



Education Workforce Initiative

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Education Workforce Initiative: Initial Research

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The Open University

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This paper has been prepared for the International Commission on Financing Education Opportunity (the Education Commission) as initial research to inform the approach to the Education Workforce Initiative's Education Workforce Report.

List of Acronyms

AUF	Agence Universitaire de la Francophonie
CPD	Continuing Professional Development
DAPP	Development Aid from People to People
DFID	Department for International Development (UK)
DIET	District Institute for Education and Training (India)
DISE	District Information System for Education (India)
DISS	Deployment
EFA	Education for All
EGRA	Early Grade Reading Assessment
EWI	Education Workforce Initiative
EWR	Education Workforce Report
GEMR	Global Education Monitoring Report (UNESCO)
GNAT	Ghana National Association of Teachers
ICFGE0	International Commission on Financing Global Education Opportunity
ILO	International Labour Organization
IRI	Interactive Radio Instruction
ITfC	IT for Change
MDG	Millennium Development Goals (United Nations)
MOOC	Massive Open Online Course
NCCE	National Commission for Civic Education (Ghana)
NCEE	National Center for Education and the Economy (USA)
NCFTE	National Curriculum Framework for Teacher Education (India)
NGO	Non-Governmental Organisation
NIE	National Institute of Education (Singapore)
NTIP	New Teacher Induction Program (Canada)
NUEPA	National Institute of Educational Planning and Administration (India)
OECD	Organisation for Economic Co-operation and Development
OER	Open Educational Resources
OLPC	One Laptop Per Child
P21	Partnership for 21 st Century Skills
PAT	Projecto Aprendizagem para Todos (Learning for All, Angola)
PTR	Student-teacher ratios
RAIS	Remote Area Incentive Scheme (Australia)
SABER	Systems Approach for Better Education (World Bank)
SDG	Sustainable Development Goal (United Nations)
STEM	Science, Technology, Engineering and Mathematics
STF	Subject Teacher Forum
TALIS	Teaching and Learning International Survey (OECD)
TCAT	Teacher Capability Assessment Tool
UIS	UNESCO Institute for Statistics
UNICEF	United Nations Children's Fund
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAID	United States Agency for International Development
WB	World Bank
WDR	World Development Report
WHO	World Health Organization

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1. Introduction

The Education Commission (EC) report ‘The Learning Generation’, describes in detail the global challenges in school education; millions of children and adolescents are out of school and millions more attend school but are not learning the skills and knowledge they need to live fulfilled, healthy and productive lives in the 21st century. This has a lasting impact on the lives of each one of these children and their communities. The Education Commission aims to offer progressive ways forward to address these challenges to ensure each child and young person has the opportunity to benefit from a quality education in a safe environment free from violence and abuse, wherever they live in the world.

The Education Commission recognises that an effective education workforce is critical to a quality education system and that workforce costs are the main expenditure item in education systems. Teachers are central to the education workforce, high talent teachers are essential to improving student learning outcomes in school and their long term outcomes such as participation in higher education and future employment (Popova et al, 2017). But multiple challenges currently prevail: in many countries, teaching is neither an attractive nor publically valued career choice; a considerable number of trained teachers do not enter teaching or leave after only a few years; gender imbalances are found across the teaching workforce; the rising demands for early childhood and secondary education in many systems require large numbers of additional teachers with specialist subject knowledge and pedagogic skills; many teacher education curricula are outdated and much teacher training has been shown to make little difference to teacher performance; in many contexts teachers are required to undertake a range of non-teaching duties including those external to the school, with very limited support from other professional roles, limiting the time they spend facilitating student learning; school leaders can be focussed on management and administrative duties with little training in pedagogic leadership; there are few formal role descriptors or training opportunities for learning support staff and so on. How these challenges might be addressed is the focus of the work of the Education Workforce Initiative (EWI), an initiative of the Education Commission.

Providing universal access to quality education demands addressing these challenges with new holistic solutions. Radical changes and new thinking are needed if we are to guarantee every child and young person is adequately prepared for life and work in an increasingly uncertain, unequal and volatile world. Expanding current practices will not be enough; in Sub-Saharan Africa, for example, there are insufficient maths and science graduates to staff the secondary schools needed to meet student demand. This has consequences for policy relating to the education workforce. It suggests, for example, that consideration should be given to thinking about the recruitment of teachers, how schools are organised, how staffing structures might be redesigned at school and district level, how education related professionals can be most effectively deployed and how education systems can articulate with other systems such as health to engender a cross-sectoral approach. The overarching aim of any proposed change must be to contribute to safe and healthy school environments, to improve student learning outcomes and support the social and physical development of students – the ‘whole child’.

There are a number of opportunities and tools which offer promise to support the design and implementation of new solutions to meet these challenges of changing curricula, uncertain environments, expanding student enrolment and teacher supply, training and motivation. Advances in neuroscience are deepening our understanding of the process of learning, new forms of partnerships offer possibilities for mobilising resources and sharing expertise, lessons can be learnt from the approaches taken by other sectors such as health where the workforce is becoming more diversified, and as digital technologies become more ubiquitous and affordable they offer potential

as tools to support new practices. Digital tools are becoming increasingly adaptive and oriented to meeting the personal learning needs of students and professionals, and we are beginning to understand how their use can amplify and expand the impact of effective student centred teaching practices in multiple contexts. Technology-enabled assessments, for example, can be embedded to reduce interruptions to teaching and learning processes and provide near real-time feedback to teachers, school leaders and most importantly students and their families. Use of such tools expands what teachers need to know and do in their classrooms and in their collaborative working with other staff.

In this context a lens on workforce reform prompts us to reconsider roles and personnel within the workforce (workforce design) **and** new practices to build and sustain a strong, professional, motivated and effective education workforce (workforce strengthening). Investment in both is required to provide a workforce equipped with the capacity, skills and respect to deliver the goals of education as these evolve to address contemporary and future individual and societal needs.

Education workforce design entails stepping back from current arrangements to systematically review education workforce roles *within (inside and outside classrooms) and across schools* to see what roles are needed to achieve education system goals. Existing roles may require clarifying, differentiating and further professionalising and new roles may need to be conceptualised. The central aims of education workforce design are to enable teachers to focus their professional capabilities more fully on facilitating student learning and to ensure all students have access to specialist staff to address their learning and related needs, for example mental health support. Such roles include but are not limited to: lead and specialist teachers; learning support staff; pedagogic advisers and trainers; health practitioners; social work / student welfare practitioners; psychologists; technology and administrative staff and school and district¹ leadership.

This is an opportunity to re-think the education workforce as a set of teams centred on the student and her learning and wellbeing. Such teams might be distributed over different sites and work across multiple groups of students. Composition of teams will shift over time and be driven by local needs and contextual factors. Workforce design involves considering not just the roles in these teams and the skills required for these roles but also the personnel recruited and trained for these roles; a key aspect of workforce design is broadening the demographic composition of the education workforce such that it reflects more fully the communities it serves.

Education workforce strengthening aims to ensure that all students are guided by trained, appropriately qualified, motivated and supported educators, to achieve the learning outcomes they need for the future (see section 4). It is concerned with expansion of the workforce to meet local needs and investment in improvements in the recruitment, deployment, initial training and professional development of groups within the education workforce. Enabling factors such as improved working conditions will be needed alongside the generation and use of robust data.

To date there has been a tendency to focus on system inputs such as teacher qualifications and attracting teachers in particular subjects and localities, and outputs such as teacher evaluation. These issues remain important but the extent of the challenges in education systems is such that new design solutions are required: Solutions which can be operationalised at scale – within national and global frameworks – whilst also adapted to meet local needs, recognising that many systems are currently weak. Digital technologies in particular have exciting potential for accelerating change in workforce reform. Whilst there is an urgency to address needs, solutions need to acknowledge that

¹ Or the equivalent e.g. cluster or block

system change is complex and not accomplished overnight. Thus solutions should look beyond the SDGs to 2040 or 2050.

The purpose of this initial research is to offer evidenced possibilities in the key areas of education workforce roles, recruitment, training, deployment and leadership, along with suggested areas for further research to inform innovation in the design and strengthening of the public sector education workforce. The examples described were identified through the process outlined in the methodology section of this report, whilst we recognise that separation of examples from their context is problematic – effective innovations are highly sensitive to context and uncritical transfer of initiatives is rarely successful.

The research aims to support the Education Workforce Initiative (EWI) in moving forward with engaging education leaders and other key actors in radical thinking around the design and strengthening of the education workforce to meet the demands of the 21st century. EWI policy recommendations will be drawn from a number of country level workforce reform activities and research activity associated with the production of an Education Workforce Report (EWR). This research has informed the key questions, approach and structure of the EWR as outlined in the Education Workforce Report Proposal.

Issues pertaining to teaching and learning in *primary and secondary* education are at the centre of the research reported here; the focus is on moving towards schools as safe places where all children/ young people are able to engage in meaningful activity. The majority of the evidence shared here relates to teachers and school leaders; evidence on learning support staff, district officials and the wider education workforce is scant. Many of the issues examined are also pertinent to the early childhood care and education sector but these are being examined in depth by the Early Childhood Workforce Initiative. Resourcing for the Education Workforce was out of scope of this initial research but the EC recognises, as outlined in the Learning Generation Report, that provision of additional finance is a critical factor in achieving a sustainable, strong and well-motivated education workforce, particularly but not exclusively, in low and middle income countries. The next stage of EWI work will consider the relative costs of current initiatives and modelling of the cost implications of proposed reforms.

EWI aims to complement the work on teacher policy design and teacher career frameworks (including salary structures) being undertaken by other bodies and institutions such as Education International, the International Task Force on Teachers for 2030 and the Teachers' Alliance, most particularly by bringing a focus on school and district leadership, the role of Education Support Professionals (ESPs) and inter-agency working.

2. Key messages from the initial research

➤ Overall

- **Education workforce reform is complex** and requires holistic context appropriate solutions to strengthen systems. It requires paying attention to multiple interconnected and interdependent subsystems within an education system, all contributing to enabling educators to support children to achieve their full potential.
- **Implementation and integration** of new roles and changed practices will require ongoing evaluation to facilitate connections between processes and outcomes and to reduce negative unforeseen outcomes.
- In many contexts there is currently a lack of **robust empirical data** on the daily activities of teachers, school leaders, district officials and other roles to support workforce design and implementation.

- There is very **little available information on the financial costs of implementing education workforce reforms**; financial modelling of proposed reforms should include both short and long term cost analysis and requires robust data – gaps in current data make accurate predictions difficult.
- **Education workforce design**
 - **Preparing all students** for living and working in the rapidly changing context of the 21st century, requires **radical re-imaginings of the school and classroom**, drawing on digital technologies where appropriate. We suggest drawing on the concept of ‘social capital’ to design **learning teams** to guide and support student learning.
 - There are currently **few formal training programmes or formal role descriptors for education support professionals** and other members of the wider education workforce in low and middle income countries and many of these roles are not deemed professionals in their own right.
 - Drawing on lessons from the health sector, education workforce design could benefit from a **focus on the competencies and skills needed by education systems** when designing roles and associated training programmes.
- **Education workforce strengthening**
 - Successful innovations to improve workforce professionalism integrate vertical decision making (such as formal policy approval) and **horizontal leadership and ownership** of change. The latter is both at ministry level and, most critically, at local level by different agencies, district officials, school leaders, teachers and other education and related personnel (such as health professionals) in and across formal and informal sites of learning.
 - **District support structures have a key role** to play in coordinating services, offering guidance and enabling sharing of expertise across schools and collaborating with pre-service training programme providers.
 - Learning within school-based practice, whether through professional learning communities, action research projects or other approaches, is critical to **strengthening pedagogical practices and pedagogic leadership**. Time needs to be allowed for education professionals to engage in these activities.
 - **Digital technologies offer possibilities to strengthen teacher and school leader professionalism** (through automation of routine tasks freeing up time for teaching, leadership and management activities) and to **shift the paradigm of educator professional learning** through enabling new kinds of networks and communities, and innovative modalities for learning including personalised social learning. Technology has a role in enabling adaptive, personalised learning for students but it is recognised that it will not substitute for or diminish the importance of the relationship between the teacher and the student.

3. Re-envisioning and strengthening the education workforce: Challenges and opportunities

A number of complex issues point to the need for education workforce reform.

The shortage of classroom teachers in many localities is restricting student access to specialist trained teachers. Furthermore, there is a lack of evidence to help understand what teachers are doing in school and, thus, how they might best be supported by other professionals and digital technologies to focus on professional tasks and activities directly linked to preparing students for productive, healthy lives and improving student learning outcomes.

Transformation in teachers' classroom practice is critical to improving students' learning. However, in numerous contexts teacher morale is low and many teacher education programmes – both pre-service and in-service – are not sufficiently disrupting embedded forms of didactic practice and empowering teachers to engage their students in meaningful activities. Detailed conceptualisations of 'teacher equality' are far from universally agreed with competing perspectives on how to identify, quantify and analyse indicators relating to teacher quality.

The increasing availability of digital technologies offers possibilities for supporting growth in the professional competence of educators, for enhancing student access to specialist teaching, and for automation of routine tasks at classroom, school and district level. All potentially shift what teachers do in their classrooms. In addition, neuroscience research is prompting new thinking on the role of the teacher.

3.1 Challenges: Introduction

'The challenge facing education and schools is not to do a better job at what they are already doing, but to do a fundamentally different job. They are now in the business of preparing students for a new world.'

(Levine 2006:104)

In a recent report on Education and the Fourth Industrial Revolution, Graham Brown-Martin (2017) suggested that 'nothing in our formal education systems today is designed to meet the human challenges of the 21st century' (p.8). 'Old tasks' across all workplaces are increasingly being automated but simultaneously automation can lead to the creation of new tasks, roles and industries which are deeply dependent on and responsive to geographical, social, economic and political contexts. This has implications both for the outcomes of education systems and the ways in which these goals might be achieved. Increasingly, uncertainty over food security, environment changes and so on, further heighten the demands on education systems, schools, headteachers and particularly teachers. The environment of many schools is unsafe and there is an urgent need to ensure all children are protected.

Brown-Martin's report focused on high-income countries, yet has an additional and problematic relevance for global education agendas focussed primarily on striving to make education systems in low-income countries 'look like' and perform like those in high-income contexts. The challenges relevant to these agendas are well-known and we do not intend to simply repeat them here. Rather, this section presents some of these challenges as they relate to the issue of education workforce

reform, and specifically, the kinds of workforce reform that it is hoped will support the goals of 21st century learning set out in Section 4 of this report.

3.2 Student learning

While concerns over the ‘quality’ of education were raised during, and prior to, the launch of international education campaigns at the start of this century, data published in the last decade have sharpened the focus on what is commonly called the ‘learning crisis’. Headline findings from these data are well-known and often cited; only half of primary school students and just over a quarter of secondary school students are learning basic skills (ICFGeo, 2017). Globally, around 250 million children each year finish their fourth year of primary education unable to read, write or count well enough to meet basic standards (UNESCO, 2016). For example, one recent study from rural India found that only half of grade 5 students could read fluently grade 2 level texts (World Bank, 2018). In a large-scale study involving data from over 2000 schools in seven Sub-Saharan African countries, Bold et al. (2016) found that only one in 200 children in Sub-Saharan Africa (i.e. 0.5%) attend a school where key quality factors are in place. Current monitoring systems (such as SDG Target 4.7 and ASER) focus on measuring competency in numeracy and literacy but of course the purposes of education are much broader, however there is, as yet, little data on these broader learning outcomes, for example those related to civic education.

Furthermore in many countries levels of adult skills, in particular literacy, are low, potentially limiting parental/carer support for children’s learning (UNESCO, 2017). It is well-established that the teacher is the main factor in student learning and it is clear that teachers’ skills, and the support given to teachers in their schools and classrooms, needs to be a core focus moving forward.

The student curriculum is also changing – see section 4: it needs to be adapted to incorporate new technologies, both as a subject (computer coding and programming) and to make best use of new technologies to support learning. Assessing new student learning outcomes also presents a challenge.

3.3 Teacher supply

Teacher supply is an established and major challenge across the world, particularly in low- and low-middle income countries (LMIC). UNESCO has reported that 74 countries worldwide are facing acute teacher shortages, with Nigeria facing the greatest challenge (UIS, 2017). Globally nearly 69 million additional teachers are needed if every child is to learn in a class with 40 or fewer students at primary level and 25 or fewer students at the secondary level (UIS, 2016). These headline figures are powerful reminders of the staffing shortages facing education systems, particularly in Sub-Saharan Africa, where population growth and increased access to primary school has led to a surge in demand for secondary education. But focusing on student-teacher-ratios (PTR) for qualified teachers, at the regional or national level can mask disparity at local levels, such as differences in gender deployment and specific subject teacher requirements in particular locations. For example, in 2012 the average PTR for Sub-Saharan Africa was 42:1, but for the poorest quartile of schools in Nigeria it was 150:1 (Their World, 2018) while in India approximately one-third of elementary schools have no female teachers (NUEPA, 2016).

Shortages in particular subjects are highly contextual although shortage of mathematics and science teachers are seen in the majority of regions; media reports and academic papers frequently report, for example, severe mathematics and science teacher shortages in Sub-Saharan Africa, in 2013, 84 secondary schools in South Africa (1.3% of all high schools) were unable to offer mathematics as a subject to grades 10-12 due to a shortage of mathematics teachers (News 24, 2013). Urwick and Kisa (2014) similarly found that, while mathematics and science subjects take up half of the Ugandan

secondary curriculum, only a quarter of teachers specialised in these areas. Such shortages in specialist teachers are not unique to Sub-Saharan Africa; in the United States, large numbers of mathematics and physical science classes have been taught by teachers without university qualifications in these subjects for some time (Ingersoll, 2004). In other contexts teacher shortages are in other subjects; in Trinidad and Tobago there is a shortage of teachers in the visual arts and physical education (UNESCO, 2015).

The relationship of teacher salaries and teacher supply is complex and depends on multiple factors including historic and contemporary public value accorded to the teacher role, current remuneration and working conditions. For example teachers in Finland, regularly lauded as having one of the best global education systems and where competition for teacher training places is fierce, are paid a salary similar to those received by professionals in other disciplines with similar experience and training and in line with OECD averages but teachers' salaries here do increase significantly with experience (OECD, 2017).

In the context of education workforce reform, use of PTRs as a core metric for education policy planning can frame the teacher supply debate around the pursuit of an 'acceptable' PTR, aligned with standard conceptualisations of school and classrooms. This can limit consideration of alternative models of school organisation. Of course there is evidence to suggest that students have more focused individual attention and support in smaller classes (Blatchford et al, 2007) but this still constitutes a small part of any individual student's experience of teaching, a factor which may account for the absence of a relationship between class size and student attainment in high income contexts. However few people would argue that one teacher with a class of 80 or 100 or even 200 students is acceptable. But where funds – either nationally (OECD, 2012), or locally (Duflo et al., 2012) – have been invested in more teachers, there has often been a disappointing impact on student learning within the timeframe of the research.

Governments are frequently criticised for not training sufficient people to become teachers to meet the demands of expanding education system. For example, the pre-service college system in Ghana trains 9000 teachers per year (GNAT, 2009), yet the proportion of qualified teachers in the education system is declining (UNESCO, 2015). Indeed, the reality is often more complex. For example, a side effect of countries raising the minimum qualification for teaching (a common policy shift since 2000) has been a muddling of the data on the proportion of teachers who are trained compared to those who are 'qualified'; in many countries, the stroke of a pen on a policy document rendered a huge proportion of 'qualified' teachers 'unqualified'. Recruitment issues are also critical to understanding the relationship between teacher training and teacher supply. Nigeria, as highlighted above, recently topped the global list of teacher shortages, but a British Council study (2016) of teacher graduates in five Nigerian states found that most were not working as teachers a year after graduating; in one state only 5% were working in schools.

Teacher shortages can be exacerbated by low teacher retention for example in Ghana over 10,000 teachers leave the profession each year (GNB, 2017). UNESCO Institute of Statistics (UIS) data on attrition rates for primary school teachers, when available, can be as high as 56.5% (Honduras in 2015) or fluctuate massively, from 27% to 5% in Qatar between 2014 and 2015 (UIS, 2016). The reasons for teacher attrition are multiple and complex and require solutions which are context-specific and pay attention both to working conditions and teacher motivation. In some contexts teachers are leaving due to poor student motivation and difficult classroom behaviours, often caused by health and social problems. However in the UK teachers cite the pressure of workload arising from constant curriculum and assessment changes and increased bureaucracy as the main reasons for leaving the classroom (Guardian, 2018). Similarly a recent study in the US found that

dissatisfaction with testing and accountability pressures and a lack of administrative support were the most frequently cited reasons for teachers leaving their jobs (Carver-Thomas & Darling-Hammond, 2017).

To date many countries have prioritised teacher recruitment and training over issues of teacher allocation, deployment and utilisation (UNESCO, 2016) with the result that there are high levels of randomness – non-correlation between the number of teachers and the number of students in a school, in many education systems. School student-teacher ratios (PTRs) often vary significantly across and within districts and within and between sub-districts. Unsurprisingly schools with better facilities e.g. an electricity supply, and proximity to trading centres are more attractive to teachers. This can lead to severe local shortages of teachers in some schools alongside relative surpluses in others, in some cases within the same small geographic area. A recent World Bank report reports that in one ‘peri-urban sub-district area in Southern Malawi, Khombwe Zone, for example, school-level PTRs vary from 27 to 130 within an area of a few square kilometres’ (World Bank, 2017). Multiple factors often act to constrain more coherent and equitable teacher ‘density’ even though changes to teacher allocation processes could dramatically increase the efficiency of public education expenditure and lead to system improvements. Such factors include political influence by teachers (common in many Indian states for example), limited community influence over the process, and most importantly, weak data on which to base teacher deployment (World Bank, 2017:3). However an emphasis on achieving equity through distribution of teachers to equalise PTRs across a district ignores contextual factors and pays little attention to student learning needs. Workforce design offers an opportunity for a more nuanced lens on equity.

3.4 Teacher activity

A further challenge in contemporary education debates with relevance for the workforce reform agenda is the complex and under-researched area concerning what teachers are *expected* to do compared to what they *actually* do. There is evidence to suggest that teachers in low-income countries teach for fewer hours per week than they are contracted (Mulkeen, 2010) due to various reasons, including absenteeism, accommodation and transport challenges, pressures to engage with non-teaching tasks, weak accountability frameworks, unpredictable school closures and inefficient time-tabling. Often this means that teachers are in school, but not in the classroom. These challenges are most severe in the communities which serve the poorest students (Alhassan & Adzahlie-Mensah, 2010; World Bank, 2018).

Teachers’ working hours spent in class vary across countries but we were not able to locate any data relating this to student learning outcomes. Recent OECD data indicates a range of 15 -27 hours per week for the statutory time teachers spend in class (OECD, 2017) and that this varies widely as a proportion of their total working time. At the top end, teachers in Columbia spend 75% of their working time teaching, more commonly teachers spend slightly less than 50% of their working time in class. In Japan, at the other end of the scale, teachers spend considerably more time on other tasks each week (66% of their working time) than they do on being in-front of a class (34% of working time). This reflects policy in Japan, where 40% of teachers’ time at school is devoted to professional development, teacher collaboration and mentoring. Similarly in Finland teachers spend less time in classrooms than the average for OECD countries with the additional time used for planning and assessment, activities which are almost wholly delegated to schools. In Kenya, although lesson preparation activities are recognised in teacher policies, no time is allocated for them at school; ‘official working time is exclusively the time spent teaching’ (World Bank / SABER, 2014, p. 4). However changes in teachers’ terms and conditions do not always lead to improved teaching practices without support; in 2014 a federal initiative in Brazil 30% of teachers’ working hours were

designated for lesson preparation and professional learning but these activities have been most frequently observed in schools where they are collaboratively planned and undertaken.

Research from the United States and Latin America suggests a highly variable relationship between what teachers do in classrooms and the results children achieve (Bruns & Javier, 2014) and recent TALIS data reveals considerable differences across countries in what teachers do in the classroom. For example, in lower secondary schools teachers can spend between 67% and 90% of their time in class engaged in teaching, with 9% to 20% of their time occupied by keeping order. In some countries (Brazil, Mexico and Malaysia, for example), teachers spend around 10% of their in-class time undertaking administration, but that percentage is much higher in other locations (OECD, 2014). In studying classrooms in Latin America and the Caribbean Bruns and Luque (2014) found consistently substantial in-school differences in how teachers spend time in class.

Outside classrooms teachers' role in shaping and contributing to school development and curriculum and pedagogic visions is far from common; recent research for the International Task Force on Teachers for Education 2030 looking at teacher responsibilities across 25 countries revealed that only in 8% of cases did teachers participate in internal evaluation in their schools; most are not active participants in a highly 'top down' process (Attias – Delattre, 2018). Similarly only a few participated in mentoring or collaborative working (approx. 20%) indicating highly privatised practices with limited joint planning and constraining the development of teaching communities.

3.5 Teacher roles, competencies and standards

The 2017-2018 UNESCO Global Education Monitoring Report (GEMR) on accountability emphasised the importance of having clearly defined roles in education systems, arguing that clarity and transparency of roles and responsibilities can enhance trust and feelings of fairness. Other key institutions promote the development of teacher performance standards and have highlighted the role they can play in professionalising teaching and, in turn, boosting the prestige of the profession (Care et al 2017; Education International/ Oxfam 2011; OECD 2017).

However, research carried out for this report located examples of teacher competence and standards lists (see Section 4.2) that included up to 100 different competencies, sometimes conflicting, and with progression associated with qualification and seniority, rather than experience. This implied epistemological positioning represents a challenge for re-thinking the teacher role. Many HIC have much briefer lists of competencies and skills in their teacher standards frameworks, for example 11 in England, 7 in New York, 6 – 12 in various Canadian states; such brevity may allow teacher training institutions 'space and autonomy' to respond to specific contextual needs (UNESCO, 2015). Reports have found that teachers are often unaware of these lists or feel insufficiently supported to develop core competencies (Care & Luo, 2016), which can be especially problematic when they are linked to career progression and salary. This is also important for design of the workforce because lessons from other sectors (see Section 7.0) indicate that a focus on competencies and skills, rather than merely qualifications, is important for diversifying the roles associated with different functions. Of course qualifications are important but too frequently qualifications are an indicator of skills and knowledge which bear little relation to core classroom teaching tasks.

3.6 Educator preparation and practice development

Core to questions about what teachers do in classrooms is how they are prepared for their role as teachers. It is increasingly being suggested that models of campus-based colleges (where up to 80% of investment in an individual teacher's development is 'front-loaded') need to change (Anamuah-Mensah et al., 2013; Lewin & Stuart, 2003). Not only is it impossible for most countries to recruit the

necessary numbers of teachers to meet global goals through this model but for many student teachers the relatively short period of training, particularly in school classrooms, does little to challenge implicit ideas about teaching that they bring to their training (Britzman, 1986; Pajares, 1992). In this way, the college experience is 'sequestered' from the school context (Murphy & Wolfenden, 2013). Pre-service colleges in Sub-Saharan Africa have been criticised for being overly theoretical (Dembélé & Miaro-II, 2013), with limited attention given to use of digital technologies and working within local contexts and languages (Bird et al., 2013; Kaphesi, 2003; Lewin & Stuart, 2003). There are few opportunities for critical reflection on how such contexts impact learning (Buckler & Gafar, 2013; Fertig, 2012). In Ghana, for example, Akyeampong et al. (2011) highlighted the unpreparedness of teachers for the realities of classrooms and Agbenyega and Deku (2011, p.3) reported 'intensely oppressive' pedagogical practices in programmes which are 'prescriptive and mechanistic'. In 2017, Akyeampong reported examples of college pedagogy which aligned with the processes, but not the principles, of learner-centred teaching promoted in policy.

This evidence suggests that merely training more teachers in current programmes will not transform education outcomes; instead what is needed is teachers who are confident connecting subject knowledge and pedagogy for different students and who have the skills and aptitude for career long professional learning linked to transparent motivating career paths. But there is, as yet, little agreement on indicators for teacher quality with several competing frameworks. There is little evidence that either current or historic formal teaching qualifications or years of teaching experience are good predictors of teacher effectiveness (Aslam & Kingdom, 2011). This uncertainty is reflected in a lack of clarity around what might be expected from teacher emerging from Colleges of Education and universities and what these teachers should be able to be and do.

Similar issues are found within in-service professional learning opportunities: cascade models continue to dominate despite robust evidence challenging their effectiveness; training is often dislocated from the context of the classroom, school and subject being taught; there is little planned follow up; few concrete goals for practice and limited examples of collaborative methods such as observing others, reflecting as a group and exchanging experiences (Popova et al, 2017). These latter techniques are complex to implement and require specialist skills, perhaps one reason for their limited use despite evidence of their effectiveness (UNESCO, 2013). In addition practitioners often lack familiarity with alternative practices thus tending to teach the way they were taught, and headteachers and other school leaders frequently have few incentives to encourage and reward improvement in classroom practices.

Quality of leadership is a 'chief factor' in school performance – student outcomes (Schwartz & Mehta, 2014; Crawford, 2017) – but in many contexts role descriptors for headteachers are weakly understood and focus primarily on issues of management and administration rather than pedagogic guidance and teachers supervision and mentoring. In many countries teachers are appointed to headship because they are efficient classroom teachers and, with little preparation, many operate on a 'trial and error' method particularly around school timetabling, often hindered by their inability to select and hire staff to meet needs within their school (Odubaker, 2008). Pathways to promotion and professional development for headteachers are similarly often neglected (EdQual, 2010; UNESCO, 2009).

However increasing decentralisation in many systems is delegating responsibility for implementing reforms to the headteacher and other school leaders. Their roles are both evolving and expanding as they take on new areas such as children's rights (Ortega-Salazar, 2018). The shift towards 21st century skills requires headteachers to increasingly work between global and local agendas and to define and lead a school plan which is 'based on a vision of the future that both rests on shared

values and breaks with tradition' (UNESCO, 2009). This leads many headteachers to be in conflict between leadership of 'building a community' and 'contractual' view of their role as primarily management and administration. However there is currently little data on the actual tasks and activities undertaken by school leaders in LMIC and there is need for empirical based evidence on these to inform and validate the efficacy of proposed and agreed policies on school leadership.

3.7 Opportunities: digital technologies

The headline finding of the World Bank's recent World Development Report on the digital revolution (2016) was that, while digital technologies have the potential to be transformative (in education, and other fields), those most likely to benefit are those who are already advantaged. As such, the largest barriers are not technological (see also Trucano, 2016). The report argued that we need to 'strengthen the analog foundation of the digital revolution'. Where the fundamentals of education, health and governance are weak, digital technologies struggle to fulfil their potential for individuals and communities. Brown-Martin (2017) also argued that, while technologies offer unimaginable potential for the personalisation of education (a direction seen as critical in aligning skills with future recruitment needs), powerful global corporations and institutions are instead investing in the opportunities technology offers for standardising the education experience at local, national and international levels (see also Blewett, 2016). Rather than transforming education, teaching and learning to meet the challenges of the 21st century, we frequently witness a digitisation of 19th and 20th century practice to be delivered by 21st century platforms (Brown-Martin, 2017), the focus is on doing the same *old things better* rather than empowering teachers and students *to do better things* (Dale, 2014).

However, there are a number of areas where there is emerging evidence of digital technologies leveraging change pertinent to education workforce reform as a result of rapid growth in feature phone/ smartphone ownership and internet connectivity: initial and pre-service professional learning; the nature of classroom teaching and learning processes and management and administration at different levels. Use of digital technologies can range from integration of web-based content in a traditional face-to-face setting, to deployment of a Learning Management System in a fully online learning experience.

In professional development programmes, pre-service and in-service, technologies such as Massive Open Online Course platforms (MOOCs) and micro-SD cards offer the potential for quality at scale, particularly where they are combined with, or complemented by, opportunities to develop relationships in face-to-face settings (Wolfenden et al., 2017). The quality of the learning experience in online and distance learning programmes is frequently questioned but recent research (Siemens, Gašević & Dawson, 2015) found that when students (educators in this case) are *supported by* the use of appropriate (i.e. contextually appropriate) technology, the pedagogy in these programmes is equivalent to, or in certain scenarios more effective than traditional face-to-face classrooms. Social media tools enable participation in professional networks and communities of practice which are not co-located, providing opportunities to overcome professional isolation (Tarisayi & Manhibi, 2017), to fill gaps in government provision and to enable grassroots interest groups to flourish.

Learning analytics² and machine learning have the potential to deliver personalised learning plans for students and new emerging adaptive³ learning platforms enable students to track their goals and

² Learning analytics is defined as the measurement, collection, analysis and reporting of data on students and their contexts with the aim of understanding and optimising their learning and the environment in which it occurs.

engage with recommended content which has been adapted to their specific learning needs. Use of such platforms could free time for teachers to engage in deep discussions with individuals or small groups and to focus on supporting students with learning difficulties. However care is needed in selecting learning technologies to ensure that they enable a ‘high touch’ student centred approach, fostering creativity and criticality (Siemens, 2015). To date results from use of classroom technologies have been disappointing because they have been used mainly to automate conventional teaching models. But when more innovative uses are employed – for example immersive authentic simulations or improving access to personalized learning software on computers or tablets that adjusts learning opportunities for the child – there are considerable benefits for students (Dede, 2014; Escueta et al, 2017). But such uses require investments in connectivity or hardware and are not currently feasible options in many LMICs where the majority of schools do not have institutional access to the internet or the funding to support associated costs such as servicing and consumables. However progress is rapid and the exponential growth in the computing power of small mobile devices and their increasing ubiquity suggests that digital technologies will play an important role in future education scenarios.

The advent of big data, from learning analytics to more traditional large-scale tests, has the potential to inform system improvements. However, attention is needed towards local contexts and needs in order to ensure its use does not constrain and homogenise the enacted curriculum and pedagogy in schools and teacher training institutions (Rabella, 2016).

Implementation of online digital technologies also offers potential to relieve teachers and other pedagogic-focussed staff from routine tasks, such as attendance monitoring, resource creation (particularly through the use of OER) and to support school leaders in school management functions. Such technologies also offer the potential for teachers and other education workforce personnel to collaborate more easily with colleagues in different locations, to bring experts into their classrooms (for example in science) to enhance and augment student learning experiences, to cooperate with other professionals such as health and social welfare professionals and to support dialogue with parents and carers. Use of digital technologies in education is also prompting a rethink of the design of learning spaces to engender and support new and expanded relationships between students, teachers and other professionals.

However, implementation must be accompanied by easy access and comprehensive training and ongoing support for educators (Selwood, 2005) and draw on strategies that adopt appropriate knowledge of the management of change, using pertinent management approaches and in ways that consider wider organisational impacts (Passey, 2002).

3.8 Education and neuroscience

Recent scientific advances have dramatically increased understandings of how the brain works, as well as the impact and potential of learning on brain development and function. Whilst much of the relevance of this research relates to pedagogy and student learning, there are implications for strengthening the education workforce both in terms of how teachers and other education professionals engage with this work, the design of schooling experiences (in particular, for very young children and adolescents), and issues of motivation for both educators and their students. The connection between strong and sustained relationships with adults and the ability of children to retain and use information, which is especially challenging for children in highly stressful or deprived contexts (World Bank, 2018), has clear implications for education workforce planning in relation to

³ Adaptive learning systems modify the level and sequence of learning activities in response to student performance in tasks and assessment leading to provision of a more personalised experience.

teacher deployment and retention. The OECD (2008) highlighted the potential of using knowledge about brain development to create highly personalised learning environments; these may require re-thinking the standard model of teachers and classrooms. However, OECD also highlighted how this emerging field raises important ethical questions, which have resonance for education workforce reform. It cautions against a hypothetically 'excessively scientific and conformist' approach to teacher assessment (and therefore, potentially, recruitment and deployment) based on individual teachers' impact on students' brains. A report from The Royal Society (2011) echoes the optimism and potential for developments in education systems which draw on neuroscience but emphasised that if the benefits are to be realised, there is a need for much more collaboration between neuroscientists and educationalists at research and policy levels.

4. Education workforce goal: Student learning outcomes

An increasing focus on 21st century skills (including life skills) in the student curriculum has profound implications for teachers, as they need to develop capabilities to teach these skills to all students. Currently these skills feature in few teacher education frameworks. Changes in desired student outcomes also have implications for the organisation and management of schools; here an organisational design approach may usefully support alignment of structures, staff roles and capabilities to maximise their benefit for improved student learning outcomes.

4.1 Student learning outcomes

'...how do we best prepare our students for a future of work that does not yet exist, careers that have not yet been created and an economy that prizes creativity and innovation?'

(Trilling and Fadel 2009: 104)

One key driving force for education workforce changes is the shifting focus towards developing students' 21st century skills, defined as the skills and abilities required for success in societies or workplaces in response to the societal, economic, technological and globalisation changes arising during the turn of the century (Binkley et al. 2012). Collaboration between educators, business leaders and government ministries has generated a variety of frameworks for building capacities for students to engage flexibly with a rapidly changing digital and global world, with perhaps the most prominent being the US-based Partnership for 21st century skills (p. 21, 2015).

In addition to 21st century skills, related literature has outlined a need for building 'life skills,' particularly in relation to children from least advantaged backgrounds and low-income countries. These life skills are typically defined around issues pertaining to health, gender equality, human rights, peace and development. An in-depth evaluation of various life skills education programmes is outlined by UNICEF (2012). Life skills perhaps more explicitly link with the skills and outcomes outlined by SDG4, which focuses on the development of basic literacy and numeracy skills, as well as skills relating to sustainable development, sustainable lifestyles, human rights, gender equality, peace and non-violence, global citizenship, and appreciation of cultural diversity. A further set of traits or 'soft skills' is identified by scholars such as Heckman (2011) who argue that these are frequently undervalued but critical to success in school and later life. A framework of 16 skills embracing 21st century skills and life and soft skills, synthesised from 25 reports including those from OECD, NESTA, European Framework of Key Competencies is shown in Appendix 1.

In a likely response to a growing focus on these various 21st century skills, we identified over 50 countries that have made major content-related changes to their student curriculum since 2000. Across these curriculum changes, eight common themes are identified (outlined in Figure 1). These changes include some of the 21st Century skills but there are notable omissions. Positioning 21st century skills as central to student curricula will, however, also require changes to assessment systems; current standardized testing has a focus on numeracy and literacy skills. Not only will the focus of the assessment need to shift but new assessment methodologies will be needed.

These trends in curriculum and assessment mean profound changes in what is required from the education workforce, with new content-related knowledges and teaching practice skills required to meet the demands of curriculum and assessment changes (further details in Appendix 2).



Figure 1: Curriculum changes since 2000 in 50 countries: 8 themes

4.2 Implications for the educators: teachers and other learning support staff

Contemporary national education policies present teachers simultaneously as ‘basic inputs’ to be ‘produced’, ‘utilised’ and redeployed as necessary, but also as community leaders who are socially, culturally and linguistically literate (Buckler, 2015). The latter resonates with the 21st century literature, but is not new: over fifty years ago, UNESCO and the International Labour Organization (ILO) co-published a report on teacher status that set out the ‘essential role of teachers in educational advancement and the importance of their contribution to the development of man [sic] and modern society’.

For this report, we analysed documents from 10 low-income countries that outlined competencies and standards expected of teachers, along with key relevant, globally-focused reports from UNESCO, Education International (EI), The Brookings Institute and the British Council (all published since 2000). From this analysis emerged fifteen key ideas (Appendix 3) about what teachers need to do and be in order to teach students in the 21st century. While few explicitly reference the 21st century skills agenda, competencies and standards resonate both with this forward-looking lens and that outlined by UNESCO/ILO in the middle of the last century.

There are, however, important caveats. There remains a lack of clarity around what many of these 21st century skills look like at different levels of competence and the role of the classroom teacher in this endeavour. Further, teaching 21st century skills is a new practice for a large number of teachers already in service and there are serious questions about whether they have the capacity to teach these skills given the demands of assessment regimes and the increasing shortage of teachers. In addition although frameworks are often extensive there are a number of notable absences from these contemporary lists of teacher competencies and skills: the inclusion of technology to support learning rather than learning about technology; collaboration with colleagues and other adults; incorporation of global citizenship issues; and supporting students with disabilities or learning difficulties (IIEP, 2017). Finally, across these frameworks formal qualifications continue to be valued over expertise gained through practical problem-solving in classrooms.

4.3 Implications for school functions and roles

Across the globe, schools are becoming increasingly complex organisations; additional functions, tasks, students and curricula have been added, often in the absence of an analysis of structures, resources, roles and capabilities. Figure 2 offers an overview of all the possible functions within a generic school whilst Figure 3 offers a diagrammatic representation of the functions found in many schools in LMICs.

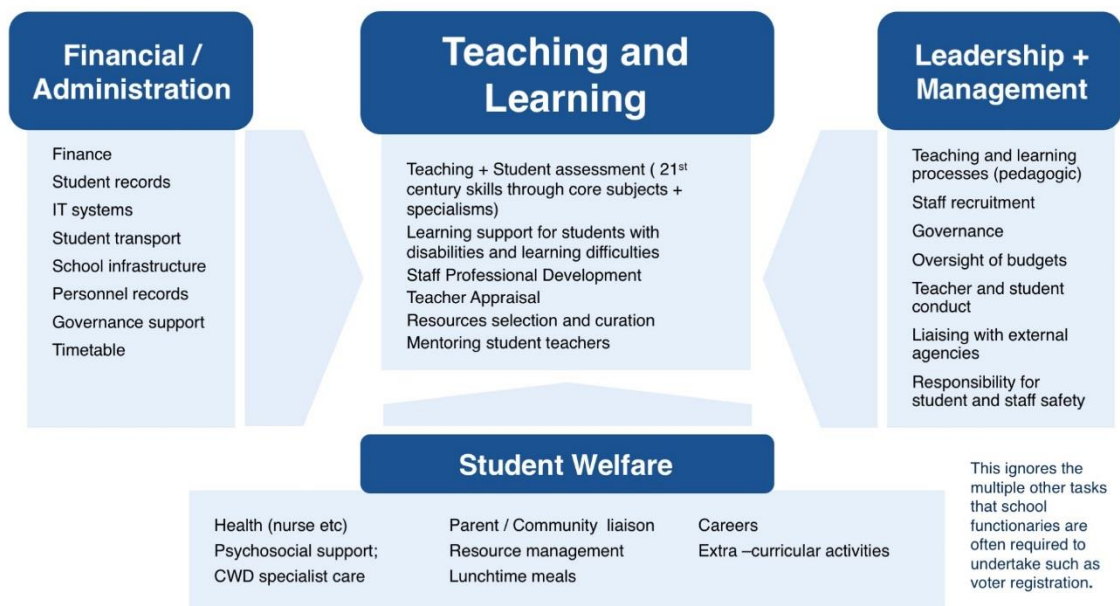


Figure 2: Possible functions of a generic idealised school



Figure 3: Functions found in many schools in LMICs

Responding effectively to changing, and increasingly diverse, student needs and parental/community and regulatory pressures, as well as changes to the formal curriculum discussed above requires many schools to transform themselves and align roles, structures and processes. Such a transformation needs to embrace consideration of how personnel can be shared with other schools and institutions in the locality. Here, an organisational design approach may be effective if undertaken at either a high level to inform role design or at local level to inform role implementation (Goold & Campbell, 2002; Knowles, 1997). Part of such a process is a critical interrogation of role accountabilities, responsibilities and tasks within a school system, to identify general and structural aspects that would benefit from change. A caveat is that such an approach may result in a loss of local sense making and the detail of teachers' professional work if insufficient attention is paid to actual behaviours and activities (Blossing et al, 2015).

5. Education workforce design

The imperative of addressing the challenges outlined above leads us to propose ways in which the education workforce can be redesigned to relieve the burden on teachers and enable high talent teachers to flourish, whilst acknowledging that these changes will demand investment. In this chapter we draw on global examples to propose education workforce teams centred on the learning needs of the student. These teams involve: learning professionals (teachers, specialist staff, learning support staff, pedagogic advisers); education leaders (school leaders, district officials and so on) and support staff (health and welfare professionals, administrators, technical staff, finance staff). The composition and ways of working of these teams will differ over time and context depending on geographical factors, availability of technology infrastructure, student demographics and national and local goals. Role definitions, professional standards, career structures and pathways, and associated training, need to be defined in many contexts to differentiate and professionalise roles.

5.1 Defining education workforce design

The combination of challenges to improving educational outcomes, especially for the most disadvantaged, and the opportunities afforded by technology outlined in previous sections prompt a reimagining of school and district workforce structures. The aim is to enable teachers to devote more time to teaching and learning processes and for students to benefit from the professional skills of teachers including specialists, and other professionals. High talent teachers remain critical to the education endeavour of improvement in student learning outcomes; in all contexts the student – teacher relationship is central to quality learning experiences.

Whilst the objective of workforce design is to improve teaching–learning interactions and support accelerating progress towards equity in student learning outcomes, workforce design is not limited to the school and classroom but embraces the whole education ecosystem. It impacts on the roles and activities of districts officials (including those charged with inspecting schools), school administrators, psycho-social support professionals and so on.

We are proposing that education workforce design is based on the following principles:

- recognition that teaching is a collective endeavour;
- classroom teachers are freed where possible from non-teaching tasks, less specialist pedagogic activities and non-learning related student support to focus developing relationships with their students and on planning, guiding and assessing their learning;
- all students have access to teachers with specialist knowledge and skills in key areas of the curriculum (for example in STEM subjects);
- students in lower primary classes taught by limited numbers of teachers / learning support staff;
- school leaders are freed from administrative duties to focus on pedagogic leadership and strategic organisational leadership;
- each role (school leader, teacher, education support personnel) should be clearly defined and recognised as professions in their own right with appropriate training, support and career pathways;
- the education workforce is a positive model for the student body such that all students encounter staff including teachers who are able to act as positive role models for them: female school leaders/teachers, those from marginalised groups, those with disabilities and so on.

Two possible future scenarios are offered in Figure 4. In both scenarios the teacher is no longer working in relative isolation in their classroom, but, instead, the learner (child or youth) is central and their learning is supported by a range of adults working in a team.

An imagined future for a primary school

Every child in the school has a 'home room' teacher responsible for their academic progress and identifying key learning needs. Children are 'taught' core subjects by their homeroom teacher. In other curriculum areas, their learning is guided by a range of different adults (including learning support staff or community members) and their peers working under the direction of the homeroom teacher. Thus learning practices include peer tutoring and peer feedback.

Digital technologies are used to provide a range of learning materials appropriate to individual student needs.

Key functions, such as business administration, are shared by a group of schools.

An imagined future for a lower secondary school

The school has a local presence but not all the students attend daily, some study at home, others in local community spaces for part of the week.

In some subjects, students work in traditional ways with teachers in the classrooms. In other subjects, students do much of their study online (social or independent learning) or engage with radio (digital or analog) broadcasts involving non-co-located specialist teachers. These latter study sessions are mediated and guided by learning support staff.

The school has a number of support staff lead by a School Business Manager, who also supports 3 local primary schools.

Figure 4: Possible future scenarios for school organisational design

Numerous other scenarios for team working can be imagined to tackle problems in particular contexts. This draws on research, albeit in high income contexts, which shows the impact of in-school collaboration - social capital - on improved student learning outcomes. Educators who are in a school with high social capital, that is around others who are collaborating effectively, are able to support better student outcomes. The effect of social capital on improved student achievement is, significantly, more than the effect of individual talent - human capital (Hargreaves & Fullan, 2013).

At classroom level, learning support staff (assistants) will play an important role, sometimes in combination with specialist teachers depending on local needs. The key point, as figure 5 illustrates, is the utilisation of teams of education professionals to guide and support student learning and wellbeing. In implementing such teams it will be important to work with all stakeholders including the teacher unions, to understand any reservations and ensure that their concerns over the position of teachers are taken into account.

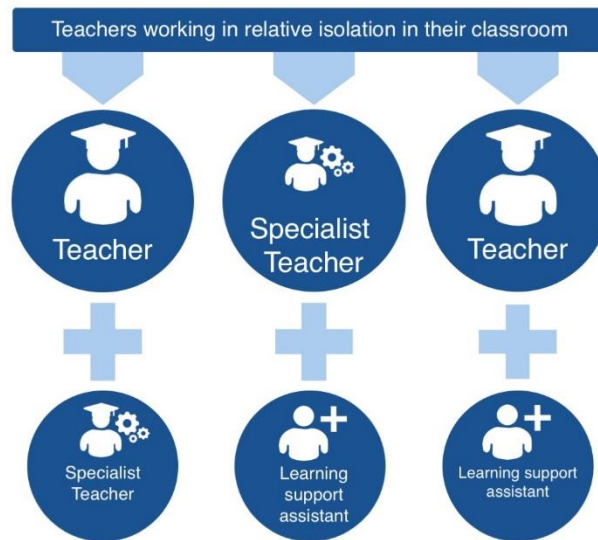


Figure 5: Teacher Plus: Simple modifications to the classroom / school workforce

Moving beyond the school, the specialist teacher and other professionals may be working across several schools, therefore it is important to consider the school district or entire education system. This lens helps to identify potential economies of scale which can yield benefits in terms of reducing the budgetary burden on the system and, through participation in communities or networks of practice, enrich the experiences and motivation of the workforce (see STIR example in section 6.4).

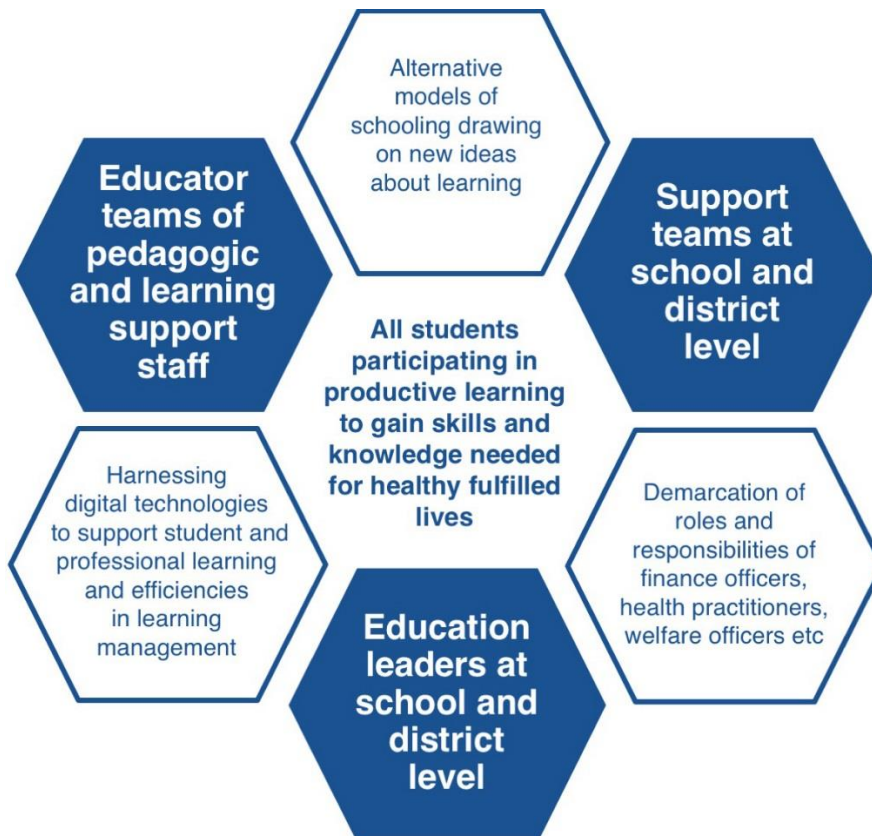


Figure 6: Conceptualisation of the wider education workforce

Implementation of new or changed roles arising from workforce design will need to ensure that the following issues are considered:

- that the challenges of EWR do not dilute the overarching focus on student learning in safe environments with specialist staff;
- that communities are sensitised to changes; community pressure can be intense;
- the need for sufficient training for school leaders who are frequently unaware of principles around good management and pedagogic practice.

Implementation of new ideas about the composition of the workforce will not be easy to enact. Short term political cycles in both host and donor countries, and the need to manage environmental and societal issues - conflict, climate change, food security, demographic shifts and so on, divert attention from the long term collaborative planning required.

5.2 Current innovations in pedagogic workforce design

Extensive research revealed no policy driven examples of workforce design or re-design of this nature at scale in low- and middle-income countries. Hence, to explore evidence which might inform the workforce design we analysed a large number of pedagogic innovations involving education staff (teachers and learning support staff) from around the world. Analysis suggested these might be grouped as shown in Figure 7.

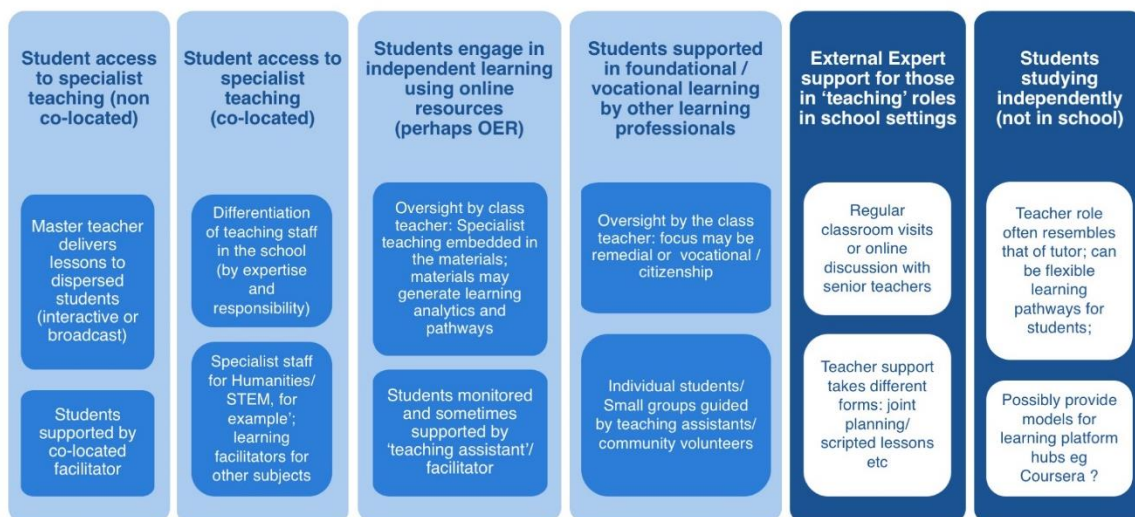


Figure 7: Typologies of interventions for school students which involve workforce modifications

Across these different innovations a number of education workforce roles emerge discussed below. It is recognised that implementation of many of these ideas will require considerable investment in professional development of the personnel involved. However at this initial stage establishing value for money criteria for each initiative was out of scope; extracting these costs is rarely easy and will be undertaken for promising initiatives in the EWR.

5.3 Specialist Teachers

A number of existing initiatives involved specialist teachers (often in STEM subjects) working with students across large geographical areas facilitated by a variety of technologies. Examples include the Amazon Media Centre project or the JAAGO programme in Bangladesh where licensed teachers teach remotely through online broadcasting to primary classes, similar to the MGCubed project in Ghana. Such schemes have their origin in Interactive Radio Instruction (IRI) which remains relevant in parts of the world without access to the internet or electricity for example in South Sudan and

remote areas in Malawi, and in distance learning programmes where tutors and students establish relationships remotely.

At present, for many of these programmes limited data is available to understand how such they were implemented and to evaluate them; the JAAGO project external evaluation showed JAAGO students were achieving similar learning outcomes to their peers in standard schools (and many students were from poor backgrounds). In the MGCubed project illustrates that use of technology to share lessons across multiple sites is possible and can be effective. In MGCubed English language and Maths lessons from specialist teachers are broadcast daily to multiple classrooms where these video lessons are mediated by a facilitator and supported with digital resources, workbooks for students and materials for the teacher. Through the project the quality of participating teachers lessons improved, showing much greater use of interactive methods and there were statistically significant learning gains for students, particularly girls, in Maths although overall student results were mixed (Coffey, 2017). Some similar programmes have found success in terms of reach. The Amazon Media Centre project, for example, has reached around 24,000 high school students per year since 2007 (Cruz et al., 2016).

Specialist teachers include pedagogic advisers who might work within or across schools to mentor teachers. In Rwanda the government has implemented the School-Based Mentors role to improve teachers' knowledge of English and pedagogical classroom practices. Each School-Based Mentor covers two schools and an online platform supports sharing of resources and peer support amongst the mentor community. Critically, impact of the mentors was shown to depend on the approach and attitude of the headteacher, illustrating the need for a holistic approach across the school (Cambridge Education, 2015)

In a number of school based initiatives, specialist teachers were found to be working across classes within the school alongside use of 'homeroom teachers' or learning support assistants. In the primary schools in the Rocketship School group, the curriculum is divided into four content blocks with specialist teachers. Students circulate around the blocks and also have time for online learning, independent learning and small group activities. The Mevo'ot HaNegev High school in Israel bases their curriculum around project work supported by access to the web. Here, subjects are split into two central clusters, each coordinated by a homeroom teacher and one other teacher who deliver all the subjects in this cluster supported by external specialist teachers. Thus, teachers see reduced numbers of students compared to standard secondary schools and students establish close working relationships with their teachers. Case study evidence has suggested an increase in collaborative learning and smaller workloads for teachers (OECD, 2012b).

Since 2015 primary school teachers in Singapore are moving to teach just two subjects, thus working across several grades in a primary school. This enables the skills of the highest qualified and effective maths or other subject teachers to be equitably utilised across a large number of students. The teachers benefit by having more time for lesson preparation and reflection and it also reduces the cost of professional development, as the number of teachers in each subject is smaller (NCCE, 2016a).

5.4 Learning support staff

Learning support staff (also known as teaching assistants, learning assistants, teachers' aides, learning mentors, mediators and enrichment coordinators) are intended to have a complementary role to the teacher. Learning support staff take on various responsibilities in different countries but in general act to:

- enable more attention to individual students, either by the learning support assistant or by the teacher;
- facilitate a more flexible learning environment;
- provide language support in multi-lingual environments;
- support the teacher with administration and planning allowing the teacher to focus on their core responsibilities;
- liaise with families and the community.

The literature suggests the presence of learning support staff may improve teaching and learning if adequate support for their training, induction and deployment is in place. There is only weak evidence of their impact on overall student learning outcomes (Blatchford et al, 2012) although some suggestions that their presence may reduce grade repetition. However, studies have indicated that to be most effective teachers and learning support staff need to collaborate closely using a combination of systematic structural forms for their deployment – working across the room, with small groups and so on (Rubie-Davies et al, 2010).

Over the last twenty years, the number of learning support staff in OECD countries has increased considerably to an average figure of 7.3 for every 1000 students across primary and secondary schooling (OECD, 2012). Numbers in the UK and US are almost double this at 15.5 learning support staff for every 1000 students; the UK saw a 100% increase in teaching assistants between 1997 and 2009. This expansion has been driven by a trade-off between class sizes and teachers' salaries, with the UK opting for substantial increases in teachers' salaries and the provision of learning support assistants, rather than small class sizes. However the presence of additional adults adds a complexity to classroom management and planning for which teachers are not always well prepared. This increase has also been driven by global moves towards greater inclusion in mainstream schools; in Finland for example, where there are only 7 'special schools', 'teaching assistants' play a large role in supporting the learning of students with disabilities within mainstream schools.

Training programmes leading to formal qualifications for learning support staff are rare outside high income countries and even then we found only one compulsory one year programme in Finland (OECD, 2015). Interestingly in Finland, learning support staff teach individual students, small groups or the whole group. We recommend this training programme is investigated further in the EWR.

In LMIC there have been a number of initiatives to complement teachers with learning support staff or 'community assistants', sometimes working alongside the teacher within their classroom and in some schemes offering after school or holiday sessions to students such as Pratham and Read India activities in India. These initiatives usually focus on improving the literacy and numeracy levels of children who have not reached age or grade norms, in part to compensate for weak classroom teaching. In Ghana statistically significant learning gains were shown by children participating in the Teacher Community Assistant Initiative (2010 – 2013) in which local high school graduates were provided with materials to teach small groups of students in grades 1–3 in various forms of the intervention. The highest learning gains (sustained a year later) were found in the in-school small group 'remedial' classes. Programmes like this offer useful insights into the deployment of learning support staff and offer highly productive work experiences to young people in the community, further data on the financial costs and the impact on the practices and motivation of the class teachers could be useful (GES, nd).

In a number of small scale innovative initiatives, learning support staff were not co-located with the teacher and were frequently described in relation to teachers as 'unlicensed' teachers or their equivalent, as in the DiSH project in Pakistan, MGCubed in Ghana or New Education Highway in

Myanmar. In many instances these initiatives were working in remote or difficult locations and those taking on the learning support role were members of the local community. Many of these staff will have gained considerable experience in facilitating learning with a range of students. With appropriate training and supervision of a trained teacher, these roles have the potential to become formal learning support positions with clearly defined professional responsibilities rather than being regarded as 'sub teachers' as at present.

5.5 Volunteer Support Staff

Various initiatives use support staff from outside the school to support students.

CAMFED supports the transition of female graduates from lower secondary school into the labour market with an 18 month programme in which these young women volunteer as mentors and role models in local secondary schools for at least 2 ½ hours each week. Known as 'Learner Guides' they deliver the 'My Better World' curriculum to students in lower secondary schools as an integrated part of the school timetable. The 'My Better World' curriculum focusses on the development of life skills and wellbeing and the programme has been shown to provide an individualised pastoral response to marginalised students and address the lack of female role models in these schools. In return the Learning Guides are given access to interest free loans to start their own business, access to a mobile technology platform and on completion of the programme they are awarded a BTEC qualification which provides a stepping stone to formal teacher qualifications. The programme is operating in Ghana, Tanzania and Zimbabwe with over 4,500 Learning Guides working with 300,000 students (Camfed, 2018).

A recent quasi-experimental design of a larger programme combining this dimension with other interventions indicated that reaching the most marginalised girls involved a higher cost but there was considerable impact on retention in school and learning in Maths and English. The data available costs the Learning Guides but it is not able to disaggregate the impact of their contribution to learner outcomes (Sabates et al, 2018).

Other initiatives using community volunteers include the UNICEF/ EQUIP programme in Tanzania. Here community volunteers have demonstrated improved outcomes for children through a 15 week school readiness programme (EQUIP, 2017). Whilst this programme is out of scope of the current EWI work, principles from the programme may have resonance for primary schools, particularly in rural areas. In several countries there are large scale schemes for youth which include supporting learning in schools. In Nigeria, for example, the National Youth Service Corps (NYSC) is a one year compulsory programme for college graduates, aiming to harness youth skills in service of national development. Each year many graduates are posted to schools to act as learning support staff although in reality many act as class teachers. Criticisms of the initiative include the low level of training given to the youth and their lack of understanding of the local context – postings are always outside a graduate's home state.

A considerable number of projects such as Projects Abroad, place young people from countries of the global North in schools in Sub Saharan Africa and South Asia, often as English teachers. Many of these volunteers are completely unqualified and whilst the experience is undoubtedly of benefit to them, there is little evidence on how they impact on student learning or on the practices of local teachers.

5.6 New school models

Although many innovative school models are small scale and few have any robust evaluations publically available, they do offer glimpses of possible alternative ways to organise schooling.

The African School for Excellence, operates a 'rotational' model in their classrooms – students rotate between teacher-facilitated lessons, small group peer learning activities, and individual work on computers. This model places the teacher in the role of the facilitator.

The Innova schools (low cost private schools) in Peru combine teacher-led, project-based learning in small groups with student self-directed time using digital learning tools. Here teachers monitor students' online work and offer personalised guidance. Of course, such models are highly dependent on the availability of infrastructure, power and access to the web and may not yet be feasible in more rural areas.

Perhaps the most famous example of a different model of schooling is the Escuela Nueva model for multi-grade classrooms. Students of different ages learn together through group discussions and projects with the teacher taking on a facilitator role. Students work at their own pace, taking exams when they feel they are ready which allows for extended absences for work or family reasons. A relevant aspect of the Escuela Model is the use of demonstration schools which enable teachers to see and experience innovations and effective practices for themselves, complemented by peer coaching from the Lead trainers at the demonstration schools. This model has now spread from its origins in rural Colombia to 16 countries, mainly in Latin America and the Caribbean. In terms of evidence, research has consistently linked the Escuela Nueva model to improved learner achievement, although questions remain around the degree to which schools fully implement the principles (McEwan, 2008).

The Sisema de Aprendizaje Tutorial (SAT) model in Central and South America offers an alternative secondary school experience for students in grades 7–12 facing structural inequalities – those in remote regions and who are economically disadvantaged. First developed in the late 1980s the programme aims to empower students with a relevant, accessible and flexible curriculum based on five community service capabilities (what rural youth need to be). These comprise scientific, language, maths, technology and community capabilities and emphasize the development of skills such as analysis, community service and inquiry in the environment of the community. They are studied through curriculum texts, practical activities, study groups and supported by tutors who stay with the same students for six years. Tutors are recruited from a wide pool not just from those who have formal education qualifications: there is an ontological positioning of the tutors as co-learners with their students in a climate of mutual trust. Students remain in their own communities and are able to continue with their livelihood activities whilst studying. Those who complete the programme are given a recognised secondary school diploma. An impact evaluation in 2010 indicated that SAT students had an increased rate of learning compared to students in conventional schools (Murphy – Graham, 2018).

More radical models of virtual schools can be found in the British Columbia distributed learning programme, the Open Access College in Australia and the Namibia Open College. Formed out of necessity in extremely sparsely populated areas such institutions, particularly with the advent of synchronous interactive lessons enabled by digital technologies, have potential to be relevant in other parts of the world.

These flexible models of schooling may support sustained engagement for students for whom travelling to school is difficult or impossible, those in highly rural communities and those for whom schooling is not or cannot be their main priority.

5.7 School Leaders

In many countries, there is a lack of clarity about the core tasks school leaders should dedicate their time to (OECD, 2008) and there are considerable variations in the degree of autonomy in decision making granted to school leaders – this is generally high across OECD countries and analysis of PISA results indicates some correlation between school autonomy and student achievement in high income countries (OECD, 2008). But beyond the OECD countries there is a paucity of evidence on the practices of school leaders and managers (Wills, 2015). Globally our understanding of how their actions influence student learning has been developed through detailed case studies of a few schools, primarily those which have achieved excellent academic results in challenging contexts (Branch et al, 2012). Recently some organisations running schools outside public systems have begun to implement slightly different models of school leadership, for example PEAS schools in Uganda which have a School Director and a Headteacher. Here headteachers oversee teaching and learning, which includes CPD (supported by PEAS' regional teams) monitoring learning progress, managing learning resources, timetabling, and student discipline. The Headteacher generally leads on teacher recruitment and is the school focal person for Child Protection. The headteacher reports to the School Director who has responsibility for the School Improvement Plan and mediates between the school and the community, managing both the PTA and the Governors. Relative to other private and public schools, management in PEAS Schools is good, with resulting improved student outcomes a strong performance management framework for headteachers is argued to be important (Crawford, 2017).

Finally we note an imbalance in men's favour in educational management and related leadership positions. Women in education leadership positions provide role models for female students and can also help reassure parents that schools offer a safe environment (UNESCO, 2017).

5.8 District level reform

Implementing education workforce design for public schools involves consideration of roles across schools at the district level, for example those with pedagogic expertise who are able to mentor teachers and headteachers. District officials, will play increasingly critical roles in new scenarios: ensuring aspects of accountability for example through teacher inspection; monitoring of gender equality; facilitating staff development opportunities including sharing ideas and practices across schools; and coordinating the effective deployment of different staff including teaching staff to meet local needs as the case study from Angola below illustrates. The precise composition and roles of district staff will depend on historic education structures (including the degree of decentralisation), context (rural/ urban etc.) and the size of the schools in the district – smaller schools will require more shared services and have greater need for specialist staff.

Learning for All (Projecto Aprendizagem para Todos PAT): Angola

This Angolan Ministry of Education and World Bank project responds to several needs of the educational sector in Angola. A country which underwent major social and economic transformation with the end of the civil war in 2002, and the growth in the oil sector, was still plagued by sharp social inequalities, weak and centralised governance structures, and low student performance, according to 2014 EGRA (Early Grade Reading Assessment) scores in mathematics and Portuguese language. The country faces additional structural challenges, since it is a vast, and sparsely populated country in rural areas (18 provinces, 1,164 districts distributed across 1.2 million square kilometres with only 25 million inhabitants, 62% of whom are located in a few urban centres, averaging 20 inhabitants per square kilometre outside these urban centres).

The Learning for All (PAT) project, therefore, aims to improve educational outcomes by training teachers, encouraging high-quality school-level projects, producing and distributing more pedagogical resources, and integrating and expanding the number of schools by reviewing the support systems within and across schools. PAT has created Areas of Pedagogical Influence (Zonas de Influencia Pedagógica, ZIPs), where a hub school, where most of the resources are kept and managed, coordinates and supports satellite schools in the vicinity. ZIP size was planned not to be smaller than 2 schools and no bigger than 10 schools, that is a ZIP is smaller than a district. In a first phase, 164 ZIPs were created. This restructuring of school networks and creation of a decentralised monitoring and support system had a strong involvement from provincial and district delegates, as well as external province-level consultants. The full impact of this project, and of each of its components separately, has not yet been released. A similar project was also implemented in Mozambique. *This model may be worth exploring in further depth in the EWR.*

There are few other recorded examples of district-level reform although in many countries support for students with disabilities and health care for school students for example, are designed to be operated at the district level but often do not function effectively. In many cases logistical factors – lack of fuel or motorbikes – prevent specialists visiting schools and students. Redesign of these shared services is critical to support workforce reform initiatives and there is potential to draw on the affordances of digital technologies to overcome some of the logistical challenges.

5.9 Design of the wider education workforce: student welfare, finance, administration and leadership / management

The discussion here has focussed on design of the education workforce concerned directly with teaching and learning but, as figures 2 and 3 illustrates, a school (and the wider education district) also includes other functions such as school management, psycho-social support and provision of meals. Consideration of the roles to do these functions is also important as they will be members of specialist and/or support teams; how might their roles be designed and enacted to reduce the burden on teachers and other staff concerned directly with learning? How might they best be organised across schools?

Currently there is little empirical evidence to answer these questions; for example almost all research on health issues pertaining to schools is concerned with health interventions with measurable health and other outcomes rather than changes in relationships and practices across groups of staff.

5.10 Principles for workforce design

Analysis of these innovations suggests the following common features relevant to a design of the workforce:

- Education workforce design needs to be in response to local problems
- Shift from one teacher to specialist teams (figure 5)
- Recruitment of local staff to 'support' positions
- Need for sensitisation of the community
- Local accountability dimension
- Use of local language (where appropriate)
- Situated regular training for staff
- Use of locally owned technology where possible to support staff and student learning
- Partnerships with a range of actors in the local community and beyond
- Desirability of role descriptors and career paths for support staff

Many of these themes are also picked up in the examples of workforce strengthening. Alignment and integration with other teacher subsystems are essential for successful implementation of these innovations – most of the impact resides in the implementation rather than the original idea.

6. Education workforce strengthening: recruitment, professional learning and retention

Education workforce strengthening complements the design of the education workforce. It embraces recruitment, pre and in-service professional education, educator motivation and school leader development to enable educators to engage in a cycle of continuous improvement to better meet student learning needs and reduce inequalities in student participation and attainment. This chapter outlines examples of effective current practice from multiple contexts. Most work to date has focussed on teachers but many of these examples offer principles which could be applied to other roles within the education workforce.

6.1 Defining education workforce strengthening

Strengthening of the education workforce is critical to reducing the learning gap. Its goal is to ensure that all students are guaranteed access to participate in high quality authentic productive learning experiences which help them develop appropriate 21st century skills. It is concerned with working towards a culture of greater professionalism within the workforce including improving educators' self-esteem and raising levels of respect – mutual respect within professional teams and respect from the communities who they serve.

Workforce strengthening involves front line professionals working with students – teachers, school leaders, learning support staff and so on, and also those less directly involved with students such as district officials, education administrators and finance officers. All need clearly defined roles matched to agreed professional standards, career pathways and salary structures; terms of accountability; and access to relevant quality professional development opportunities throughout their careers. Equally importantly they need adequate working conditions and support, including regular salary payments, equipment and resources, to enable them to carry out their roles effectively.

District level officials have a key role to play in organising development opportunities and resources to meet local needs and facilitating collaboration between schools. Collaborative practices between schools and teachers such as professional networks, make practice public, develop contextually appropriate pedagogic approaches and offer an important mechanism for making teachers accountable to each other.

Learning to collaborate and work effectively within teams will need to be central to professional learning as systems move to this team based approach and reinforce the collective culture. The increasing availability of digital technologies also demands enhanced capabilities from all members of the education workforce – to explore, find, discuss, select, create and share ideas and experiences in digital spaces.

A strong education workforce will be characterised by professionals contributing their own specialist skills to collaborative team working and transparent terms of accountability. Here codes of conduct are important through giving professional peers a way to hold each other to account; recent work in South Sudan by the UNICEF Communities Care programme brought about changes in attitudes and behaviours amongst teachers through challenging norms that enable sexual violence (UNESCO, 2017).

The Education Commission is concerned with strengthening the roles of school leaders, teachers and other education workforce personnel including those at district or cluster level through a focus on,

their recruitment and appropriate distribution, retention of these personnel (including ensuring they are motivated) and their professional learning (both pre-service and in-service). More contentiously, workforce strengthening might include mechanisms to ensure that weakly performing teachers and learning support staff, or those who perpetuate violent behaviour of any form, and who do not improve after a reasonable time with support (coaching / mentoring/ peer support networks and so on), are counselled out of their roles.

In analysing context specific needs and responses we find the idea of professional capital developed by Hargreaves and Fullan (2012) useful. Professional capital combines human capital (expert knowledge), social capital (interactions which influence and sustain human capital) and decisional capital (the wisdom and expertise to make sound judgments connecting theory and practice, cultivated over many years). This perspective positions ‘good teaching’ as a collective professional endeavour which is technically sophisticated, requires high levels of education and training, continuous improvement and which involves wise judgement informed by evidence and experience (2012:14). Digital technologies are seen to provide tools which are mediated and leveraged by good teaching but do not replace teachers.

To date much research in these areas has focussed almost exclusively on teachers but many of the findings have relevance to emerging roles in the education workforce. Key aspects of education workforce strengthening discussed here are shown in the diagram below. Although each dimension is shown independently, each influences the others both positively and negatively in different ways. For example failure to provide strong helpful induction experiences can impact on recruitment. Critical to all these dimensions is the provision of appropriate working conditions, career pathways and comprehensive teacher policies. These, however, fall outside the remit of this paper which is concerned with recent examples of how each dimension has been enacted in different contexts to improve students’ education.

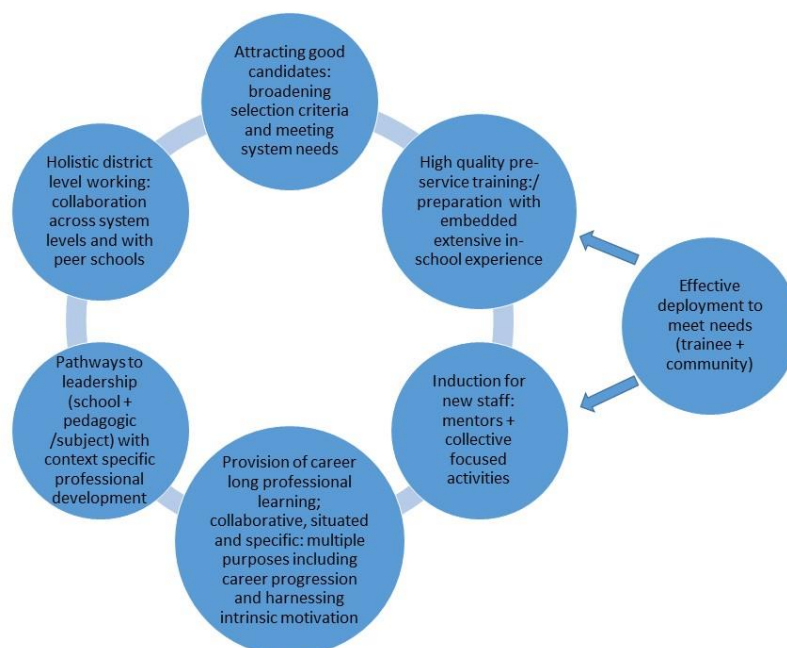


Figure 8: Education Workforce Strengthening: dimensions and key aspects (pedagogic staff)

6.2 Expansion of the workforce: recruitment and initial professional training for teachers

Strengthening the education workforce requires improving how teachers and other education professionals are recruited and prepared for their roles and ensuring that there are sufficient personnel in place to meet student needs and that these personnel include males and females drawn from diverse groups.

Factors influencing teacher recruitment are highly contextualised and dependant on a complex interplay of working conditions, the economic environment, historical perceptions of the teacher, professional prestige and so on and have been explored in detail elsewhere (Lynch et al, 2016).

However key three challenges relating to teacher recruitment and preparation are found across multiple contexts:

- I. Attracting teachers to work in marginalised communities; remote rural communities or urban areas of poverty.
- II. Recruiting teacher candidates with high level prior academic attainment (particularly but not exclusively in STEM subjects, for example in some locales there is a shortage of teachers in arts related subjects).
- III. Ensuring pre-service programmes successfully develop prospective teachers' knowledge, classroom skills and dispositions.

Innovative approaches to these challenges are outlined below, some tackle more than one issue.

6.2.1 Attracting teachers to work in high need areas is an issue in high- and low-income countries and in systems where teacher deployment is by a central authority and those where teacher deployment by a 'market system' (Lewin, 2000). The challenges in both systems (and in decentralising centrally controlled systems) have been well documented (for example Mulkeen & Chen, 2008) and include the need to consider the impact on teachers' families, their employment and education. It is worth mentioning that a key dimension to this challenge is the low number of female teachers in rural areas in many countries in Africa and South Asia (UNESCO, 2015; NUEPA, 2016), one contributing factor can be a lack appropriate employment opportunities for the female teacher's spouse. Evidence from HIC on the impact of teacher gender is mixed; Lim & Meer (2017) for example found female students performed better on standardised tests with female teachers but male students did not benefit from a teacher of the same gender. In LMIC the absence of female teachers is argued to contribute to the perpetuation of female under participation and achievement (Gaynor, 1997; Commonwealth Secretariat & UNESCO, 2011).

Conventional responses to this challenge include providing incentives to teachers to work in these communities (monetary and/or housing), compulsory transfer of teachers and targeted recruitment strategies. Targeted salary bonuses schemes can be fraught – the level of compensation is often contested, but have shown some success; the Hardship Programme in the Gambia, for example, increased qualified teacher presence by 10% in rural schools. The most successful, for example, the Remote Area Incentive Scheme in Australia, have evolved to include additional bonuses after 4-5 years to encourage teachers to remain in the community (RAIS). However impact evidence suggest that such incentives are not the most effective way to attract new teachers to these areas, new teachers are more interested in social support; headteacher support, collegial relationships, opportunities for professional development and flexibility of what they teach (Milanowski et al., 2009; Simon & Johnson, 2015).

Unsurprisingly, forced relocation to rural areas has had little success except where it is part of a career progression; in Senegal teachers are first required to undertake a period of service in rural

schools (Diop, 2016). This is successful in ensuring a supply of qualified teachers to rural schools but can lead to a lack of expertise which may result in lower student learning outcomes (Lewin, 2002) and to discontinuities in relationships between schools and the communities they serve as teachers move to more attractive posts on completion of their compulsory period in these schools (Luschei & Chudgar, 2015)

More promising is teacher recruitment from the local area although this often leads to a trade-off between qualifications, and knowledge of, and commitment to the rural community (Lewin, 2002). Since the 1980s BRAC has been recruiting teachers from the local community to support the learning of a small group of children in their community in Bangladesh. The teachers are not formally trained but receive 12-15 days training at the start of each year and monthly refresher courses. Findings suggest the scheme has increased access to education for disadvantaged children and the programme has been replicated in a number of other countries in Asia and Africa. However, teachers are paid substantially less than those in Government schools and no routes to formal teacher qualification are made available to these teachers because the long-term sustainability of these schools is not BRAC's goal; rather they aim to provide education to underserved populations until more permanent schools are established in the catchment area⁴.

A recent initiative in Sierra Leone (IGLO) aims to increase the number of female teachers in rural areas. The programme aims to do this by enabling young women who did not complete or continue their school education to follow a work/study pathway to teacher training: they undertake work experience as Learning Assistants in primary schools in their own communities four days each week, alongside studying modules in English and Maths in preparation for taking the Teacher Training College entrance exam. Learning Assistants who pass the exam become Student Teachers following the Teacher Training College distance programme, which includes regular residential schools, to become fully qualified teachers. As Student Teachers they continue to support learning in their schools under the guidance of the headteacher.

The programme thus provides both a pathway into teaching for rural women without having to leave their families and offers support to the class teacher; a defined list of support tasks for the Learning Assistant/ Student Teacher is provided.

The first cohort of participants have yet to complete the programme but to date retention rates have been high and qualitative research indicates that the impact of becoming educationally active is profoundly transformational, according to Learning Assistants and those who support them. Personal change encompasses self-esteem and self-organisation, increased confidence to speak, teach and study, and to encounter new people and experiences. The presence of the Learning Assistants has also had impact which extends beyond individual Learning Assistants to create a culture of learning and aspiration in homes, schools and communities (Safford et al., 2017).

Other programmes have used scholarships for female trainee teachers and the EQUIP programme in Tanzania also uses community volunteers to work with young children (p21) and hopes to initiate a pathways to full primary teacher accreditation for these volunteers.

6.2.2 Recruitment of high achieving graduates into teaching, particularly in STEM subjects, has been a global challenge for many years. Teach for All and its daughter projects in 46 countries (6 continents) such as 'Teach for India', have had notable success in extending the candidate pool for teaching, drawing in well-qualified college graduates to teach in urban and rural schools for 2 years.

⁴ <http://research.brac.net>

In the Teach for All model, an initial six-week training is followed by coaching throughout the two years to achieve qualified status. Candidates are usually placed in schools serving disadvantaged communities where it has historically been difficult to attract high achieving graduates.

Impact studies from a small number of Teach for All initiatives evidence impacts on students' socio-emotional skills (Mexico: Pena & Chacon, 2017), students' general academic performance (England: Allen & Allnutt, 2013) and students' maths attainment (USA: Clark et al., 2013) but as yet there is little data from the numerous more recent Teach for All initiatives in lower income countries. Data from England indicates that the Teach First model is an expensive way to train teachers (Allen et al, 2016).

However retention rates for teachers entering the profession through such alternative routes are very similar to those for teachers on conventional routes (Hanushek et al., 2016). Once teachers acquire some experience and skills they move on, to be replaced by new novices. This makes it hard to develop a strong sense of community amongst staff, increases instability in the school community and can leave untouched the conditions which make it hard to attract teachers to these schools (Simon & Johnson, 2015). Teach for All advocates claim that the model does not aim to attract long serving teachers, the goal is developing the leadership capacity of participants many of whom move to other areas of social enterprise.

'Teach for Canada'⁵ has been established to specifically serve First Nation Students and interestingly is only recruiting candidates who already have approved teacher status and who have demonstrated a commitment to the teaching profession. Successful candidates receive specialist training prior and during their two-year placements in schools in Northern Canada. As yet there is no data on retention rates for these teachers but this initiative may be worth following up. Variations on the 'Teach for All' model have been established in other places, for example, the private Corona i-Teach model in Nigeria, and apparently attract large numbers of applicants, but there is little data on their subsequent employment and retention as teachers.

In Chile where historically high school students see education as an unattractive professional option, **Elige Educar Chile** recruits 3000 prospective teachers from high achieving secondary school students. Those recruited are supported to study for a teacher education degree at one of 25 universities but must then teach for three years in one of 250 'vulnerable' public schools. The scheme is complemented by a large-scale media campaign which is changing attitudes towards the teaching profession. This is important; evidence, for example from Ontario and Finland, shows that teaching attracts more applicants when the social environment respects and values the teaching profession.

Beca de Vocacion Profesor in Chile and a similar initiative in Peru also offer scholarships to teacher candidates and have managed to attract highly talented young people to the profession (9,000 over the period 2011-2013 in Chile). Students who complete high school with top grades are offered places to study pedagogy at a prestigious university. The programmes are currently under evaluation but are claimed to have improved the image of the teaching profession. A related scheme in Brazil (CAPES) offers scholarships to initiate higher education students into basic education teaching and pedagogy.

Schemes such as these have been criticised for attracting applicants with high academic qualifications who are not committed to teaching thereby excluding those candidates who have a

⁵ 'Teach for Canada' is not part of the Teach for All global network

passion for the profession but lower academic qualifications due to their prior education experiences (UNESCO, 2013).

Several countries have implemented alternative routes into teaching for mid-career professionals, particularly for STEM graduates, who wish to become teachers but who have no formal teaching qualifications. Such alternative programmes take a variety of forms, for example online programmes enable prospective teachers to remain in their former job whilst training. There is limited data on the effectiveness of these programmes although in the US, research (NRC, 2010) has indicated there is no correlation between the route into teaching and classroom teaching effectiveness. However, importantly, this is not necessarily an equivalence statement.

6.2.3 Teacher Preparation: There are several different models of teacher preparation across successful education systems but common features centre on integrating content and pedagogy – connecting this to the school curriculum (including 21st century skills) and to the diverse students to be taught – combined with well-mentored school practice which enables trainee teachers to be ready to teach before practising independently. Such programmes are aligned with professional standards – what teachers should know, be like and be able to do, and recognise that teachers learn through practice informed by theory and need to experience different ways of supporting learning. The extensively documented Singaporean Teacher Education Model at the National Institute of Education (NIE), for example, focusses on teachers being able to carry out roles required of 21st century teaching such as ‘knowledge organiser’ and ‘designer’ of learning process and ensures student teachers are taught in the way in which they are expected to teach (NCEE, 2016). However there is still little research on how to effectively prepare teachers for diverse populations including students with disabilities over a decade since this was identified as a priority (Cochran – Smith & Zeichner, 2005).

The teacher education enterprise in countries at the top of international assessment league tables such as Finland, Singapore and Canada, have been extensively scrutinized to identify key components for transfer to other contexts, thereby uncoupling schooling practices from implicit norms and values embedded in the cultural and political transitions of these countries. That the results have often been disappointing should not be overly surprising, transfer has frequently paid insufficient consideration to complex sets of interaction between policy makers, schools and the communities they serve and how these impact on implementation in each context (Darling-Hammond & Lieberman, 2012).

Two models for teacher training outlined below, illustrate promising ways to strengthen the teaching profession in challenging contexts and critically, they are both seen as a joint enterprise with the communities which they serve. Both address issues of recruitment, pre-service preparation and retention through consideration of candidates’ qualities and skills in addition to their academic qualifications, extensive in-school experiences for trainees to develop their understanding of the contexts in which they will be teaching, and integration of ‘theoretical’ study with classroom practice.

Teacher Residency Model: This model for urban districts in the USA is designed around a tightly coupled relationship between the university teacher preparation programme and the local district to customise preparation of candidates to the needs of the schools and students in the district, thus the district is both the producer and consumer of teachers (Guha et al., 2016). The model includes a year-long residency co-teaching with an expert mentor teacher in a ‘teaching school’ that models good practices with diverse learners. Coursework closely integrates theory with school practice, to

come to theory and research through the questions, reflections, and hypotheses that emerge from practice (Solomon, 2009).

These programmes successfully recruit high-ability diverse candidates in shortage subjects and offer financial support in exchange for a 3-5 year teaching commitment. Critically, graduates receive ongoing mentoring and support in their first 3 years with the result that average rates of retention are high; one scheme, Urban Teacher Residency United reports 84% after 3 years and 71% after 5 years, compared to 50% after 5 years in typical high poverty urban districts. Applicant selection processes centre on a core set of dispositions and experiences that are intended to be predictive of successful teaching and the process includes teaching a mini-lesson in a school. It is too soon to show the impact of this model on student learning and there is little data available on the costs of this model although it is acknowledged to be expensive but other benefits include building professional capacity for existing teachers through offering 'professional learning and leadership opportunities as they support the growth and development of new teachers' (Guha et al., 2016).

Development Aid from People to People (DAPP) Malawi: It is widely suggested that many pre-service teacher preparation programmes are 'sequestered from the professional context' (Murphy and Wolfenden, 2015) and that millions of teachers each year enter classrooms inadequately prepared for the realities of teaching and learning. This is especially true for teachers posted to rural schools. In Malawi, the government preservice teacher education system runs parallel with an enhanced system run by the NGO DAPP. DAPP is committed to creating 'a different kind of teacher', educators who are agents of change in rural communities with the vision and ability to improve learning and development outcomes. DAPP students study in residential colleges, and follow the same curriculum and work towards the same exams as students government colleges. But unlike the Government colleges, DAPP colleges have a rigorous application and interview process, are hugely over-subscribed and highly selective. Once enrolled, the DAPP model includes elements such as a six-month field-trip around southern Africa in which students spend time observing classes, reflecting on teaching approaches and talking to teachers in dozens of different school contexts and are encouraged to be entirely self-sufficient (for example learning basic mechanics so they can fix the bus if it breaks down and taking turns to budget and cook for the whole cohort). Back at the college the students take responsibility for which parts of the curriculum they study and when, to encourage a sense of leadership over their collective learning requirements: 'the young teachers are challenged to be highly demanding concerning their own achievements- and serve as role-models to their students to do likewise' (DAPP, 2018). However, while the DAPP approach was recognised in UNESCO's 2013-2014 Education for All (EFA) Global Monitoring Report and DFID Malawi recently funded a DAPP college due to DAPP graduates commitment to teaching in rural schools, a DAPP teacher costs approximately three times more to train than one who attends a government-run college and the model is currently deemed not feasible to run at the national level. A more nuanced costing model, over the lifetime of a teacher's career, might produce a very different picture of the cost effectiveness of DAPP teachers.

Both these programmes have modified applicant selection procedures and criteria. Too frequently teacher recruitment processes are characterised by privileging academic qualifications and an interview with an administrator, there is little use of observational data such as videos of candidates teaching demo lessons (Liu & Johnson, 2006) although procedures in Ecuador and Peru can include local participation with parental and carer representatives (UNESCO, 2015b). Poor selection of teacher candidates has multiple implications, for the candidate themselves, the students they teach and the community that supports their training and employment.

The University of Melbourne has developed a **Teacher Capability Assessment Tool (TCAT)** which offers an evidence-based approach to the selection and development of teachers based on research into characteristics of effective teachers and selection processes in comparable professions. It aims to improve the fit to teacher education – students having a successful formative experience - and maximise the effectiveness of teacher graduates and their commitment to remaining in the profession. The tool asks candidates about ‘ability, self and social interaction’ to rate candidates on several dimensions including agreeability, openness and persistence. Importantly ability test scores complement academic test scores recognising that the latter may not accurately indicate a students’ competence, frequently promoting a particular position on equity and quality. Research into the use of this tool is emerging and it may offer principles which could be adapted for other contexts (Bowles et al, 2014).

Rapidly decreasing costs of technology may make it viable to experiment with video interviews and demo teaching more widely. For example Atlanta public schools work with Hire-Vue, a web-based technology company – to conduct ‘on-demand video interviewing’. Candidates are sent questions and a classroom video to review and complete the interview using webcam over their internet connection. These video interviews are saved and evaluated by committees enabling them to gather more extensive information on prospective teachers whilst reducing travel and recruitment costs.

6.3 Enhancing workforce skills: in-service professional learning for teachers and learning support staff

The core features of effective teacher professional development have been well documented (Darling- Hammond et al, 2017):

- Focus on subject-specific content knowledge
- Opportunities for active learning
- Collegial or collaborative culture
- Classroom-based and integrated into daily life of teaching
- Coherence with other professional learning activities
- Focus on student work and student outcomes.
- Opportunities to reflect on professional practice
- Targeted to explicit needs of individual teachers.

This last point is most often omitted in the design of professional development programmes resulting in a failure to meet differentiated personal professional learning needs and to align with local priorities.

Changes to the student curriculum to include 21st century skills, especially the integration of digital technologies, require shifts in classroom practices and the design of training structures for teachers and learning support staff to support these shifts. Thus moving forward it will be important that in-service professional learning opportunities include a focus on 21st century skills; what these are, what they might look like at different levels of schooling and effective strategies for facilitating and guiding students to develop and evidence these skills

There are a number of extensive and rigorous reviews identifying characteristics of large-scale teacher professional learning programmes – see Popova et al, 2017 for a very recent analysis which identified features of professional development interventions leading to improved student learning, namely: provision of complementary materials; focus on a specific subject; and follow up visits to support teachers in their classrooms. Our particular interest here is looking forward to examine the innovations which harness recent thinking about the value of collaborative learning including

opportunities to practise together, continued support – from peers and colleagues, and use of digital technologies (in different formats) to support sustainable changes in educators’ pedagogic practice at scale. Technology-based or technology-enhanced programmes have the potential to disrupt traditional cascade models, shown to be ineffective (Elmore, 1999) and to enable the development of meaningful relations and sustained mutual engagement, making connections with other’s ideas and understandings to develop and evolve practice (Wolfenden et al., 2015). The use of such programmes is still in its infancy but the examples outlined below may be worth further investigation.

A number of countries have made considerable investments in technology for their education systems to give each student their own device – Thailand, Turkey, Rwanda and Uruguay for instance, and whilst these initiatives are not directly linked to teacher development a meta-analysis of the One Laptop Per Child (OLPC) programme found that learning outcomes for children only improved in areas where teachers were supported to guide students’ use of the computers (Arias Ortiz & Cristia, 2014).

6.3.1 Collaborative professional learning: Social learning is beginning to be recognised as key to professional learning (UNESCO, 2015) – educators learning with and from each other, challenging the idea that teaching is private practice (Elmore, 2008). Educators interact informally through professional meetings, discussions and observations and such collective actions support collaborative professional learning in which new ‘know how’ is developed. Collaborative professional learning is situated and embedded in the beliefs and values of the educational institutions within which the educators practise. Such collaborative experiences include peer coaching, participation in professional learning communities and action research projects in which teachers engaging in reading, exploring ideas, take informed decisions and revisit them reflectively to refine and move forward with pedagogic practice. Thus these school level professional interactions give educators access to techniques which are relevant to their context, model practice, enable continuous support and reinforcement and increase lateral accountability. However not all educators may be keen to participate, they may not acknowledge their own professional learning needs and there are often weak extrinsic incentives to reward improvement. To overcome reservations teachers need to be included as partners, formatively evaluating their own progress towards their own professional goals.

Peer coaching (within and across schools) is increasingly been found to offer a motivating, effective approach to supporting teacher learning. This can take a number of forms for example in the recent education reforms in Chile, started in 2016, early career teachers receive mentoring from more experienced local teachers whilst in the much more established Escuela Nueva schools, lead teachers from the demonstration schools coach teachers in neighbouring schools (Schiefelbein, 1992). In the RANA project in Northern Nigeria (Nigeria Reading and Numeracy Activity) headteachers and lead teachers observe teachers weekly using a simple schedule and tablets. They then hold weekly meetings with the teachers to discuss the success and challenges from lesson implementation and rehearse and practise future lessons. Initial evaluation indicates improvements in student learning in these schools (Lawal, 2018). In the very different context of the USA, Digital Promise use coaches to offer personalised support to teachers on the use of technology in their classrooms to support student learning (Hardy & Bakshaei, 2018).

In the **Ceara programme** in Brazil, professional learning focusses on increasing professional interactions between teachers at the school level in a whole school initiative. Through modelled practice in the school environment it aims to increase horizontal professional accountability and

improve pedagogic practice. Teachers are first observed by external experts using a highly structured tool. Feedback at a school level compares practices in the school with those in the best performing school in the district. The school director and pedagogic coordinator receive training to understand this benchmarked data and develop skills to observe teachers and give focussed feedback. Over a period of a year they provide classroom coaching to staff in their school combined with access to materials including video, offering examples of teaching practices which stimulate student learning. Their observations and feedback sessions are recorded and shared with experts who interact with them on at least four occasions throughout the year using Skype. Recent evaluations indicate improvements in teachers' practice, including a reduction of in-school variation, and enhanced student engagement and statistically significant improved learning outcomes (Bruns, Costa, Cunha, 2017). Similar videoing of teachers' practice followed by high quality feedback is one component of the comprehensive system of teacher evaluation in Chile (UNESCO, 2013).

Teacher professional networks are active in many countries, increasingly supported by technologies (see below). They reinforce the concept of teaching as a collective activity in a school or across a group of schools and, through positioning teaching as a public activity open to peer scrutiny, community accountability is strengthened. In Brazil in the state of Paraná, expert teachers are trained under the Education Development Programme to oversee the work of teachers' networks for periods of two years (UNESCO, 2013). School level professional learning communities have played a role in sustaining improvements in pedagogic practice in Ontario, Canada. Here specialist coaches encourage school based professionals to work together to share practice and improve instruction (Mourshed et al, 2010).

Japanese lesson study activities are an established specialist form of collaborative professional learning in which teachers research their own practice in a school based community of inquiry. Teachers collectively plan a lesson – known as the research lesson, which is subsequently taught by one of the group. Colleagues observe the lesson and in a follow up discussion, provide feedback and suggestions for improvement (Darling–Hammond, 2005). No external funding is provided for the activities which are organised by teachers themselves. The aim is not to develop a perfect lesson but to expand teachers' ideas and experiences of different approaches to teaching. Lesson study develops a shared language amongst practitioners for analysis of practice and makes visible different types of knowledge. Lesson study groups are most common in Maths and popular in primary schools in Japan where flexibility in school structures allows for peer observation without provision of lesson 'cover' for the observers. This approach or a modified version of it, has been successfully adopted in a range of contexts, for example the Singapore' Teachers Network learning circles, Lesson Study in Chile and Teacher Research Groups in China. However the approach does not offer certification to teachers, is time consuming and intense.

Digital technologies offer opportunities to support professional social learning in various modes as outlined below.

6.3.2 Use of locally-owned technologies (mobile phones): As mobile phones become increasingly ubiquitous several projects have begun to use educators' own phones to give them access to professional development materials and to participate in professional learning communities. Use of phones rather than MP3 players or radios has led to much higher use of such materials⁶.

In Madagascar, a 'Mobile phone assisted teacher training' programme was established in a partnership between the ministry, AUF (Agence Universitaire de la Francophonie) and a mobile

⁶ http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/ICT/pdf/Loiret_Lequentrec.pdf

phone company. The programme aimed to improve the pedagogical practices of primary school teachers and their capacity to speak and teach in French. Teachers (500) received mobile phone (and solar chargers) which included access to audio resources and training manuals. Teachers could contact, for free, school counsellors by phone or SMS to answer questions related to lesson planning. Participants were also assigned tutors (teachers with additional training) for their independent study and could contact the tutor or other teachers for free, developing practice networks. Mobile banking was used to provide teachers with funds to attend group meetings. Evaluation of the project 18 months after the formal project end date indicated that the mobile phone acted as an 'extrinsic motivator' for teachers, encouraging daily engagement with the materials, collaboration with other teachers as well as facilitating administrative and personal tasks (Loiret & Le Quentrec 2013)

Similar projects deploying audio materials on mobile phones for teacher professional development have been undertaken in Nigeria using a mobile app (Nokia Life +) and Bangladesh.

The large-scale English in Action programme in Bangladesh reached over 51,000 teachers over a 9 year period and found positive results in teacher and student practices in English language teaching with over 90% of teachers reporting an impact on their practices and statistically significant improvements in students' ability to communicate in English. The audio and video teacher professional development materials were accessed from micro-SD cards in phones and were complemented by print materials and support through paired teachers in schools, teacher meetings and launch workshops (English in Action, 2015; Walsh et al., 2015)

6.3.3. Use of Open Educational Resources (OER): OER are defined as 'teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits free use and re-purposing by others' (Smith & Casserly, 2006). Under all OER licences users are given rights to free access, to copy and to re-share but many OER also grant users the right to adapt, modify and translate the materials for different contexts and purposes thereby adding value to the original OER and creating derivative resources, thus 'users are able to become creators and readers become authors' (Smith, 2014: 131). Use of OER enables educators to collaborate and practise in new, locally relevant and productive ways as this project in India illustrates:

In Karnataka, India, IT for Change (ITfC) has been working with government authorities since 2011 to initiate and support an in-service teacher professional development initiative known as The Subject Teacher Forum (STF). The aim was to enable teachers to utilise digital technologies to support professional networking and peer learning in subject-oriented professional learning communities. There are now over 12,000 mathematics, science and social teachers participating in these communities. Recent action research around the STF indicated that teachers were developing their competence with digital tools and sharing useful open resources with their peers through the forums. In focus groups teachers claimed that these supplementary resources were both improving their own subject knowledge and developing student interest in the subject. They expressed an increased sense of agency as educators. The project has yet to focus on changes in teacher practice but reports anecdotal modifications to classroom behaviour and activities (Gurmurthy & Sriranjani, 2017).

Other initiatives using OER to support teacher development include TESS-India, TESSA, and initiatives in Afghanistan, Columbia, South Africa and Sri Lanka (Hodgkinson-Williams & Arinto 2017).

6.3.4. Blending online engagement:

The following two examples illustrate ways in which elearning might be integrated with classroom activities and face-to-face sessions to support development of educators' practice.

FHI360 recently developed an e-course for early grade literacy coordinators in Rwanda in partnership with the Rwanda Education Board and University of Rwanda. The seven month course comprised 4 modules and required participants to study for around 30 minutes a day or approx. 4 hours each week. Weekly tasks comprised viewing a 20 min audio - video clip, activities to try out in participants' own classrooms and forum / discussion activities. In addition there were live 'meet the expert' sessions. Participants accessed the course through different devices – computers, tablets and phones and on successful completion of all four modules were awarded 40 credits from the University of Rwanda. Evaluation of the pilot course (150 participants) indicated that participants' confidence and skills in working in a learning community had improved together with their digital skills (Uwirague, 2018).

TESS-India, a large-scale teacher education initiative across seven states in India aiming for the transformation of pedagogic practice in schools and teacher education, deployed a MOOC on EdX, first in English, and then in Hindi. The MOOCs supported targeted sustainable capacity building with over 40,000 registrations and a completion rate of approximately 50% for each of the two MOOCs. Participants included teacher educators and teachers, including many from rural areas and those who had little or no previous experience of online activity. The project employed a *blended support model*: within the MOOC platform support was available from peers and facilitators through the course forums, feedback on the peer-reviewed assignments, and the framing of the activities themselves. This asynchronous and sporadic interaction was complemented by *face-to-face contact classes* which met weekly or fortnightly throughout the period of the MOOC in District Institutes of Education and Training (DIETs) and other Teacher Education institutions or in secondary schools. Contact classes served a dual purpose; to enable participants to study as part of a group in a more synchronised fashion while also offering online study facilities for participants without personal access to a PC or the Internet. Many participants accessed the MOOC through their mobile phone or a shared mobile device such as a tablet. Each contact class was led by a local facilitator – educators who had successfully completed an earlier version of the MOOC. Extensive facilitator guidance (English and Hindi versions) and training were provided.

Feedback from the MOOC indicated that these contact classes played a crucial role in MOOC engagement offering opportunities to develop professional relationships and engage in peer learning (Wolfenden et al., 2017). Furthermore imaginative user owned solutions were found to overcome infrastructure and access challenges and tools; participants harnessed social media platforms to create and engage with self-generated support groups. These have continued post MOOC with participants sharing lesson ideas and videos. Through the combination of the MOOC platform, contact classes and social media, the MOOC bridged local and distributed learning, creating a hybrid space focussed on a shared 'domain of practice' (Wolfenden et al., 2017).

6.3.5 Micro-credentials: Evidencing and recognising teachers' and education support professionals' professional learning is important through certificates, portfolios or badges; this enables professionals to use it for career advancement, to plan future professional learning and to reward those teachers who engage with professional development.

Micro-credentials have potential to capture and validate educators' learning, making visible improvements in their practice and increasing motivation to participate in professional learning opportunities. Micro-credentials are designed to support school-based personalised relevant professional learning, each micro credential addresses a discrete set of education practices. Educators demonstrate mastery of the associated competencies through submission of samples of student work, videos and other artefacts, working at their own pace. Their submissions are vetted and either approved (awarded a digital badge) or returned with a request to go back to 'dig deeper'. Although no impact evidence is yet available, research indicates that micro-credentials give focus and coherence to in-service professional learning, allowing the teacher to meet her own personal learning needs and to experience the competency-based learning which she is attempting to put into practice in her classroom (DeMonte, 2017).

6.4 Enhancing workforce skills: support for school leaders

Diversifying the education workforce at school level increases the headteacher workload and requires the headteacher to develop and strengthen their capabilities; to lead a team with the quality teaching and learning dimension owned across the team; to manage diverse staff groups including providing mentoring to classroom practitioners; and to analyse their own setting (perhaps using an organisational design approach (State of Victoria, 2016)) to provide effective decision making around workforce planning, structures and people to maximise student learning. This enhancement of the capabilities of headteachers will require targeted investment.

Whilst there is a growing discourse on the importance of quality school leadership for student learning, South Africa, for example, explicitly identifies the importance of school leadership in the National Development Plan (NPC, 2012, p. 309- 310), little is known about how to develop good school leaders at scale outside high performing school systems. Training, induction and mentoring for school leaders is currently limited (Ortega – Salazar, 2018). Two recent initiatives employing differ approaches to this problem show some promise to address this gap.

In South African the innovative '**Partners for Possibility**' programme pairs school principals with business leaders – thinking partners, to design change solutions for under-performing schools (Collins, 2015). Drawing on 'action learning' approaches the business leader and school principal first participate together in a leadership development programme and then jointly tackle problems within the school. Evidence from 300 case studies indicates that the initiative is leading to improved school functioning and the programme has been taken up by the Gauteng Department of Education. Understanding how the programme has been integrated into the public system, and the degree of autonomy according the school leaders, may be worth pursuing in the EWR.

A recent school leadership pilot programme in Kenya and India paired schools which are 'statistically similar' but which show very different student learning outcomes (EDT, 2017). Leaders of the high achieving schools were designated mentors and undertook coaching and mentoring training to support them in 'codifying' their effective school practices. The mentee – the school leader from the lower performing school – agreed a school improvement priority related to teaching and learning with their mentor and these paired school leaders (mentor and mentee) met monthly for coaching conversations and visits to each other's schools. The pilots in both countries reported evidenced improvements in the skills of the school leaders and in the targeted school improvement priority of the lower performing school. Understanding the costs of this programme would be useful for the EWR.

However these initiatives, along with a recent school leader training programme in Jamaica (WB, 2017) which resulted in better management, are rare examples of school leadership development initiatives in challenging contexts. In Brazil the Escolas de referencia have made significant gains in student learning through a variety of approaches including fostering partnerships with local businesses who have helped support improvements in school management systems.

High performing school systems – Ontario, Hong Kong, Shanghai, Singapore and so on – are characterised by rigorous leadership development programmes which begin early in a teacher's career and include recruitment and initial training followed by ongoing training and support (Jensen et al., 2017). Common to all these programmes are long-term action research projects undertaken by participants within their own schools, integrating theory and practice. Critically these leadership development programmes have not emerged overnight, in each case their origins date back to reforms begun in the 1990s or early years of this century and they are planned to be contingent with the wider structures for education workforce recruitment, training and deployment in each system, taking account of how leadership for learning is understood within each system. Common themes across these systems include the proactive recruitment of prospective leaders, career paths which allow teachers to take on leadership roles and which serve as key components of a learning system i.e. teacher advancement is tied to professional learning (NCEE, 2016)

6.5 Professional learning across the education workforce

Members of the wider education workforce, beyond school based pedagogic staff and pedagogic leaders, require training to ensure they are better able to meet broader student needs particularly with respect to wellbeing and the development of 21st century skills. The following example from South Africa illustrates how improvement interventions are increasingly being designed holistically to include educators at all levels across districts.

The Jika iMfundo programme involved over 1000 primary and secondary public schools across two districts (rural and urban) of KwaZulu Natal in 2015-2017. The aim was to improve student learning outcomes through focussing on curriculum coverage – the pace of teaching and learning, working through existing systems with an alliance of stakeholders to build and embed new institutional and professional routines relating to curriculum coverage at classroom, school and district level. The programme promoted the school as the site of professional development and was characterised by identifying and solving problems of curriculum coverage through professional conversations both between teachers and senior leadership in the school, and between the school and district officials. The routines acted as conceptual tools to support teachers make professional decisions about when to move from one topic to the next, particularly those working with mixed ability classes. The routines were complemented by materials, including lesson plans, to help teachers plan, track, assess and reflect on their students' learning.

The programme focussed on training and coaching for senior leaders in schools, to develop their skills in pedagogical leadership and in particular in curriculum monitoring and support for teachers. District officials were charged with working across silos and driving forward data driven problem solving.

Programme evaluation of grades 3, 6 and 9 showed an increased in curriculum coverage in different subjects. Senior leaders including heads of department developed increased professional judgement and there was some evidence of changes in the relationship between district officials and schools. But many heads of department lacked time to participate in professional conversations with all their staff and the curriculum load posed a challenge for many teachers. The cultural shift from a climate

of compliance towards exercise of professional judgement is not easy and will require further effort to embed (Metcalf & Witten, 2018).

In Nigeria the TDP programme is institutionalising relationships in each state between the Colleges of Education and the SUBEBs (State University Basic Education Board) to ensure that the Colleges are training teachers to meet the needs of the SUBEB – subject, level and skills and that there is match between supply and demand (Umar, 2018).

6.6 Enhancing workforce motivation

OECD's (2014) results from its 2013 TALIS study of teachers' work and working conditions highlighted how teachers, on average, increase their effectiveness through the middle years of their careers but this is not universally seen and in many countries low teacher motivation is reported through this period (Bennell & Mukyanuzi, 2005).

An innovative approach to teacher motivation applicable to teachers at all stages of their careers has been devised by STIR working in Uganda and India. The principles of this model have potential to be transposed to other contexts for implementation in a localised manner appropriate to the prevailing ways of being as a teacher and local structures.

The STIR initiative is focused on enhancing education through 'igniting and sustaining teachers' intrinsic motivation'. It works at national or sub-national level and commits to a five-year intervention which tackles the challenge of teacher motivation at all levels of the education system. Teachers follow a two-year 'development journey' in collaboration with other teachers from nearby schools in small, supportive, reflective networks. The journey covers 21st century skills, and core teaching skills such as teaching reading. The networks are run by specially-trained cluster-level government officials. A recent transition to a government-led model (in partnership with the Teachers' Union in Uganda) which utilises existing system-resources more than halved the cost of the initiative.

An independent World Bank-funded randomised control trial of the STIR intervention in Delhi showed that even when only a fifth of the teachers in a school had access to the intervention, the entire school saw a strongly statistically significant gain in learning levels in maths (0.11 standard deviation average across the entire school). This strong 'spill over' of learning gains across the whole school coincided with a statistically significant gain in teachers' growth mind set and motivation.

In Uttar Pradesh (UP) STIR interventions led to a statistically significant increase in teacher effort (measured by teaching time), of up to a maximum of an additional lesson per day for children taught by teachers involved in the intervention (LATE/IV analysis). At the whole school level, every dollar invested in the approach resulted in approximately seven dollars of more teaching time. However, both treatment and control improved sharply versus baseline, bucking the trend of flatlining or declining learning levels, STIR is still trying to understand the reasons why. The main structural differences between Delhi and UP were that in Delhi, there were staff dedicated to running the teacher networks, and there was more in-school support from headteachers to support classroom practice change in between the teacher network meetings. This suggests that the teacher intrinsic motivation model is sensitive to the system structural conditions and so more effort needs to be put into working with governments to ensure these system conditions can be put in place to maximise impact. With the government increasingly absorbing more and more of the costs of the intervention into existing roles and resources, the marginal cost of the STIR intervention has since fallen further, to as little as 40 cents per child per year in India (Jeevan, 2018).

6.7 Teacher retention

High-quality induction and social interactions, including support from the headteacher, school culture and atmosphere and collegial relationship, are key to motivating teachers to remain in teaching: professional peer support is critical when teachers are faced with increased student alienation arising from unresolved health and social issues. Beginning teachers provided with *mentors from the same subject* field and the opportunity to participate in *collective induction activities* (e.g. planning and collaboration with other teachers) are less likely to move to other schools and leave teaching after the first year (Ingersoll, 2004). The implementation of a revised induction scheme in Ontario (NTIP) involving mentoring and professional development in key areas such as classroom management, increased the retention rate for new teachers to over 95%. In Japan the classroom teaching workload is greatly reduced for beginning teachers. They benefit from twice weekly one-to-one guidance sessions from senior teachers, in-school training and off site experiences including the opportunity to visit other schools (Darling-Hammond, 2005). Facilitating teacher collaboration on lesson planning, preparation and assessment and classroom observations in Finland, Hong Kong, Shanghai, Korea and Singapore has also been shown to be effective in retaining teachers (NCEE, 2016).

7 Lessons on workforce reform from the health sector

Shifts in health sector workforce reform resonate with the shifts in education workforce reform proposed here, in particular the foregrounding of, and strategic planning around, skills and competencies in role optimisation rather than length of service or training and qualifications. But the challenges resonate too, for example, lack of specialist staff and resources, rising demand, inadequately robust data, need to work more effectively across different parts of the system and epistemological tensions between ‘indigenous’ and ‘professional’ knowledge to address local needs within national systems. Health professionals have a much stronger tradition of working in teams and studying how health systems have shifted the skill mix in teams to move towards a new equity in health worker density and distribution could be useful for education systems.

Education and Health are argued to be the two merit goods all people should have access to. Just over a decade ago, the Human Development Index (HDI) was created to evaluate the well-being of a country using not only income-based measures, but also both Education and Health measures. The pressure for universal access to quality and equitable education and health pose unprecedented challenges on their workforce and supply of resources when: demographics show both the increase and the ageing of world population but increase of youth population in some areas; when workforce is the main expenditure item of supplying both these goods; and when we are entering what has now been labelled the Fourth Industrial Revolution. The initiatives and principles of strengthening human resources for health have important features which the education sector can draw on; in particular, given the scope of this report and the issues already raised.

A lens on systems thinking in the health sector arose from challenges in financing health across the globe, highlighted in reports in the late 80s and 90s. The subsequent 2003 WHO report, and the WHO Task Force for Health Systems Research emphasised strengthening systems and scaling up interventions, capacity building and training were important dimensions of these although much of the training was around improved service delivery. However many workforce issues such as practitioner competencies are still somewhat peripheral to health systems research – perhaps an issue to bear in mind when considering how the developing field of education systems research might inform workforce remodelling.

Recent work in health workforce reform indicates the following issues have pertinence to discussions and innovations in education systems:

7.1 Towards the design of the education workforce

Recently, Bond et al. (2016) published the details of a European-based programme aimed at better informing health workforce programmes. The two most important features of the research which led to the initial recommendations of this programme were the coordinated effort from national and international statistical offices to create and analyse detailed data in order to diagnose the health workforce in terms of their skills and tasks, and the notion that the health sector needs to be planned around skills and competencies, and not professional qualifications. There are two major implications of this shift in policy, one being a redefinition of roles within the health workforce, and their being defined for the different and changing types of care, whether it is personalised long-term care, or community-based health services. The other is a shift towards more collaborative, team-based care, where there is delegation from doctors to nurses, and from nurses to assistants, in a context where technological innovation can facilitate diagnosis and treatment. The role of front line workers and their responsibility in this new design needs to be adjusted. This is more likely to work for primary health care. According to the WHO Health Workforce 2030 report, diversity can be ‘harnessed through strengthened collaborative approaches to social accountability, inter-

professional education and practice, and closer integration of the health and social services workforces to improve long-term care for ageing populations' (WHO, 2017).

7.2 Short- and long-term, direct and indirect, tangible and intangible costs and benefits of workforce reforms

Two of the main challenges towards adequate evaluative tools of health workforce reforms are access to detailed data, but probably more important, assumptions underlying the models used to estimate demand for health human resources, and costs and benefits of any intervention or reform. For instance, Liu et al. (2017) show with a projection model that a market demand and supply projection model would estimate that highest skills shortage would be in high income countries, where due to higher and increasing life expectancy, demand for healthcare professionals will increase more sharply than supply. At the same time, even though a 'needs-based' assessment according to disease burden will show that unmet need is highest in low- and middle-income countries, market models will predict unemployment. Both these sectors have strong market failures driven not just by strong positive externalities, but also by asymmetric information. These have to be taken into account and adequately modelled in any projection model, and in any cost-benefit analysis of possible reforms. Failing to account for wider benefits often leads to rejecting reforms with far-reaching impact. Alternatives to Randomised Control Trials which take account of the systemic nature of health reforms should be considered. Scenario building methods have been widely used in policy research (Miani et al., 2014; Innogen, 2013; Jones et al., 2012), facilitate adaptive policy and decision making and are recently being experimented with in health policy research.

7.3 Shortage of adequate staff as part of a system and recruitment of local staff

In developing countries, the proportion of mothers who still choose to deliver their babies at home is high. MDGs contributed to decreasing maternal mortality rate and expanding the supply of health facilities, community health workers, faith-based organisations, and trained midwives, but the choice of health treatment bears an important social dimension. And health workers themselves are often members of these communities where the value of or trust assigned to standard health care is often too low. Selection and retention reforms should contemplate these dimensions, in particular when aiming at recruiting female health workers (WHO, 2017).

7.4 Data limitations

Recent work on the health system research drew attention to the limitations of available data on both registrations of health personnel and health expenditure (Hansen, 2015). Our work would indicate that similar limitations apply to education systems, reinforcing the advantages of undertaking implementation research on innovations to evaluate not just outcomes but also processes underlying these outcomes to test out the theory of change.

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EiA: [English in Action: www.eiabd.com](http://www.eiabd.com)

IGLO: Improving Girls Learning Outcomes in Sierra Leone: <http://www.open.ac.uk/about/international-development/ido-africa/development-programmes-africa/iglo>

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STIR: <https://stireducation.org/>

Teach for All: <https://teachforall.org>

TESS-India: www.tess-india.edu.in

TESS-India MOOC: Enhancing Teacher Education through OER:

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TCAT: <https://tcat.edu.au/>

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Appendices

Appendix 1: Synthesis of 21st Century Skills

The US-based Partnership for 21st century skills (P21) (P21, 2015). P21, although focused within the United States, has served as a springboard for further developments of 21st century skills worldwide by various agencies and partnerships for example, the fifteen core competencies from the Organisation for Economic Co-operation and Development (OECD), the World Economic Forum's (WEF) 16 proficiencies for the 21st century and the Wider Skills for Learning from Nesta. An earlier in-depth review and comparison of 32 documents related to 21st century skills is provided by Voogt & Roblin (2012).

In addition to 21st century skills, related literature has outlined a need for building 'life skills'⁷, particularly in relation to children from least advantaged backgrounds and low-income countries. An in-depth evaluation of various life skills education programmes is outlined by UNICEF (2012). 'Life skills' perhaps more explicitly link with the skills and outcomes outlined by SDG4.

SDG4 focuses on the development of basic literacy and numeracy skills, as well as skills relating to sustainable development, sustainable lifestyles, human rights, gender equality, peace and non-violence, global citizenship, and appreciation of cultural diversity. However, whilst the importance of these skills is generally accepted, there are questions about whether they are often articulated or formulated for, connect with or address the life situations faced by many children and young people in their local communities. Alternatively, it is worth considering whether they hinder the reduction process of global inequalities by perpetuating an individual deficit account of the child (Maithreyi, 2017).

A framework of 16 skills synthesised from 25 reports is shown in figure 9. The skills would be developed through the subject curriculum and alongside values and attitudes.

Figure 9: Synthesis of skills for input into a 21st Century curriculum

Synthesis of C21 skills

Framework of 16 skills delivered through key subjects (numeracy literacy, science and so on)



⁷ The term 'life skills' is used in different ways by different organisations. The discussion here draws on the UNICEF: www.unicef.org/lifeskills/index_7308.html

Further detail of these 16 Skills:

	Skill	Definition
1	Creativity and innovation	Ability to think creatively, independently and with imagination; ability to ask questions; ability to engage with arts and culture
2	Critical thinking and problem solving	Ability to use analytic reasoning and logic; ability to make judgements on different sources
3	Communication	Ability to express oneself with ease and clarity; ability to communicate with a wide variety of people and across different forums or platforms
4	Collaboration and teamwork	Development of interpersonal skills and teamwork; ability to work with others efficiently; ability to work with people from different types of backgrounds in various settings
5	ICT and digital literacies	Ability to use different types of technologies with ease; development of technical skills and abilities; ability to communicate and create using technologies
6	Information literacy	Ability to digest information from different sources and evaluate their credibility; ability to find credible answers to questions or problems
7	Civic literacy	Ability to actively be involved in local communities as productive members of society; development of patriotism in face of internationalisation pressures; development of knowledge that is relevant for local communities
8	Global awareness and intercultural competencies	Ability to understand different cultures; ability to communicate and engage with people from diverse backgrounds and to participate in a globalised world; development of knowledge that is relevant or a globalised world
9	Financial or business literacy	Entrepreneurship and ability to contribute to the economy; development of practical business skills and budget management
10	Health literacy	Development of basic physical, mental and sexual health competencies; Ability to recognise and understand health and safety issues affecting global and local communities
11	Environmental literacy	Knowledge of issues affecting global and local societies; ability to recognise society's impacts on the natural world and to take action to minimise environmental footprints
12	Media literacy	Understanding how and why media is constructed; ability to interpret meaning of media outputs and to evaluate their credibility; knowledge of ethical or legal issues surrounding access to media
13	Bilingual or multilingual skills	Developing language skills necessary for communication on a national and international scale; ability to understand local languages and

		dialects; ability to communicate in multicultural societies and a globalised world
14	Lifelong learning and curiosity	Ability to question; fostering a desire to learn and developing a constant renewal of knowledge
15	Leadership	Ability to take initiative; knowledge of how and when to be an effective leader on a local and global scale
16	Ethical reasoning	Ability to make ethical judgments based on cultural values; ability to debate and evaluate actions and decisions from an ethical perspective

Appendix 2: Trends in Curriculum Changes across 52 countries since 2000

Trend	Definition
ICT and technological skills	Developing of ICT infrastructure and hardware available in schools and classrooms; developing teachers' capacity to use and teach with technology; developing students' technical skills and abilities (see Skill 5 in Appendix 1)
Collaborative and active learning approaches	Changing teaching practices away from rote memorisation or lecturing; incorporating collaborative activities (for example, group work) and active learning approaches whereby students lead the learning activities and processes; developing a student-centred and student-led approach to teaching and learning with a focus on making education applicable to real life; developing communication, collaboration, leadership, and critical thinking skills
Dual tensions of globalisation and localisation	Recognition of the dual needs to develop global awareness while simultaneously developing patriotism and civic involvement on a local level; Developing a curriculum that prepares students to participate in both local communities and a globalised world
Decolonising the curriculum	Incorporating local knowledges and locally-relevant materials; removing or restructuring colonial legacies in education structures and materials
Connecting with local communities	Developing connections with members of the community through volunteer or mentorship programmes; connecting locally-relevant learning with community initiatives
Multiculturalism and inclusion	Widening access to education for traditionally marginalised groups (disability, minority ethnic groups, students from nomadic backgrounds, refugees, immigrants, etc.); including knowledges and backgrounds of all members of society; incorporating civic skills for communicating within multicultural societies;
Language skills and language learning	Providing education in students' own first language; developing communication skills in the national language; developing English skills for communication on a global scale

Appendix 3: Synthesis of what teachers need to do and be

Figure 10: Synthesis of what teachers need to do and be.



Appendix 4: Methodology

The initial search for policy reforms and innovative projects focussed on the following categories of data base: University research centres and consortia (8 databases); UK Government affiliated sites (3 databases); other country government aid agencies (6 databases); non-university affiliated research organisations (15 databases); NGOs (9 databases); Global organisations (10 databases); Media (2 databases); other (3 databases). In addition a search for academic papers was carried out through the Open University's repository of over 150,000 journals.

To support the initial phase (which was focused on identifying initiatives for the mini case-studies or cameos) 38 search terms were identified with truncated endings to capture multiple variants. For example *educat* workforce* reform returns documents relating to *education* workforce reform and *educator* workforce reform. Returns from these searches helped to shape and focus the five priorities listed in the framework in section 4 of this report. In the second phase, new searches were carried out with more specific country or initiative/reform-based search terms in order to identify appropriate initiatives to include in the cameos for each priority.

For both search phases, an explicit framework of inclusion / exclusion / priority criteria was adhered to, based on the following assessments of each initiative:

1. the age of the information or data (with priority given to post-2000 initiatives)
2. whether or not the initiative had been evaluated, and whether that evaluation was designed and managed by internal or external teams;
3. the scale of the initiative;
4. whether the initiative focused on rural or marginalised locations;
5. whether or not the initiative was based in a low or low-middle income country and;
6. whether or not there had been a demonstrated positive impact on children's learning.

Details of relevant initiatives were captured in a standardised template and shared between the research team.

Over 700 initiatives were reviewed and a long list of 48 generated to inform this initial research. After further refinement a short list was generated.

In addition to this reform/initiative-focussed search, separate thematic searches were undertaken. These were allocated to different members of the research team based on their main areas of expertise. The process for each search and analysis/presentation of findings depended on the focus and purpose of each search. In brief:

The scale of need in relation to the teaching workforce

A search was undertaken which focused on literature and data relating to global education workforce challenges. The main data sets used were the UNESCO eAtlas of Teachers and UIS data. Data queries were restricted to the last 7 years; a trade-off between contemporary need, and data availability. Data queries included all indicators for selected countries which measured the following dimensions:

- Demand and supply projection for teachers in primary and lower secondary schools
- Lack of teachers with appropriate specialist skills (available mostly for lower secondary)
- Equitable distribution to rural schools and marginalised communities (conflict areas / fragile states) (not available for many countries)
- Gender distribution of teachers
- Teacher specialisms (not refined enough, vocational versus general)
- Contract / community teachers (available for very few countries)

21st Century Skills (children/adolescents)

This search focused on literature and frameworks derived from non-profit partnerships (9 documents) and international organisations (4 documents). A framework was developed which included 16 skills which were commonly represented across the literature. It was acknowledged that much of this literature is authored in or by high-income countries or organisations, so a separate framework was overlaid which highlighted skills explicitly referenced in the SDGs and UNICEF's Life Skills framework; frameworks whose development has been much more collaborative between north and south. These were also cross-validated with five additional life skills frameworks and suggestions by various international organisations.

Curriculum change

This search focused on literature from international organisations and non-profit organisations, along with policy documents and informal communication documents (press releases, news articles, etc.). Fifty two countries were identified that have proposed substantial changes to the curriculum and teacher workforce expectations, primarily in response to shifting focuses worldwide towards 21st century skills and life skills. Key changes evident across these 52 countries were used to create the framework in section 3 of the report.

Teacher skills, competencies and standards

Policy documents, curriculum frameworks and national reports relating to teachers' work were analysed from 10 low and low-middle income countries (Ghana, Nigeria, Kenya, Uganda, South Africa, Cambodia, Vietnam, Myanmar, Chile and Brazil) and these data were supplemented with key relevant globally-focused documents from for example UNESCO, Education International, Brookings and the British Council. Documents published since 2000 were prioritised, unless it was known that elements of earlier-published policies are still drawn on (e.g. South Africa's Norms and Standards for Educators).

Authors and experts contacted for recommendations included colleagues in the Inclusive Innovation for International Development research group at the Open University and experts: Prof John Bennington, Prof Jean Hartley, Prof Bob Moon and Prof Peter Twining.