted, it should be specified how these quotes were obtained; where classroom observations are reported, it should be specified how these were systematised);

Criterion 4 - must provide information on either the impact or cost-effectiveness of the intervention, or both. Impact here is broadly defined (see Section 1.2.3), and includes data gathered through both quantitative and qualitative methods, i.e., the review is interested in the 'appropriateness' as well as the 'effectiveness' of the interventions discussed. Likewise, cost-effectiveness will need to be defined broadly (see Section 1.2.4).

Appendix 2.2: Search strategy for electronic databases

Database and date searched	Search strategy	Number of hits obtained by search
ASSIA 28th May 2011	((teacher*) or(DE=teachers)) and((untrained) or(under-trained) or(para-teacher*) or(parateacher*) or(contract teacher*) or(communit y teacher*) or(inexperience*) or(novice*) or(less educated) or(less qualified) or(poorly qualified) or(DE=novices))	91
ADEA PRISME 8th June 2011	Untrained teachers: Unqualified teachers: Teacher training: This database does not hold publications as such; rather it records programme and project information. These search results were thus used to inform further searching, but are not included in the figures in Figure 3.1.	1 1 95
Australian Education Index 9th June 2011	“((unqualified ADJ teachers OR teacher ADJ education OR untrained ADJ teachers OR para-teachers OR parateachers) .TI,AB. OR (professional ADJ development) .TI,AB. AND teachers.TI,AB.) AND (DEVELOPING-COUNTRIES.DE. OR INDIGENOUS-POPULATIONS.DE.)”	81
BLDS 6th June 2011	(untrained teacher*): (unqualified teacher*): (underqualified teacher*): (under-qualified teacher*): (undereducated teacher*): (under-educated teacher*): (in-service teacher*): (INSET teach*): (qualified teacher*): (pupil teacher*): (teacher education AND rural): (teacher education AND distance): (teacher training): (teacher* AND professional development):	0 1 0 0 0 0 24 1 5 1 5 7 11 4

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British Education Index 10th June 2011	((untrained teacher*) OR (para-teacher*) OR (community teacher*) OR (unqualified teacher*) OR (undertrained teacher*) OR (underqualified teacher*) OR (TEACHER-DEVELOPMENT.DE. OR TEACHER-EDUCATION.DE.)) AND DEVELOPING-COUNTRIES.DE.)	47
EBSCO - LISTA 3rd June 2011	(in-service teacher*) or (developing countr* teacher) or (untrained teacher*) or (unqualified teacher*) or (underqualified teacher*) or (under qualified teacher*) or (para-teacher*) or (parateacher*) or (community teacher*)	62
Econlit 12th July 2011	teacher train* or in-service teacher*	91
ELDIS 7th June 2011	unqualified teacher: unqualified teachers: untrained teacher: untrained teachers: teacher mentoring: teacher professional development: in-service teacher training:	8 10 9 9 4 67 39
ERIC 21st September 2011	("qualified teacher*" OR "unqualified teacher*" OR "untrained teacher*" OR "para-teacher*" OR parateacher* OR "in-service education training" OR "uncertified teacher*" OR (upgrade WITH teachers) OR (Cost-Effectiveness.DE. AND Teacher-Education-Programs.DE.)) AND (Developing-Nations.DE. OR Afghanistan OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Belize OR Bhutan OR Bolivia OR Botswana OR Brazil OR Brasil OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Cuba OR "Djibouti" OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR "Georgia Republic" OR "Georgian Republic" OR	834

	Ghana OR “Gold Coast” OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR India OR Maldives OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR “Kyrgyz Republic” OR Kirghiz OR Kirgizstan OR “Lao PDR” OR Laos OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Madagascar OR “Malagasy Republic” OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR “Marshall Islands” OR Mauritania OR Mauritius OR “Agalega Islands” OR Mexico OR Micronesia OR “Middle East” OR Moldova OR Moldavia OR Moldovan OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR Antilles OR “New Caledonia” OR Nicaragua OR Niger OR Nigeria OR “Mariana Islands” OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR “Puerto Rico” OR Rwanda OR Ruanda OR “Saint Kitts” OR “St Kitts” OR Nevis OR “Saint Lucia” OR “St Lucia” OR “Saint Vincent” OR “St Vincent” OR “Grenadines” OR “Samoa” OR “Samoa Islands” OR “Navigator Island” OR “Navigator Islands” OR “Sao Tome” OR “Saudi Arabia” OR Senegal OR Seychelles OR “Sierra Leone” OR “Sri Lanka” OR “Solomon Islands” OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadjhikistan OR Tadjikistan OR Tadjhik OR Tanzania OR Thailand OR Togo OR “Togolese Republic” OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uruguay OR Uzbekistan OR Uzbek OR Vanuatu OR “New Hebrides” OR Venezuela OR Vietnam OR “Viet Nam” OR “West Bank” OR Yemen OR Zambia OR Zimbabwe OR Jamahiriya OR Jamahiryria OR Libia OR Mocambique OR Principe OR Syrian OR “Indian Ocean” OR Melanesia OR “Western Sahara”)	
ESDS	untrained teachers:	0
6th June 2011	unqualified teachers:	3
IDEAS-REPEC	“untrained teachers” (date limits: 1990-present)	54
29th August 2011	More complex searches obtained no coherent results, so no more terms were used. IDEAS-REPEC looks for synonyms so this was not considered a serious omission.	

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3ie Impact Evaluation Database 30th July 2011	(unqualified teacher) or (untrained teacher)	34
Index to Theses 29th May 2011	(untrained or unqualified or less qualified or underqualified or under-qualified) and teacher*	43
Informaworld 9th June 2011	(untrained AND teacher*) OR (unqualified AND teacher*) OR (rural teacher* AND developing countr*) OR (distance teacher training) OR (INSET teacher) OR (professional development AND teacher AND developing countr*) OR (teacher educat* AND Africa*)	38
Ingentaconnect 8th June 2011	(Title, Keywords or Abstract contains (untrained AND teacher*) OR (unqualified AND teacher*) OR “rural teachers” OR (“para-teacher”) OR (“in-service training” AND Africa) OR (“in-service training” AND African) OR (“teacher education” AND “developing countries”) OR “school-based training” OR “in-service training needs” OR “distance teacher education”)	98
JSTOR 30th May 2011	((unqualified teacher*) OR (underqualified teacher*) OR (parateacher*) OR (para-teacher*) OR (untrained teacher*) OR ((INSET) AND (teachers))) AND ((developing countr*))	211
SABINET: African Journal Archive 5th June 2011	(untrained near4 teachers): (unqualified near4 teachers): (in-service near4 training):	1 0 5
Science Direct 30th May 2011	“untrained teacher*” or “unqualified teacher*” or “underqualified teacher*” or “para-teacher*” or “parateacher*”	254
SCOPUS 5th June 2011	((TITLE-ABS-KEY-AUTH(“rural teacher”)) OR (TITLE-ABS-KEY-AUTH(“developing country teacher”)) OR (TITLE-ABS-KEY-AUTH(“pupil teacher”)) OR ((TITLE-ABS-KEY(“untrained teacher”)) OR (TITLE-ABS-KEY-AUTH(para-teacher)) OR (TITLE-ABS-KEY-AUTH(“community teacher”)) OR (TITLE-ABS-KEY-AUTH(“unqualified teacher”)) OR (TITLE-ABS-KEY-AUTH(“underqualified teacher”)) OR (TITLE-ABS-KEY-AUTH(nqt)) OR (TITLE-ABS-KEY-AUTH(“teacher trainee”)) OR (TITLE-ABS-KEY-AUTH(“rural teacher”)))) AND ((TITLE-ABS-KEY-AUTH(“open courseware”)) OR ((TITLE-ABS-KEY-	332

	AUTH("continuing professional development") OR (TITLE-ABS-KEY-AUTH("upgrading teacher") OR (TITLE-ABS-KEY-AUTH("teacher certif*") OR ((TITLE-ABS-KEY-AUTH("untrained teacher*")) OR (TITLE-ABS-KEY-AUTH("teacher train*")) OR (TITLE-ABS-KEY-AUTH("teacher educat*")) OR (TITLE-ABS-KEY-AUTH("in-service train*")) OR (TITLE-ABS-KEY-AUTH("school-based train*")) OR (TITLE-ABS-KEY-AUTH("distance learn*")) OR (TITLE-ABS-KEY-AUTH("open learning"))))))	
UNESCO 2nd June 2011	unqualified teachers: untrained teachers: INSET: improving teacher quality:	1 15 89 68
Web of Knowledge 3rd June 2011	((in-service and "developing countr*") OR (unqualified) OR (qualified and "developing countr*") OR "less qualified" OR inexperience* OR INSET OR untrained OR underqualified OR para- teacher* OR parateacher*) AND teacher*	269
World Bank 4th June 2011	unqualified teachers: untrained teachers: improving teacher quality in developing countries:	9 193 299

Supplementary searching in other languages, using Google Scholar

French

Enseignants sans formation
Enseignants sans qualification
Professeurs sans qualification
Instituteurs sans qualification
professionnalisation des enseignants
professionnalisation des instituteurs
professionnalisation des professeurs
Instituteurs sans formation
Professeurs sans formation

Portuguese

professoras pouco habilitados
professoras sem habilitação

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professores sem qualificação

professores não-habilitados

professores leigos

professores contratados

Spanish

profesionalización de profesores

profesionalización de docents

profesionalización de maestros

profesores sin calificaciones

docentes sin calificaciones

maestros sin calificaciones

profesores no calificados

docentes no calificados

maestros no calificados

profesores contratados

docentes contratados

maestros contratados

profesores PRONOEI

docentes PRONOEI

maestros PRONOEI

Appendix 2.3: Journals handsearched

Compare: A Journal of Comparative and International Education 2002-2011

Comparative Education Review 2002-2011

Comparative Education 2002-2011

International Journal of Educational Development 2002-2011

Journal of Education for Teaching: International Research and Pedagogy 2002-2011

Prospects 2002-2011

Teaching and Teacher Education 2002-2011

Appendix 2.4: Letter sent to Education Ministries (English version)

Dear Sir/Madame

I am writing to ask for your assistance with a project of research in Education, which we at the University of Sussex are leading, under the auspices of the Departments of International Development of the UK and Australia. Specifically, this consists of a systematic review of the evidence on the efficacy of interventions to improve the practice of unqualified or under-trained schoolteachers, in low- or middle-income countries. We are undertaking a systematic search of the principal electronic databases in this area, but, being aware that there may be important local, regional or national studies which do not necessarily appear there, we would also like to consult with your Department in case you know of any study or report that is relevant to the subject in [insert name of country].

At present, we are trying to identify all studies or reports, produced since 1990, that may have researched or attempted to improve the teaching capacity of these teachers, whether at pre-primary, primary or secondary level, who practice without having completed the official courses required for such a post or without the required level of training in the subjects which they teach. For now we are not placing limits on the methodology or whether material has been published or not, because this will take place at the evaluation stage. Most of the literature that we have identified to date is from Africa or some Asian countries, but we know that there have been relevant projects in Latin America, e.g., Proformação, which is a distance-course leading to certification and administered by the Brazilian Department of Education to train practicing, unqualified teachers. In the event that you are aware of any similar work in your country, perhaps in rural schools or schools among marginalised populations, we would be very grateful if you might be so good as to inform us of it so that we can take it into account in our summarising of the evidence.

We are at your disposition for the clarification of any detail of the above, through the e-mail given above, and we thank you for your time.

Thank you in advance for your assistance.

Yours sincerely

Appendix 2.5: Websites searched

The following websites were also searched for studies of relevance to UUTs:

http://www.vso.org.uk	Searched 28th June 2011
http://www.actionaid.org.uk	Searched 28th June 2011
http://www.oxfam.org.uk	Searched 28th June 2011
http://www.unicef.org.uk	Searched 29th June 2011
http://reliefweb.int/	Searched 29th June 2011
http://www.savethechildren.org	Searched 30th June 2011
http://www.thecommonwealth.org	Searched 4th July 2011
http://www.campaignforeducation.org/	Searched 4th July 2011
http://www.tessafrica.net	Searched 4th July 2011
http://www.gatesfoundation.org/	Searched 8th July 2011
http://www.inclusion-international.org/	Searched 8th July 2011
http://uk.camfed.org	Searched 8th July 2011
http://www.dfid.gov.uk/	Searched 8th July 2011
http://www.cida.gc.ca	Searched 21st September 2011
http://www.usaid.gov.au	Searched 30th September 2011

Appendix 2.6: EPPI-Centre keyword sheet including review-specific keywords

Codes applied to studies in the systematic map

Coding Item	Response Options
Region and Country of Focus	<ul style="list-style-type: none"> - sub-Saharan Africa (please specify country or countries); - North Africa and Middle East (please specify country or countries); - Central Asia (please specify country or countries); - South Asia (please specify country or countries); - South-east and East Asia (please specify country or countries); - Oceania (please specify country or countries); - Central America (please specify country or countries); - South America (please specify country or countries); - Caribbean (please specify country or countries); - Other (please specify country or countries)
Research Type	<ul style="list-style-type: none"> - Theoretical paper; - Description; - Exploration of Relationships; - Evaluation; - Other (please specify)
Types of Teachers Involved (select all that apply)	<ul style="list-style-type: none"> - Group 1; - Group 2; - Group 3; - Group 4; - Group 5; - Group 6; - Other (please specify); - Not specified clearly
Phase of Teaching (select all that apply)	<ul style="list-style-type: none"> - Pre-School; - Primary School; - Junior Secondary School; - Senior Secondary School; - Not specified
Subject Specificity (select all that	<ul style="list-style-type: none"> - General pedagogy;

Appendix 2.6: EPPI-Centre keyword sheet including review-specific keywords

apply)	<ul style="list-style-type: none"> - Mathematics; - Reading; - Science; - Languages; - Other (please specify); - Not specified
Specific Target Group	<ul style="list-style-type: none"> - No specific target group/general application; - Rural schools; - Private schools; - Multigrade classes; - Other
Intervention Strategy	<ul style="list-style-type: none"> - General InSET or CPD; - Subject-based teaching programmes within specific pedagogic curriculum; - Subject knowledge programmes without specific pedagogic content; - Curriculum reform programmes; - Upgrading training for unqualified or under-trained teachers who remain in post; - Other (please specify); - Not applicable
Intervention Method (select all that apply)	<ul style="list-style-type: none"> - Short workshop; - Longer single workshop - Series of workshops; - In-school support; - Distance study; - Resources; - Directed tasks; - Incentives; - Other (please specify); - Not applicable
Performance Outcomes (select all that apply)	<ul style="list-style-type: none"> - Change in assessment results; - Pupil attendance; - Use of resources associated with improved pupil performance; - Use of specific practice associated with improved pupil performance;

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	<ul style="list-style-type: none"> - Stakeholder satisfaction; - Other (please specify); - Not applicable
Facilitators of classroom performance	<ul style="list-style-type: none"> - Please specify facilitators
Barriers to classroom performance	<ul style="list-style-type: none"> - Please specify barriers
Number of teachers reached	<ul style="list-style-type: none"> - 1-50; - 51-100; - 101-500; - 501-1000; - 1001-5000; - 5001-10,000; - 10,000+; - Not specified; - Not applicable
Geographical Spread	<ul style="list-style-type: none"> - School-Specific Strategy; - Cluster Strategy; - District Strategy; - Regional Strategy; - National Strategy; - International Strategy; - Other (please specify); - Not applicable
Is Cost-effectiveness addressed?	<ul style="list-style-type: none"> - Specifically addressed; - Mentioned but not addressed in detail; - Not mentioned; - Not applicable
Suitability for Data Extraction within the In-Depth Review?	<ul style="list-style-type: none"> - EXCLUDE not an intervention; - EXCLUDE no information given about impact or cost-effectiveness; - EXCLUDE no detail given about elements of intervention; - EXCLUDE no methodological description; - INCLUDE

Data extraction and quality assessment tool for use with studies in the in-depth review

Section A: Administration details	
Name of reviewer	Please specify
Date of review	Please specify
Title of main paper and date of publication	Please specify
Author(s)	Please specify
Date when the study was carried out	Please specify
Linked reports	Not applicable
	Details
If this study has a broad focus and this data extraction focuses on just one component of the study, please specify this here	Please specify
Section B: Study aim(s), rationale and research questions	
Please describe the study's aims, objectives and underpinning rationale	Details
What are the study research questions and/or hypotheses?	Details
Section C: Intervention Focus	
Please describe briefly the intervention, with which the study is concerned	Details
Section D: Design	
Which type(s) of study does this report describes?	Description
	Exploration of relationships
	Evaluation: naturally occurring
	Evaluation: researcher manipulation
	Other (please specify)
	Not stated/Unclear
Which variables or concepts, if any, does the study aim to measure or examine?	Please specify
Section E: Methods - Groups	
Are comparisons made between two or more groups, or within a group (e.g., a before-and-after intervention)?	Between two or more groups
	Within group
	Other (please specify)
If comparisons are made between two or more groups, please specify the basis of	Not applicable (not more than one group)

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divisions made for group allocation and comparison between groups	Prospective allocation into more than one group (e.g. allocation to different interventions, or allocation to intervention and control groups)
	No prospective allocation but use of pre-existing differences to create comparison groups (e.g. receiving different interventions, or characterised by different levels of a variable such as stage of learning)
	Other (please specify)
	Not stated/unclear (please specify)
Section F: Methods - Sampling strategy	
Are the authors trying to produce findings that are representative of a given population?	Explicitly stated (please specify)
	Implicit (please specify)
	Not stated/unclear (please specify)
If applicable, what is the sampling frame (if any) from which the participants are chosen?	Not applicable (please specify)
	Explicitly stated (please specify)
	Implicit (please specify)
	Not stated/unclear (please specify)
Section G: Recruitment and consent	
Were any incentives provided to recruit people into the study?	Not applicable (please specify)
	Explicitly stated (please specify)
	Implicit (please specify)
	Not stated/unclear (please specify)
Was consent sought?	Not applicable (please specify)
	Explicitly stated (please specify)
	Implicit (please specify)
	Not stated/unclear (please specify)
Section H: Study participants	
Please describe the participants in this study, stating how many there were and their characteristics e.g. social class, ethnicity, age, level of professional attainment, etc.?	Details
Section I: Methods - Data collection	
Which were the main types of data collected, and please specify if they were used a) to define the sample, b) to measure/monitor aspects of the intervention, c) to measure/monitor aspects of the sample as findings of the	Details

study	
Section J: Methods - Data analysis	
What are the main methods of analysis, including statistical procedures, used in the study?	Details
Section K: Results and conclusions	
Please summarise the results, including outcomes (both negative and positive findings), facilitators and barriers.	Positive (Please specify)
	Negative (Please specify)
	Inconclusive (Please specify)
	Mixed (Please specify)
	Other (includes facilitators and barriers) (Please specify)
What do the authors conclude about the study and is this justified from the findings reported?	Positive (Please specify)
	Negative (Please specify)
	Inconclusive (Please specify)
	Mixed (Please specify)
	Other (includes facilitators and barriers) (Please specify)
Section L: Quality of the study - Reporting	
Is the study clearly reported?	Yes (Please specify)
	No (Please specify)
Do the authors report on their own relationship to the intervention studies?	Yes (please specify)
	No (please specify)
Section M: Quality of the study - methods and data	
Has the trustworthiness/reliability and validity of data collection tools, methods and analysis been established?	Yes (please specify)
	No (please specify)
How generalisable are the findings?	Details
Are there ethical concerns about the way the study was conducted or reported?	Yes (please specify)
	No (please specify)
Section N: Weight of Evidence	
Methodological Trustworthiness - Taking into account the clarity of reporting in the study, the appropriateness of study design and methodological rigour, and the extent to which the authors' conclusions are justified by the findings reported, what is the overall weight of evidence this study provides to answer the question of this particular systematic	High trustworthiness (please specify)
	Medium trustworthiness (please specify)
	Low trustworthiness (please specify)

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review?	
Robustness of Contextualisation - Taking into account the degree of contextual detail included about the intervention, the educational setting, and the level and backgrounds of the teachers in the sample, what is the overall context-specific weight of evidence this study provides to answer the question of this particular systematic review?	High robustness (please specify)
	Medium robustness (please specify)
	Low robustness (please specify)

Please support judgements or comments with direct quotes or figures where possible. If reading electronic copies, these can be copied and pasted; if reading in hard copy, it is enough to give the page reference here and highlight the relevant section on the copy.

Appendix 3.1: Studies that could not be obtained in time for the review

Author	Title	Year
Ajayi OY	<i>Evaluation of the correspondence delivery mode and support services of the National Teachers' Institute Distance Learning Programme</i>	1997
Ankiewicz P, de Swardt E, Engelbrecht W	<i>Continuing professional teacher development (CPTD) : teaching technology teachers contentious issues</i>	2008
Ayodele JB, Akindutire IO	<i>The production of quality teachers to boost the efficiency of Nigeria's education system</i>	2009
Best A	<i>Where next?</i>	2000
Burns R	<i>Culture, crisis and educational renewal in East Timor</i>	1999
Casale, CF	<i>Adapting active learning in Ethiopia</i>	2010
Chapman DW, Mahlck LO	<i>Adapting technology for school improvement: a global perspective</i>	2004
Creed C	<i>The use of distance education for teachers</i>	2001
Dzakiria H, Razak AA, Mohamed AH	<i>Improving distance courses: understanding teacher trainees and their learning styles for the design of teacher training courses and materials at a distance</i>	2004
Farrell JP, Oliveira JB	<i>Teachers in developing countries: improving effectiveness and managing costs</i>	1993
Fyfe A	<i>The use of contract teachers in developing countries: trends and impacts</i>	2007
Glewwe P, Kremer M	<i>Schools, teachers, and education outcomes in developing countries</i>	2006
Griffin P, Gillis S, Thanh MT	<i>An empirical analysis of primary teacher standards in Vietnam</i>	2006
Ikupu A	<i>Marere: an indigenous approach to mapping social change : the Elementary Teacher Training Program in Papua New Guinea</i>	2005
Ikupu A, Glover A	<i>Papua New Guinea elementary teacher education: mixed mode teacher training for 16000 village teachers</i>	2002
Mettananda DS	<i>Evaluation of continuing teacher education programmes conducted in teachers' centres, Teacher Education and Teacher Deployment Project, Sri Lanka</i>	2001
NCAER	<i>Deployment and professional competence of para-teachers</i>	2008
Nielsen HD	<i>Quality assessment and quality assurance in distance teacher education</i>	1997

What are the impacts and cost-effectiveness of strategies to improve performance of untrained and under-trained teachers in the classroom in developing countries?

O'Donoghue T	<i>Improving the quality of primary school teacher education in the South Pacific island nations</i>	1993
O'Donoghue T	<i>The quality of primary school teacher education in the South Pacific Island nations: problems and prospects</i>	1994
Perraton H, Creed C	<i>Applying new technologies and cost effective delivery systems in basic education (Thematic study for Education For All 2000 Assessment)</i>	2000
Perraton H, Creed C, Robinson B	<i>Teacher education guidelines: using ODL - technology, curriculum, cost, evaluation</i>	2002
Robinson B	<i>Distance education for primary teacher training in developing countries</i>	1997
Robinson B, Murphy P	<i>Upgrading the qualifications of serving primary teachers using distance education in Uganda: a comparative study of costs and effectiveness</i>	1996
Samiti Bodha Shiksha	<i>Reaching out further: para teachers in primary education: an in-depth study of selected schemes</i>	1999
Senkomago NS	<i>Teacher education at a distance: impact on development in the community: country report - Uganda</i>	2004
Siraj-Blatchford I	<i>An evaluation of early years education and training in the Integrated Child Development Services (ICDS) in India</i>	1994
Srivastava R	<i>Evaluation of community based primary schooling initiatives in Madhya Pradesh: Education Guarantee Scheme and Alternative Schools</i>	1998
State Council of Education Research and Training, Madhya Pradesh	<i>An evaluative study of Alternative Schooling Programme in Madhya Pradesh</i>	1997
Thomas D	<i>Teacher education at a distance: impact on development in the community: country report - Guyana</i>	2004
Thomas E	Policy and practice in initial teacher training. Quality in basic education: professional development of teachers. Papers Presented at a <i>South Asian Colloquium on Teacher Training</i>	1993
Viljoen JM, Du Preez C, Cook A	<i>The case for using SMS technologies to support distance education students in South Africa</i>	2005
Wolff L, Schiefelbein E, Valenzuela J	<i>Improving the quality of primary education in Latin America and the Caribbean</i>	1994
Yahampath K, Dias S, Jayasinghe S, Fernando SDM	<i>Evaluating teacher responsiveness to in-service training in primary mathematics</i>	2002

Appendix 4.1: Details of studies included in the in-depth review

<p>Akyeampong et al. (2010)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Medium</p> <p>Location: Ghana</p>	<p>Aims: To assess the success of a flexible ICT-enhanced open and distance learning strategy (the UTDBE programme) by evaluating the programme's cost-effectiveness and impact on trainees' teaching practices.</p> <p>Sources of data included a survey administered to trainees and classroom observations.</p> <p>Intervention: UTDBE was a four-year in-service teacher development programme, leading either to a Certificate 'A' or a Diploma depending on performance. The programme structures included: study materials; induction; district support; study tutorials; study circle meetings; lesson observations; and residential face-to-face meetings. Originally it was intended to facilitate this through ICT-delivered training; in practice, this seems to have taken the form of print materials. Support was provided by tutors from the teacher training colleges and by district directorates, in large part through cluster meetings. Residential face-to-face meetings were organised three times a year.</p> <p>Outcomes: The programme had an observable impact on teachers' performance. Compared to untrained teachers, the UTDBE teachers' lessons tended to engage pupils more actively in the development of ideas; they used teaching and learning aids quite effectively to demonstrate concepts and principles, and showed greater flexibility in their teaching approaches in response to their learners' needs. They exhibited a level of professionalism and better classroom management skills. Trainees expressed more satisfaction with teacher training college support than with district directorate support. Headteachers supported them with lesson preparation but mostly not in other ways. Trainees reported that costs were a problem, and many reported attending only some of the cluster meetings due to the difficulty of meeting transport expenses. A high proportion of trainees found the modules difficult to understand, particularly mathematics and science, which hindered the achievement of programme goals. It emerged that a number of tutors were condensing the modules into pamphlet form, to simplify the material. About half the trainees had no internet access, showing that the ICT element of the programme was not meeting expectations. Streaming trainees into Certificate 'A' and Diploma groups based on performance was perceived as unfair, unclear and demoralising.</p> <p>The programme provided an affordable training to unqualified teachers. The public cost per trainee was 125 GhCedis (US\$88/trainee) which is less than the cost of a year of teacher education based in a primary school. However, some of the costs were borne directly by the trainees through the purchase of course books and materials, boarding and lodging fees for the residential meetings and travel expenses.</p>
<p>Andre (2008)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Low</p> <p>Location: Brazil</p>	<p>Aims: To identify the links between Proformação, a national upgrading intervention, and changes in teachers' conception and practice in the classroom.</p> <p>Sources of data included observation notes in the classroom, interviews with teachers and tutors, teachers' tests in Portuguese, mathematics and didactics at baseline and one year post-intervention, students' achievement tests and analysis of the reports produced by the teachers.</p> <p>Intervention: Proformação was a two-year on-line course for unqualified teachers in early childhood education, literacy and the initial four years of primary education who worked in the poorest</p>

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	<p>regions of Brazil (North, Northeast and Central-West). The programme was organised around four semesters/modules. Each module included training sessions in a centre for 10 days, self-study of the materials and a writing assignment. Trainees undertook an on-line test every 2 months and were engaged in collective activities every 15 days. Tutors visited teachers in schools every month.</p> <p>Outcomes: As a result of Proformação teachers' pedagogical practice and their competencies in Portuguese, mathematics and pedagogy had improved. Teachers were more prepared and their performance was better; they made effective use of classroom space; used more real-life situations in their class; managed diversity in the classroom well; and adapted the curriculum to the students' context. Teachers were more aware of their role as facilitators instead of transmitters of knowledge; they integrated the assessment in the process of teaching and learning as a formative tool; they expressed a sense of increased self-esteem and they felt more autonomous in their practice.</p>
<p>Ashraf and Rarieya (2008)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Medium</p> <p>Location: Pakistan</p>	<p>Aims: To explore the process and impact of engaging teachers in reflective conversations for improving teaching practices and to find out what facilitates or hinders this reflective process.</p> <p>Sources of data: Classroom observation notes, reflective memos, field notes, transcripts of reflective conversation sessions, the researcher's diary and the participants' teaching strategies books, which provided a record of the teaching strategies they learnt during the reflective sessions. The reflective coach's own reflections provided data for the study and were used to monitor aspects of the intervention.</p> <p>Intervention: The pre-intervention phase helped establish the teachers' prior level of reflection on their practices. The intervention phase comprised five cycles of action research, in which the strategy of engaging teachers in reflective conversations was planned, implemented, observed, reflected upon and re-planned. In the first two cycles, the reflective conversation sessions took place between the coach and individual teachers. The last three cycles of action research involved all three participants (reflective coach/researcher and two participating teachers). The post-intervention phase allowed evaluation of the ability of the teachers to reflect on their own as a result of their reflective activities.</p> <p>Outcomes: The teachers and the reflective coach critically inquired into the teaching processes in the class, facilitating the gradual development of a reflective stance among the teachers. Reflective conversations helped teachers and the reflective coach to: (i) identify gaps in their knowledge, skills and attitudes that hinder improvement of their practices; (ii) collaboratively inquire about teaching and learning in their classes; and (iii) develop a trusting relationship and commitment to teaching. However, teachers were unable to question the beliefs underpinning their practices. School leadership was unsupportive in encouraging reflection. Reflective conversations were not structured as part of the school culture, but were just an 'add on' and therefore discarded when work schedules intensified.</p>
<p>Binns and Wrightson (2006)</p> <p>Methodological Trustworthiness: Medium</p> <p>Robustness of Contextualisation:</p>	<p>Aims: To look at the wider impact of distance education (DE) on the students and their families, parents, teachers, headteachers, pupils and the local business community, and to compare the community development impact of teacher education at a distance in the three countries. The study did not set out to measure the impact or the quality of the teacher education it delivered.</p> <p>Sources of data included documentation of programmes and reporting material from the three countries, review of relevant research,</p>

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<p>Medium</p> <p>Location: Uganda (focus for data extraction); also Nigeria and Guyana</p>	<p>structured questionnaires and semi-structured interviews (sometimes audio-taped, for later transcription and analysis).</p> <p>Intervention: Only one intervention was detailed: The Northern Integrated Teacher Education Project (NITEP) in Uganda. The NITEP used primary teachers' college personnel (and experienced teachers in schools) to train and support trainee teachers and their facilities for administrative and residential purposes. Their formal learner support system had five elements: (i) a student support officer at district level; (ii) tutor counsellors from the nearest primary teachers' college offered weekend tutorials fortnightly; (iii) residential tutors supported two weeks of intensive face-to-face contact twice yearly; (iv) subject specialist tutors marked student assignments and provided personalised feedback; (v) a personal tutor, who was a teacher from the same school, was assigned to each trainee for providing professional development advice. The support system also had a pastoral focus. At all levels, training in the needs of DE learners was offered, creating a cadre of teacher educators with specialised knowledge and experience of the distance learner.</p> <p>Outcomes: Teachers who had received DE training reported high self-perceptions, and expressed high perceptions in planning, preparation, management, teaching methods and subject knowledge. Headteachers felt that the training had improved teacher performance. In all three countries, teacher educators, colleagues, headteachers and community leaders noted greater professionalism in DE teachers as they showed willingness to share professional issues with colleagues, and initiate and participate in extra-curricular activities. DE teachers took initiative in leadership and consequently were more often consulted by the local community, education authorities and colleagues. Indirect beneficiaries from the DE-delivered teacher education programmes in the three countries included conventional teacher educators and other education personnel (administrators, tutors, materials developers and examiners in the traditional teacher education institutions, headteachers, teachers, inspectors and local administrators), who all received training in supporting the development and delivery of the DE programmes. The extensive material resources for the local DE learners strengthened the local professional materials resource base, contributing to the quality of the delivery of conventional education. On the negative side, DE teacher educators reported that the lengthy periods of time they had to spend away from home were putting strain on their family lives.</p> <p>In theory, costs were covered. However, it appeared that students had to meet considerable hidden costs.</p>
<p>Bof (2004)</p> <p>Methodological Trustworthiness: Medium</p> <p>Robustness of Contextualisation: Medium</p> <p>Location: Brazil</p>	<p>Aims: To describe the design and implementation structure of Proformação and report on the results of its external evaluation.</p> <p>Sources of data for external evaluation included statistical analyses of trainee performance, surveys of all participants and six case studies in different regions. Other data included: drop-out rates; perceptions of teachers and trainees as to improvement in performance; classroom observation; changes in content knowledge, teacher self-esteem, participation in school and community; and feedback on aspects of the programme.</p> <p>Intervention: The programme's aim was to deliver 3,200 hours of training, divided into four modules (semesters), each comprising 800 hours of individual and group activities. These modules encompassed an introductory face-to-face session, individual workbook activities, tutor evaluation of teaching practice in the teacher's school,</p>

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	<p>fortnightly tutorial meetings, bi-monthly testing on content areas and preparatory activities for the tests. The programme included tutorials and communication services among tutors (including toll-free telephone consultations with tutors to clarify doubts). Course materials included study guides, videos and workbooks.</p> <p>Outcomes: A high proportion of teacher trainees achieved certification/promotion. The majority of teacher-trainees felt that their teaching practices had improved after they joined Proformação which was also corroborated by tutors. The majority of trainees agreed that their ability to plan classes had improved because of the programme, and believed that their classes were now more interesting for their students. Case studies of this programme revealed significant changes in the teacher trainees' teaching practice in the classroom. Positive changes included: use of refined teaching strategies, methodology and resources; use of games, reasoning activities and concrete activities; more emphasis placed on student participation; consideration of differing levels of student development; using student's previous knowledge in the educational setting; and overall positive changes in teacher trainee's attitudes towards their students. However changes in content knowledge appeared to be less apparent. Results of classroom observation showed that Proformação had positive effects on classroom environment and class management strategies. Increases in self-esteem and professional identity, and participation in school and community were also evident.</p> <p>While general feedback on Proformação was positive, some concerns over travel and subsistence costs and lack of support from municipalities were expressed.</p>
<p>Guzman et al. (2000)</p> <p>Methodological Trustworthiness: Medium</p> <p>Robustness of Contextualisation: Medium</p> <p>Location: Lao PDR</p>	<p>Aims: To establish the effectiveness, or otherwise, of the Teacher Upgrading Project (TUP) in upgrading the skills and knowledge of untrained and unqualified teachers.</p> <p>Sources of data included documents, face-to-face interviews with key personnel at each site visited, a survey for trainees and trainers, a school survey form and a classroom observation form.</p> <p>Intervention: This was an upgrading programme for untrained and unqualified primary school teachers who remained in post. It involved two face-to-face residential sessions with tutors held during vacations, in-school classroom experience monitored by trainers and three levels of curriculum studies through printed course materials for use in the residential courses. TUP worked with school clusters, within which a core school held a resource centre for cluster schools.</p> <p>Outcomes: TUC-trained teachers were found to be better trained than graduates of TTCs and had greater retention. They were more active, sharing knowledge, skills and experiences with other teachers in their schools or cluster, applied learning directly in the classroom and displayed improved classroom management skills. TUP had increased the number of qualified and trained teachers in rural and remote areas, and enhanced the quality of education for the children. The TUP in a cluster school was found more effective than in non-cluster schools because of regular professional development activities such as teacher meetings and discussions. Such schools reported higher pupil achievement and retention rates. Greater community participation was noted, resulting in increased enrolment in schools and contributions by the community towards providing teachers with financial, medical and housing assistance and the cluster with financial support. However, modules needed revision and handbooks for both trainees and trainers needed to be developed. There was a lack of instructional materials</p>

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	<p>such as textbooks, teacher’s manuals and curriculum support materials, and training for teaching in multigrade classrooms was far too short. The Resource Centre Manager position was also expected to carry a full-time teaching load. Many satellite schools within the cluster were inaccessible.</p>
<p>Halai (1998)</p> <p>Methodological Trustworthiness: Medium</p> <p>Robustness of Contextualisation: Low</p> <p>Location: Pakistan</p>	<p>Aims: To critically examine one’s role as a mentor to a group of mid-career mathematics teachers and to understand how mentoring practices influence teacher learning.</p> <p>Sources of data included classroom observation notes, audio-recorded and transcribed conferences between the teachers and the mentors, and reflective journals (mentees and mentor).</p> <p>Intervention: The author was a mathematics teacher in the school. Having been seconded for a two-year Master’s Degree (M. Ed.) course in teacher education from a local university, the author worked as a mentor to mathematics teachers in the school. The mentoring focused on developing classroom practice by using mathematical discussion to promote pupils’ conceptual understandings of mathematics. Mathematics classrooms in the school had been largely characterised by pupils working silently, and social interaction was seen as a means of improving learning. The author interpreted her role as a mentor to include teaching, coaching, planning, observing, providing feedback and reflecting on her own and the mentees learning. The mentor carried out pre-observation face-to-face conferences with individual teachers before she observed their teaching. This enabled an understanding of teacher’s needs, concerns and espoused beliefs. During this conference, they worked through all the mathematics tasks they were going to teach that day - thus trying to enhance subject knowledge. Teacher observations of their classrooms focused on how pupils learn, on any problems faced during mathematical discussion, and on the relationship between teacher’s espoused beliefs and practice. Each lesson observation was followed by a post-observation conference with teachers to promote reflection on key issues and thinking about alternative ways of dealing with problems, and to celebrate success.</p> <p>Outcomes: There was indication that some learning had taken place, although the sustainability of the outcomes was difficult to assess given the short period (three years) of the mentoring process; some teachers suggested staying after school for an hour every week for sharing experiences, ideas, and concerns. Teachers who initially did not question or raise issues were doing so now. The mentor herself learnt significantly about how mathematics teachers learn. This approach places heavy demands on time and other resources, which are difficult for an economically less developed country such as Pakistan to meet. When mentees perceived the mentor as a problem solver or evaluator of performance, learning was inhibited, whereas when mentor and mentee relationships were established based on mutual trust, mentees’ personal and professional growth was enhanced.</p>
<p>Hardman (2009)</p> <p>Methodological Trustworthiness: High</p> <p>Robustness of Contextualisation: Low</p>	<p>Aims: To investigate the impact of the School-Based Teacher Development (SbTD) programme on the pedagogical practices of participating teachers.</p> <p>Data sources included comparing (structured) classroom observations of the pedagogical practices of key resource teachers (KRTs) and non-KRT teachers, and satisfaction of stakeholders (KRTs, non-KRT teachers, headteachers, school committees and pupils) through interviews and data on students’ performance.</p>

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<p>Location: Kenya</p>	<p>Intervention: SbTD graduated over 47,000 primary school teachers throughout Kenya in three core subjects: mathematics, English and science. Three teachers from every school (KRTs) led professional development in their subject, and they were in turn supported by a zonal-based advisory system of over 1000 Teacher Advisory Centre (TAC) tutors, and headteachers (who also received training materials). SbTD was developed as a programme of self-study using distance learning modules combined with regular face-to-face cluster meetings. Following a one-week induction, there was a six-month period of self-study, with fortnightly visits from TAC tutors and fortnightly visits to the TAC centres for seminars. Self-study time was 54 hours for primary pedagogic practice and 54 hours on the specialist subject. In addition, KRTs had to write three reflective assignments. They received a Ministry of Education-approved certificate at the end of the course. Central to the SbTD training modules was the concept of the reflective teacher encouraging critical reflection on beliefs and classroom practice.</p> <p>Outcomes: The use of group/paired work increased significantly, and with it the opportunity for pupils to use their mother tongue in exploratory talk to aid understanding. Lesson planning appeared to be more systematic and focused, with teachers making greater use of teaching aids from the local environment beyond the traditional chalk board to make the curriculum more relevant to the pupils. Nearly two-thirds of the KRTs used a mix of whole-class and group-based teaching, they were far more interactive and gender sensitive, and they appeared to be creating a more positive classroom climate by exhibiting personal enthusiasm in their teaching through the greater use of praise rather than criticism. While KRTs were most likely to pass on their knowledge and provide help to other teachers, this was done on an ad hoc basis. While students acknowledged the use of group work and found lessons incorporating group work as enjoyable and useful, the numbers reported were inconclusive. The response from headteachers on the role of KRTs in the delivery of school-based training was mixed. Where SbTD was working well, classroom-based support was being provided to teachers to encourage them to reflect upon their beliefs and pedagogic practices. The ‘cascade’ model of school-based training, whereby KRTs worked with other colleagues in the school to pass on their training, was having less impact than had been anticipated by the SbTD designers. The main reason given for the lack of success of KRT school-based training was the heavy workload of all teachers, which left little time for non-scheduled activities.</p> <p>The cost of course fees (1200ksh) was considered high and was paid by teachers.</p>
<p>Harvey (1999a)</p> <p>Methodological Trustworthiness: High</p> <p>Robustness of Contextualisation: High</p> <p>Location: South Africa</p>	<p>Aims: To assess the impact of classroom-based coaching on observable changes in teachers’ classroom practice.</p> <p>Sources of data included an observation instrument (Shared Criteria Observation Schedule), with its accompanying post-observation interview schedule. The author also referred to ethnographic data collected over three years of participant observation during classroom support visits to schools.</p> <p>Intervention: The Primary Science Programme (PSP) started with the supply of a low-budget kit of science apparatus to schools, and an orientation workshop. Following that, teachers received seven one-day workshops per year over three years. The first year focused on subject knowledge and the use of apparatus; the second year had a focus on developing a repertoire of teaching methods; and the third year focused on lesson planning and self-evaluation. A network of subject-</p>

	<p>interest committees was developed. In each year of the study, ten schools received eight day-long ‘classroom support’ visits spread over one year. During visits, the author worked on a one-to-one basis with teachers in timetabled science classes. Usually, he spent two hour-long lessons with each of up to three teachers per visit. Initial visits usually focused on a demonstration lesson on a subject chosen by the teacher, with subsequent visits increasingly emphasising cooperative planning and team teaching. During the second or third months of support, the author facilitated the drafting of school science teaching policies, which were useful in providing realistic shared aims that teachers felt commitment to. With time, some more skilled teachers developed a preference for being observed in teaching lessons of their own devising. Each visit was concluded with a debriefing discussion.</p> <p>Outcomes: There was a clear difference in teaching methods between teachers who had followed the intervention and those who had not; PSP teachers were more focused in their aims and used a range of teaching strategies including practical and activity-based learning. Lesson content had greater relevance to pupils’ everyday lives, and was more appropriate to students’ ability levels. Pupils contributed more of their own experience and knowledge to lessons. More attention was paid to developing English language skills through structured language activity. Pupils did more talking and writing in English in whole sentences. PSP teachers used Zulu more often, and for a wider range of purposes. They employed a wider range of oral questioning methods and provided more feedback, especially in the correction of written classwork. Science lessons were on average longer, permitting a wider range of activities. Teachers changed their teaching methods more readily if they participated in both classroom support and workshops than if they had workshops only. However, there was no evidence of an overall increase in group work, in the use of scientific process skills, or in questioning by the pupils. Only limited evidence was found for sustainability of changes attributable to PSP InSET. Teachers maintained most gains for 14 months after classroom support was withdrawn.</p> <p>Coaching involved high costs, with the one coach costing approximately US\$32,000 per year.</p>
<p>Holmes et al. (1991)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Low</p> <p>Location: Nepal</p>	<p>Aims: To describe the ways radio has been used for teacher training in Nepal, including the selection and recruitment of participants, the balancing of diverse instructional methods, their level of effectiveness, and costs.</p> <p>Sources of data included enrolment and drop-out figures, pre- and post-test scores, teachers’ monthly responses to questionnaires (evaluating the use they made of learning) and the costs of the intervention.</p> <p>Intervention: There was a nominal 150 hours of instruction, consisting of 120 hours of radio lessons (half an hour in length, broadcast 6 days/week for approximately 9 months) and 30 hours of practical instruction. Lessons covered mathematics, Nepali, English, science, health, social studies and education, and also covered the theoretical aspects of pedagogy. Lessons generally included interactive games or dramatic dialogue. Teachers were provided with self-instructional materials (1-2 page units for each radio lesson) and a below-market price transistor radio. There was also a ‘Resource Teacher System’, with the opportunity to meet once a month with fellow trainees as a cluster, and with resource teachers to discuss and clarify training issues. Monthly questionnaires were also distributed to monitor</p>

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	<p>trainees' feedback.</p> <p>Outcomes: Some evidence of learning from the radio course was apparent; the average scores of the participants rose from 56.5 percent on the pre-test to 67.3 percent on the post-test. Successful completion rate for the radio course (56.6 percent) was lower compared to the face-to-face programme (94.8 percent), but was consistent with other campus-based courses in Nepal for earlier years.</p> <p>The cost per teacher of the radio intervention (3,141 Rs) was lower than that of the face-to-face intervention (3,534 Rs). However, it was more costly for the government, which paid 49 percent of the costs compared to 28 percent in the case of face-to-face programme. The course would be less expensive on a per-teacher, unit cost basis than the face-to-face alternative if upwards of 3,000 teachers were enrolled and the course successfully managed.</p>
<p>Johnson et al. (2000)</p> <p>Methodological Trustworthiness: Medium</p> <p>Robustness of Contextualisation: Low</p> <p>Location: Egypt</p>	<p>Aims: To document the teachers' perceptions of their experiences and their implementation of different teaching methods, and to collect data on their perceptions of the possibilities and inhibitory factors of these methods.</p> <p>Sources of data included self-reported teaching practices and constraints on using alternative teaching strategies through the production of group posters; selected teachers were interviewed in the UK and after resuming duties in Egypt, and selected trainees were observed in Egypt.</p> <p>Intervention: Egyptian teachers received 12 weeks of training in the UK and then resumed their previous duties in Egypt. In the UK, they spent about 40 percent of their training time in secondary schools observing classes, recording details of lessons and researching school systems. They wrote on links between their observations and their own practice in Egypt and received weekly seminars on how to do these tasks. Additionally, they compiled a portfolio of writing about textbooks, videos, computer software etc., together with outlines of the organisation, pastoral care and examination arrangements of their school. They were assessed formatively and summatively in these tasks. The rest of the study time was spent on a course which had a subject work component, an IT component and an evaluative comparison of varieties of activities for students, which included a consideration of learning objectives, general aims and approaches to their specialist subjects. The teachers were assessed on the work they produced.</p> <p>Outcomes: Teachers were still at the mechanical stage of teaching; they knew more strategies than they actually used in the classroom; they used little reflection, and reverted to previous practices on return from the UK. Teachers recognised that the new strategies learnt were good and were keen to implement them, but were constrained by the material and social environment to which they returned, including resistance from colleagues and pupils; a lack of resources made it difficult to implement what they had learnt and what they wanted to practice.</p>
<p>Kruijer (2010)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation:</p>	<p>Aims: To determine to what extent, and in what ways, an upgrading initiative had been successful in educating unqualified and underqualified primary teachers.</p> <p>Sources of data included semi-structured interviews with students and mentors. Additional data were collected from donors, ministries, headteachers and union members, but it is not clear how this was done.</p>

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<p>Medium</p> <p>Location: Tanzania, Malawi and Nigeria</p>	<p>Intervention: Four different upgrading programmes designed for un- or under-qualified primary teachers. Tanzania: MUKA was compulsory for Grade B and C teachers, and required distance learning while in post using face-to-face sessions, course materials and classroom support from tutors. It started with a week-long introductory session, meeting tutors and working in groups on course materials of 25 modules to be studied over three years. TTC tutors visited twice, assessing course work and work in schools. Malawi: the LINK programme for volunteer/assistant teachers with secondary education gave five days training and students then left to teach full time with the school's support. They could upgrade to the open and distance learning (ODL) programme (not yet started at the time of report), which would start with two to three weeks of residential training, then three self-study modules with school experience. Nigeria: the Special Teacher Upgrading Programme (STUP) aimed to upgrade primary school leavers with a Teaching Certificate grade 2 to the National Certificate of Education over two years, through weekly and holiday face-to-face sessions, self-study modules focused on subject content, new methods and integrated school experiences where mentors visited and observed twice a year. Practical teaching had to be passed before taking the examination.</p> <p>Outcomes: MUKA, LINK and STUP succeeded in upgrading very large numbers of teachers, who were positive about their subject enhancement and improvement in teaching methods. LINK and STUP used a form of pupil assessment and observation to assess class learning outcomes. Respondents stated that they had learnt about working with disabled children for the first time. MUKA improved the quality of teaching and learning in the classroom and raised the status and motivation of the teachers. LINK maintained its high entry qualification, introduced an improved selection procedure and provided an initial training of five days that included the colleague who would mentor the auxiliary teacher. Management was positive about the quality of the auxiliary teachers. STUP: Large numbers of students were enrolled - 50,000 in two batches - and kept teachers in their classrooms, drawing on their teaching experience. Rural women in the north particularly benefited, as the compulsory, part-time nature and free tuition allowed them to participate within the cultural mores. Some respondents stated that teachers used more participatory methods in the classroom.</p> <p>MUKA teachers had to pay an exam fee, opportunity costs arose from study time, and there was little or no remuneration in salary rise once the course was finished. LINK teachers' salaries were too low to support further study or to motivate teachers to upgrade. STUP tuition was free, but trainees paid their own transport costs to STUP centres, which were too high for some to participate. Costs for mentors were underestimated. Programmes were cost-effective when they made use of local teacher development centres and kept teachers in the classroom, particularly in rural areas.</p>
<p>Kunje (2002); Kunje et al. (2003); Stuart and Kunje (1998); Stuart and Kunje (1999)</p> <p>Methodological Trustworthiness: Medium</p>	<p>Aims: To investigate how the new recruits were coping and how far the schools were able to provide informal on-the-job training, and to explore factors that might be significant for the success of the Malawi Integrated In-service Teacher Education Programme (MIITEP).</p> <p>Sources of data included interviews with training staff, observations of the training process and focus group discussions with trainees. The action research projects additionally used reflection and notebooks.</p> <p>Intervention: The programme consisted of a one-term residential course followed by four or five terms of supervised teaching in schools.</p>

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<p>Robustness of Contextualisation: High Location: Malawi</p>	<p>In the sixth term, trainees attended a one-month residential block which included final examinations. Trainees followed a conventional college-based programme in the first phase, with minimal teaching practice. Subsequently, they returned to schools (usually the ones where they had been teaching as untrained teachers) and followed a self-study programme based on tasks set by the Malawi National Examination Board (MANEB). The curriculum both in the colleges and during the school-based training was based on the student teacher handbooks developed by MIITEP. In-school support included advice and guidance from trained teachers, and occasional visits by college tutors. They also had to attend zonal workshops and complete a series of assignments and projects which were assessed by colleges. The last period in college comprised a residential block leading to a final examination. Further action research input took place to support a sample of untrained temporary teachers (UTTs) within the larger project.</p> <p>Outcomes: Some schools did take initiatives to train and support UTTs. Senior master trainers checked lesson plans and schemes of work. Some qualified teachers were willing to support UTTs, but there was little evidence of systematic mentoring. UTTs were also able to keep reflective journals when encouraged to, which were of a certain amount of use in improving performance. Much of the MIITEP instruction remained compartmentalised, and did not encourage more student-centred approaches or encourage teachers to engage in independent study or reflection. The demands placed on trainees by MIITEP seemed excessive to some, especially women. Students' achievement in mathematics, English and Chichewa showed little progress. Factors affecting the quality of teaching included a large number of pupils in some classes, a lack of resources and teaching materials, classroom discipline and absenteeism.</p> <p>MIITEP was seen as an affordable option to train UTTs, although there were concerns about its efficacy.</p>
<p>Maheshwari and Raina (1998) Methodological Trustworthiness: Low Robustness of Contextualisation: Medium Location: India</p>	<p>Aims: To describe the use of interactive video technology in the training of primary teachers and evaluate the outcomes of the intervention.</p> <p>Sources of data included trainees' ratings of the achievement of training objectives, a multiple choice achievement test, observations of each session by the investigators and evaluation of presentations/demonstrations, group activities and panel discussions by the trainees. Much information on methods is missing.</p> <p>Intervention: Interactive video technology involving the Indira Gandhi Open University and the Indian Space Research Organisation was used in seven-day training courses for primary school teachers of a single language group in 20 centres in Karnataka State, providing one-way video transmissions and telephone feedback to experts from the centres. Trainee teachers used telephone Straight Trunk Dialling (STD) to ask questions to expert panellists, who provided them live answers from the studio. Participants had to complete activity sheets and post telecast work around the development of specific competencies, and were involved in group work consisting of writing lesson plans, preparation of teaching aids, and use of science and mathematics kits. A group of about 20 content and media experts planned the content and process of the programme and provided 13 training sessions with equal numbers of activity sessions. Each televised presentation session was followed by an interactive question and answer session with the experts. A set of 20 video clips on hard to teach concepts, each 5-10 minutes long, was produced in advance by recording classroom</p>

	<p>teaching in schools. Video clips were used by experts during live transmissions and were integrated into their lesson plans.</p> <p>Outcomes: Trainees' conceptual understanding improved. The majority of trainees rated the achievement of training objectives as high or medium. Once the technology had been set up unit costs were favourable, particularly for those in remote rural areas, compared to traditional face-to-face training, and large numbers of teachers were trained. New technology can work as an alternative to the cascade model by reducing training loss at successive levels, an inherent feature of multi-tier cascade training.</p>
<p>Mehrotra and Buckland (2001)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Low</p> <p>Location: Case study examples include Zimbabwe, India, Bangladesh and Egypt</p>	<p>Aims: To present a comparative analysis of teacher costs for access and quality in developing countries.</p> <p>Sources of data included secondary sources.</p> <p>Intervention: Four case studies were used to analyse interventions enabling accelerated training for unqualified teachers:</p> <ul style="list-style-type: none"> • The Zimbabwe Integrated Teacher Education Course (ZINTEC) was an accelerated four-year teacher-training programme. The first and last terms of this period were spent in college, with the remainder spent teaching in the schools with the support of distance learning materials and college tutors. • A number of para-teacher programmes in India were discussed. These recruited teachers from the community and offered savings on salary, but little detail was given about the training interventions. • The Bangladesh Rural Advancement Programme (BRAC) permitted the employment of untrained teachers and community volunteers, who were supported by an intensive programme of support materials, training and guidance. • In Egypt, teachers who were not fully qualified from the community were employed as teachers, and provided with extensive support in the form of materials and intensive training programmes, in a well-resourced conducive learning environment. <p>Outcomes: The study concluded that unqualified teachers could perform with moderate effectiveness, but needed ongoing support and a combination of distance and contact education to do so. The costs of this provision affected the savings that could realistically be made. The outcomes of each case study follow:</p> <ul style="list-style-type: none"> • ZINTEC was successful in terms of both quality and cost-effectiveness - the cost of training a teacher under ZINTEC was less than half the cost of conventional training. A reduction was seen in average teachers' costs with large numbers of untrained teachers qualified over time, but savings declined as they became fully qualified. • Para-teachers in India were found to be more accountable than regular teachers, and were hired at a third of the salary of regular teachers. Community participation and support were critical factors in these programmes. However, in some areas it proved difficult to find suitable candidates. • The BRAC programme improved learning outcomes and was cost-effective. It had a high pupil success rate, with more than 90 percent graduating. BRAC teachers were hired at a third of the

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	<p>salary of regular teachers.</p> <ul style="list-style-type: none"> Evaluations of community schools in Egypt showed very satisfactory performance of pupils compared with pupils in state schools, and low dropout rates.
Nielsen (1991)	see Tatto
<p>Njenga and Kabiru (2001)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Medium</p> <p>Location: Kenya</p>	<p>Aims: To assess and compare the academic performance and social skills of children cared for by teachers trained by the District Centre for Early Childhood Education (DICECE) and those cared for by untrained teachers, and to assess the impact of DICECE training on the family and the community.</p> <p>Sources of data included searching records and registers to track pupils' progress, conducting interviews, holding focus group discussions, and scoring observation schedules and rating scales.</p> <p>Intervention: The two-year DICECE programme provided in-service and on-the-job training with two components: residential and field experience. The residential training took place during school holidays, with teachers attending six residential training sessions over the two-year period. Each of these sessions lasted three weeks, amounting to 18 weeks. During the residential sessions, the teachers studied a wide variety of subject areas, including child development, health and nutrition, the early childhood development curriculum, thematically integrated learning approaches, the foundations and administration of early childhood development in Kenya, general knowledge and languages (English and KiSwahili). Residential training sessions were alternated with field experience, each of which consisted of three months, taking place three times a year during the school term. There were five field sessions during the two-year training period. There were additional interventions in the form of one- and two-day workshops, and a five-week short course for untrained teachers.</p> <p>Outcomes: Repetition rates among the pupils cared for by untrained teachers were almost twice those of pupils cared for by trained teachers. Children who had been cared for by trained pre-school teachers and who were enrolled in schools with high academic standing did significantly better than children who had untrained pre-school teachers or children from either group who were in academically poor schools. The children cared for by DICECE-trained teachers were found to make the transition from pre-school to primary school more successfully than children cared for by untrained teachers. This influence seemed to diminish over time, but the impact could be seen to continue through all levels of primary school, although it was not as strong as school quality. DICECE training was found to be hugely advantageous over a lack of training, but the difference was not clear-cut because there were multiplier effects, and even those who did not receive training actually benefited from the shorter workshops.</p>
<p>O'Sullivan (2000); O'Sullivan (2001a); O'Sullivan (2001b); O'Sullivan (2002a); O'Sullivan (2002b); O'Sullivan (2003); O'Sullivan (2004b)</p>	<p>Aims: To investigate the effectiveness of action research strategies in helping under-trained Namibian teachers to teach reading skills.</p> <p>Sources of data included semi-structured and unstructured observations, learner assessments, interviews, evaluation forms, attendance rate at workshops, photographs and video clips.</p> <p>Intervention: Action research was implemented through training circuits covering needs assessment, lesson observations, three- to five-day workshops, follow-up school visits with observation and feedback, and supervised peer coaching. The INSET was delivered through a three-year cycle, with the aim of improving the teaching of reading to primary school pupils by unqualified teachers. It included the following</p>

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<p>Methodological Trustworthiness: Medium</p> <p>Robustness of Contextualisation: High</p> <p>Location: Namibia</p>	<p>stages: reconnaissance, hypotheses, planning, action, monitoring and reflection. The author hypothesised about the effectiveness of a particular INSET strategy, tried it out in practice, and monitored and reflected upon its effectiveness.</p> <p>Outcomes: A marked improvement in pupil reading was found and teacher classroom practice had improved over the course of the training circuits. Teachers had shown more ability to reflect as training went on, as shown by their journals and interview responses. The use of structured, prescriptive lesson plans was more successful than untrained teachers developing their own. Reflection and learner-centred teaching did not reach the level envisaged in the literature, that is, the trainees did not attain a fully independent level of practice. Learner-centred approaches might not be realistic for the Namibian situation, but learning-centred strategies might be. This meant less emphasis on a fully constructivist approach (brainstorming, self-directed learning, group work tasks) and a more limited, teacher-directed approach to classroom study.</p>
<p>Sampong (2009)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Low</p> <p>Location: Ghana</p>	<p>Aims: To evaluate the distance teacher education programme at the University of Cape Coast, Ghana, and to examine the perceptions of the teacher trainees and faculty/administrators to ascertain the gaps, if any, between the standards and performance of the distance teacher education programme of the University of Cape Coast.</p> <p>Sources of data included two sets of questionnaires, one for the trainees and the other for faculty/administrators, programme documents and interviewing an official of the university.</p> <p>Intervention: The two distance education programmes, a three-year diploma and a two-year post-diploma degree in basic education, were delivered through a combination of self-study, face-to-face teaching and bi-weekly tutor visits to the classroom.</p> <p>Outcomes: The curriculum was considered appropriate as specified from programme documents. Both trainees and staff/administrators rated the installation of the programme high. The majority of trainees agreed that the programme contributed to their academic and professional development. Both groups of respondents felt that the programme had benefited trainees' performance in the classroom. Both groups expressed concerns over a lack of computers with internet connectivity, the effectiveness of classroom supervision and the financial burden on trainees. While both groups found contact with course tutors and the editing, revision and distribution of the study materials unsatisfactory, trainees additionally felt that their assignments were not returned to them in reasonable time. Revision of performance was needed to close the small gaps between the objectives and programme performance as perceived by the two groups.</p>
<p>Shohel et al. (2010)</p> <p>Methodological Trustworthiness: Medium</p> <p>Robustness of Contextualisation: Medium</p> <p>Location: Bangladesh</p>	<p>Aims: To evaluate the impact of mobile technology for enhancing teaching and learning in the English-language classroom in Bangladesh via the the Secondary Teaching and Learning Programme (STLP).</p> <p>Sources of data included a questionnaire, classroom observation, semi-structured interviews with school administrators (the headteacher) and teachers, and group interviews with students, but the paper was based only on interviews.</p> <p>Intervention: The intervention took place in schools run by an NGO Underprivileged Children's Educational Program (UCEP), where teachers were normally unqualified, as a test bed for upscaling and to provide communicative learning teaching methodologies. English-</p>

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	<p>language teachers were provided with media players (iPods), preloaded with video and audio language learning resources, along with battery-powered speakers for use in the classroom. The programme contained 12 modules, each centred on a particular activity designed to be taught in a secondary classroom. Each module demonstrated the activity, explored the principles underlying it and encouraged teachers to use, adapt and extend this and similar activities. During the pre-pilot phase (July 2009-June 2010), the 'Communicate' strand of the STLP was implemented in UCEP schools. STLP was based on a range of 'blended' support systems for teachers: these might include an orientation workshop, a teacher guide, a multimedia player (iPod), cluster meetings of teachers on the programme, a pairing of teachers from each school, school visits from programme staff giving feedback, and technical assistance.</p> <p>Outcomes: Trainees achieved most of their professional development at home and at school by working with new tools and materials. They learnt and worked individually and with their project partner, exploring a number of new settings and opportunities to engage with the materials and tools for their own professional learning. Teachers found the intervention useful in developing their own pedagogic knowledge and their self-perceived English-language proficiency, particularly in pronunciation. Teachers attached value to the external support personnel visiting them in school and observing lessons, which they termed crucial to their motivation. Some teachers experienced difficulties with the project technologies, or in managing to create time and space for professional learning within their busy lives.</p>
<p>Siraj-Blatchford et al. (1997)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Low</p> <p>Location: Uganda</p>	<p>Aims: To evaluate the success of the School Improvement Project (SIP) against its objectives, focusing particularly on the process of project implementation and cost-effectiveness.</p> <p>Sources of data included semi-structured questionnaires with teachers, headteachers, SIP co-ordinators, groups of children and parents, classroom observations and short interviews with teachers.</p> <p>Intervention: SIP provided expert input to nursery and primary school teachers in Kampala on child-centred pedagogic strategies and how to create teaching materials with the support of a Teacher's Resource Centre. There were workshops, on-the-job training and technical class-based support. Project strategies involved training teachers in workshop settings, providing instructional materials to support learning, and providing on-the-job training and follow-up support for teachers. Links to the ministry, to teacher training colleges and Makerere University were made to support the project.</p> <p>Outcomes: The whole-school approach, with project assistants working directly in the classrooms and schools, supported changes in teachers' practice towards a more child-centred approach. The workshops run by the project assistants (PAs) in the teacher resource centres (TRCs) were well attended and positively evaluated. On-the-job training by the PAs with model lessons critiqued by the teachers led to real changes in practice. The TRC was seen as the cornerstone of the whole project's success, particularly in the making of cheap teaching aids, teacher collaboration and the beginnings of in-school libraries. Children in well-resourced schools where group work was used seemed happy and able to voice their opinions. Teachers reported being better able to manage larger classes and keep their students busy, using groups and making their work 'easier'. SIP schools had already undertaken a number of outreach activities and word of mouth was seen to be influential in communicating good practice. Children in less-privileged schools were angry about the government not helping their</p>

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	<p>school to have more resources. The classroom observations showed that child-centred pedagogies, resources and group work were more sporadically used than the questionnaires indicated. Teachers remained unclear about the educational objectives of the child-centred approaches being adopted. A longer time was needed to see the actual embedding of such practices.</p> <p>Costs per child dropped dramatically over the three years and the project was seen to be cost-effective.</p>
Stuart and Kunje	see Kunje
<p>Tatto et al. (1991); Tatta and Kularatna (1993); Tatta et al. (1993); Nielsen (1991)</p> <p>Methodological Trustworthiness: High</p> <p>Robustness of Contextualisation: High</p> <p>Location: Sri Lanka</p>	<p>Aims: To examine the effectiveness and costs of three different approaches (colleges of education, teachers' colleges and distance education - DE) to elementary teacher training in Sri Lanka.</p> <p>Sources of data included administration of achievement and skills tests to trainees and measuring their attitudes at three points - entry, exit and post-programme. Classroom observations, a self-administered questionnaire to elicit information on teachers' roles, collection of data from headteachers, and pupils' achievement were also used. Costs were measured via interviews with programme directors, questionnaires to trainees and document analysis.</p> <p>Intervention: DE is an in-service approach, lasting from three to five years, targeting experienced but un- or under-trained teachers. This was a learner-centred approach encompassing both pedagogy and subject matter. The course consisted of self-study materials called modules, supervised teaching, peer learning, follow-up and frequent and continuous evaluation. Additionally, face-to-face sessions in a variety of forms, often in regional centres, reinforced on-the-job learning. The tutor was in charge of organising face-to-face contact sessions, where groups of trainees engaged in discussions about what they learnt in the training programme and how it applied to their experience in the classroom. Tutors also provided counselling and visited trainees in their respective schools. DE costs were low for the government but high for the trainees.</p> <p>Outcomes: The attainment levels of DE graduates were high on exit but low in post-programme longitudinal measures. The weakest areas were in subject matter (mathematics and mother tongue) and attitudes, suggesting that the course gave less emphasis to subject matter compared to pedagogy. DE teachers (and college of education-trained teachers) had a higher level of performance in the use of effective teaching strategies (assigning and reviewing homework, actively involving pupils in the teaching and learning process, careful monitoring of pupils' progress during class, effective teacher-pupil interaction, and effective use of instructional resources) than their counterparts in teachers' colleges. The achievement of pupils taught by DE teachers was higher than that of those taught by untrained teachers, but lower than the other two groups. Teacher training seemed to make a difference in what they did in the classroom which in turn was positively correlated with pupil achievement. Trained teachers performed differently from untrained teachers; the former were knowledgeable in subject matter and pedagogy, while the latter turned to traditional methods. DE worked best when programme materials were used in conjunction with tutorial visits, and when there were constant face-to-face sessions between tutor and trainee.</p> <p>Institutional costs were the lowest for DE programme and it was the most cost-effective in preparing teachers for their roles, but its cost-effectiveness depended on the economies of scale produced. As the backlog of untrained teachers was reduced, provided no new untrained</p>

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	<p>teachers entered the system, the cost-effectiveness of DE would decrease.</p>
<p>Welford and Masha (2002)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Low</p> <p>Location: Tanzania</p>	<p>Aims: To describe, analyse and assess the effectiveness and impact of the objectives, programmes and outcomes of the Dar-es-Salaam Primary Schools Project.</p> <p>Sources of data included document review, individual interviews and focus group interviews with the stakeholders, observations of project-school classrooms, and observations of a limited number of in-school and teacher-centre-based training workshops.</p> <p>Intervention: This approach combined teacher-centre-based training using a modular approach with school-based support, follow-up and monitoring. This involved training of teachers, headteachers and teaching centre staff to upgrade knowledge and skills, and also to work within this programme model. Teachers were trained in the use of activity-based teaching techniques, with a concentration on stimulating pupil-initiated interactions in the classroom. Built into courses for teachers was training to organise and conduct workshops for other teachers in their schools, the idea being to empower teachers to provide school-based support for their peers. The core subject team initiated the training of selected teachers through centre-based training seminars. The trained teachers then took on a training function themselves, cascading the training to their colleagues through school-based subject-focused workshops.</p> <p>Outcomes: Stakeholders' feedback was positive in terms of project management, knowledge underpinning teaching and improvement in children learning. All classes observed had adopted desk layouts to facilitate group work. Some improvement in teaching was observed, with teachers using real objects including high-cost equipment and questioning techniques. The learner engagement seen was high and pupils indicated that their teachers more frequently used teaching aids. Teachers scanned their classes to ensure on task attention. Teachers trained at the TRCs seminars felt effectively trained, but these were more likely to be those with a formal training already. Classroom constraints, the size of classes and material problems limited the improvements possible. The absence of quantitative measures of the growth in pupil learning made a cost-benefit analysis impossible.</p>
<p>Wilson (2000)</p> <p>Methodological Trustworthiness: Low</p> <p>Robustness of Contextualisation: Low</p> <p>Location: South Africa</p>	<p>Aims: To give an overview of the Primary English Teaching in Rural Areas (PETRA) project, and to make practical suggestions for maximising the effectiveness of aid-funded educational projects.</p> <p>Sources of data were trainees' teaching practice files, written assignments and interviews held with the trainees.</p> <p>Intervention: Teachers from five regions in South Africa attended a part-time in-service training course, which led to external certification. Successful teachers were awarded the Cambridge-RSA Certificate for Overseas Teachers of English (COTE). COTE was an early in-service training programme aimed at giving training and support to teachers working in a locally-defined context. The syllabus content and assessment procedures were set by the examination board. The participating teachers were asked to complete a series of written assignments. In-service training was structured around two full-time study blocks (of two weeks each) and a series of regional seminars, alongside supervised practical teaching in the teacher's own schools. Study blocks involved participants attending a series of lectures and workshops covering prescribed syllabus areas of language awareness, learning and learners, classroom management, materials and</p>

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	<p>resources, syllabus and course design in the local context, and testing and assessment. The COTE assessment procedures required teachers to be assessed on their practical teaching abilities and on their understanding of English language teaching, as expressed through a series of written assignments. A smaller group drawn from the teachers who were awarded the COTE then attended a 12-week materials development course in the UK run by Canterbury Christ Church College. The materials developed by these teachers were then trialled with primary classes in South Africa, evaluated and modified as necessary, and subsequently distributed to primary teachers in the five regions, with the aim of using them in a series of cascade workshops.</p> <p>Outcomes: External evaluators noted a range of new ideas in use, including classroom management techniques, group-based learning activities, efforts to encourage interaction in meaningful contexts, and the use of varied materials, including real objects and authentic texts. The teachers interviewed spoke of increased confidence and pleasure in their work, and a substantial increase in student interest and motivation. They also mentioned networking with colleagues in the schools and the area in a smaller-scale, personal way, rather than more formal cascade activities.</p>
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