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THE IMPACT OF THE INTRODUCTION OF GRADE R ON LEARNING OUTCOMES

POLICY SUMMARY, EXECUTIVE SUMMARY & EVALUATION REPORT

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GRADE R EVALUATION POLICY SUMMARY

In December 2012 the Department of Performance Monitoring and Evaluation (DPME) in the Presidency in partnership with the Department of Basic Education (DBE) commissioned an Impact Evaluation of the Grade R programme. Through combining various data sources it was possible to create a very large dataset of 18102 schools, which allowed precise measurement of the impact of Grade R on test performance in mathematics and home language for Grades 1 to 6.

Key policy findings from the Impact Evaluation are:

- **There has been a massive expansion of the provision of Grade R.** Between 2001 and 2012 Grade R places in public and independent schools expanded more than threefold, from 242 000 to 768 000, meaning 45 000 additional learners and a thousand classrooms per year. A further 55 000 children attend Grade R in ECD centres meaning a total of 804 000 Grade Rs. 78% of 5-year olds were in some sort of education programme in 2009, up from 39% in 2002. More than 90% of all Grade Rs are in public schools, and 89% of public primary schools offer Grade R.
- **However, the impact of Grade R in South Africa is small and there is virtually no measurable impact for the poorest three school quintiles, while there are some impacts for the higher quintile schools. Thus, instead of reducing inequalities, Grade R further extends the advantage of more affluent schools.** Grade R impacts convert to only 12 days of normal learning gains in maths and 50 days in home language (for a school year of 200 days). Results are better in higher quintiles, better performing schools, and educationally stronger provinces (Gauteng, Northern Cape and Western Cape).
- **The cost per public ordinary school learner (excluding Grade R) in 2011/12 was R10 500, but for Grade R it was only R3 112 per year**. Actual spending may be higher, given inaccuracies in how Grade R spending is categorised or recorded. Low spending per learner suggests cross-subsidisation of Grade R from other programmes. Even considering the low (and probably under-estimated) cost of providing Grade R places, Grade R is not cost-effective in terms of learning outcomes: A lot is spent on the programme but with fairly small resulting learning outcomes. However, the problem of weak outcomes despite high expenditure applies to the entire school system. Therefore, given the absence of known more cost-effective alternative forms of intervention and in the light of the potentially high impact of early interventions, it is recommended that the Grade R programme be continued and that ways to improve its impact be explored.
- The existing literature shows **poor quality** in many ECD and Grade R centres and that practitioners have limited understanding of their role in child development.
- **Poor quality may be part of a wider endemic failure of schools known to exist in SA schools rather than being specific to Grade R.** This may imply that impact is associated with the capacity (supportive framework, availability of good teachers and parental support) to deliver a quality programme in addition to specific factors that apply to Grade R only.
- Key **strategies** should be:
    - To measure success not by access alone, but by what is actually being **achieved** in order to narrow inequalities.
    - To pay more attention to the **quality** of Grade R. For teachers, quality issues include training and support, including qualifications, knowledge of *how* children learn and how to facilitate learning to achieve Grade R learning outcomes. Curriculum issues include clear spelling out of practical guidelines and standards for teachers and improving understanding of the curriculum.
    - To improve the **basic data** about Grade R enrolments and spending.
    - If government is to fund 90% of Grade R places, it may need to fund 212 000 more places. At R3 112 per place that will require R220 million per year extra over the next three years, but that may be an under-estimate.

EXECUTIVE SUMMARY

1 BACKGROUND TO THIS STUDY

This study entails a literature review of the impact of early learning, impact estimates of early learning on learning outcomes based on existing datasets, an impact evaluation using a new dataset that can attribute causation to the measured impact of Grade R, a short fiscal analysis, and a conclusion.

2 LITERATURE REVIEW: THE EVIDENCE ON EARLY LEARNING

The first few years of a child's life lay a foundation for cognitive functioning, behavioural, social and self-regulatory capacities, and physical health. These early determinants reinforce each other. Early interventions could shift these trajectories. Our scientific knowledge base is however constrained. The difficulty is to distinguish impact from self-selection: children who attend preschool may perform better in school simply because their families value education. Returns on investment are greatest for the young as they have a longer horizon over which to recover investments, and because "skill begets skill." Early investment in disadvantaged young children reduces inequality and raises productivity.

Most quantitative studies draw from a few US studies, with recent evaluations in Argentina and Uruguay providing further evidence that early interventions improve later cognitive outcomes. Studies on the impact of ECD services in South Africa report mainly on health benefits. The Sobambisana programme found mixed impacts of various programmes aimed at improving children's readiness for Grade R.

The developmental trajectory of most children is well established at school entry: schooling reinforces developmental trends and usually widens gaps. The key question is how much educational interventions *before* primary school can reduce gaps. Opportunity for language learning is greatest *before* children enter school. A South African study found that language delays remained stable between Grades R to 3, suggesting that education was not powerful enough to overcome an entrenched problem (Klop, 2005). Emergent literacy in preschool (including ability to manipulate phonemes and to recognise letters and letter sounds) predicts later reading achievement.

Grade R should be aligned with ECD pedagogical practice and not be a "watered-down" Grade 1. The curriculum must be clear about foundations for literacy to be laid in Grade R. It requires active, child-centred, participatory methods that are difficult to assimilate into the school system. Opportunities for emergent literacy development through exposure to reading, pictures and mediated explanations of text are especially important. A South African study found that 65% of Grade R learners enter Grade 1 without the necessary skills or concepts to master reading.

Impacts for preschool are more consistent and stronger than other remedial strategies, especially for children from poor home environments. The benefits of early education need to be maintained through subsequent school experiences. Though Grade R cannot overcome deeply rooted economic problems and social pathologies, a quality programme can be a powerful equaliser to reduce disadvantages. Importantly, the evidence stresses that good quality ECD produces good outcomes, but weak provision could foster worrying outcomes such as aggressive behaviour and poor language development. Quality is key: a quality curriculum, a quality teacher, and a quality response to developmental needs.

3 EXPLORING EXISTING DATASETS FOR EVIDENCE OF THE IMPACT OF GRADE R

The re-estimation of models using NIDS, SACMEQ and GHS data confirmed findings of a DBE study, that the association of ECD with learning outcomes provides only *suggestive* and no *causal* evidence of an impact on learning.

4 AN IMPACT EVALUATION USING A NEW DATASET

A new dataset was created by merging the EMIS masterlist of schools, the SNAP data on learners in each grade, and the Annual National Assessments (ANA) of 2011 and 2012 that provide test performance in mathematics and home language for Grades 1 to 6. This large dataset of 18102 schools allows precise measurement of impact.

A (proxy) measure of "treatment" is the percentage of learners of a given cohort in a given school that had attended Grade R. Treatment for a cohort (exposure to school-based Grade R) is calculated as the number of children in Grade R as proportion of those in Grade 2 two years later. Some schools serve a wider catchment of Grade R learners who may later attend other schools, thus influencing the treatment measure. Also, some learners may have attended Grade R at non-school based facilities. This may under-estimate treatment in such schools.

Better managed schools may have introduced Grade R earlier, or a focus on poor schools may have increased treatment in schools where performance lagged. This confounds the relationship between treatment and performance in ANA tests. Fixed effects models at school level (i.e. observing the relationship *within* rather than *between* schools) remove such bias. Having a number of observations in each school of both treatment by cohort and of test performance (ANA results from Grade 1 to 6) makes it possible to use a fixed effects structure. Impact is measured as the *proportion of a standard deviation* change in test scores as a result of full treatment, i.e. full exposure to Grade R.

For the 2012 sample, exposure to Grade R increased mathematics scores in subsequent years by 2.5% of a standard deviation, and home language scores by 10.2% of a standard deviation. Assuming 40% of a standard deviation to be equivalent to one grade level in school and a school year to be 200 days of instruction, this is equivalent to what the average learner should learn in 12 days or in 50 days for mathematics and home language respectively. These are quite small effects. A review of preschool programmes in the US found average effects on cognitive outcomes to be 42% of a standard deviation at or near school entry. Oklahoma's universal preschool programme for 4-year olds, a high quality programme, saw an 80% of a standard deviation gain in pre-reading and reading skills, a 65% of a standard deviation gain in pre-writing and spelling skills, and a 38% of a standard deviation gain in early math reasoning and problem-solving. In Argentina, one year of pre-primary education increased average third grade test marks in standardised mathematics and Spanish tests by 23% of a standard deviation.

Treatment has no statistically significant effect in lower quintiles, while a significant effect of approximately 10% and 20% of a standard deviation is estimated for Quintile 4 and Quintile 5 schools respectively in both maths and language. Thus provision of Grade R to all will improve results in the wealthiest quintile by about half a year's learning, with almost no benefits for lower quintiles.

To capture differences in school functioning, two provincial groupings were distinguished: weaker performing and top performing provinces, the latter being Gauteng, Northern Cape and Western Cape. Top performing provinces may face fewer constraints with functioning of school based programs and quality of Grade R teachers. For home language test scores, there are no major differences across the provincial groupings for similar school quintiles: Quintile 5 gained 13-14% and Quintiles 1-4 only 3-4% of a standard deviation in both provincial groupings. For mathematics, treatment had a statistically significant effect across all four sub-samples: in the weaker provinces only 1.8% of a standard deviation in poorer schools and 9.6% of a standard deviation for Quintile 5 schools. Poorer schools in top performing provinces experienced a similar impact (10.4% of a standard deviation) while wealthy schools in these provinces experienced the largest impact, at 16% of a standard deviation. This suggests that Grade R provision provides greater benefits for mathematics learning when implemented within a well-functioning education system.

Quantile regressions allow investigation of differences in impact between schools that over- or under-perform. Results are best interpreted for fixed effects versions, which investigate *differences* in tests and treatment between 2011 and 2012. The impact is statistically larger amongst better performing schools in both mathematics and home language.

This unique and exceedingly large dataset makes it possible to estimate effects quite accurately and with high levels of confidence, even for small effect sizes. It demonstrates that Grade R indeed improves learning in mathematics and home language. However, impacts are larger in stronger provinces, higher quintiles and among top performers. Thus Grade R further extends the advantage of more affluent schools, rather than reducing inequalities. This may have much to do with quality of interventions and may suggest that impact relates to capacity, an issue returned to later. Importantly, the impact measured in this study was only in terms of learning (cognitive) outcomes. As Section 2 shows, good early childhood development programmes can also contribute to non-cognitive outcomes, which were not measured here.

5 GRADE R – COVERAGE, COST AND COST-EFFECTIVENESS

Between 2001 and 2012 the numbers of Grade R places in public and independent schools expanded more than threefold from just under a quarter of a million (242 000) to more than three-quarters of a million (768 000), an

average annual growth rate of 11% per year, or 45 000 additional learners or a thousand classrooms per year. A further 55 000 children attend Grade R in ECD centres. This total of 804 000 is 80% of the just over 1 million 5-year olds, though many Grade Rs are under-age. The General Household Surveys confirm the rapid expansion: in 2009 78% of 5-year olds were in some sort of education programme, up from 39% in 2002. More than 90% of all Grade Rs are in public schools, and 89% of public primary schools offer Grade R. Numbers of 5-year olds will remain stable at just over 1 million over the next 20 years, reducing pressure on new provision.

Cost per public school Grade R learner in 2011/12 was calculated as R3 112 per year, ranging from R845 in Limpopo to R7 823 in Gauteng, compared to about R10 500 in public ordinary schools (excluding Grade R), thus well below the 70% benchmark set in the funding norms and standards. However, the data appear suspect and on average probably under-estimate costs, as inaccuracies in accounting procedures are more likely to record Grade R spending as general school spending than the other way round. If government were to fund 90% of Grade R places, another 212 000 places may be necessary in the public system. At R3 112 per place that will require about R220 million per year extra over the next three years, but this may be an under-estimate.

Despite the remarkable progress in providing access, questions remain about coverage and quality. Getting an accurate picture is complicated by weak administrative data and population projections, and extremely low estimated spending in some provinces suggest cross-subsidisation of Grade R from other programmes or data inaccuracies due to how Grade R spending is categorised. Costing and estimates of cost-effectiveness first require improved basic data about enrolments and spending. It is necessary to get agreement on targets, data requirements and key data sets such as population numbers. Provincial data should be regularly interrogated to resolve anomalies and get a clear picture.

6 SOME RECOMMENDATIONS

The differential impact may imply that impact is associated with capacity, manifested in the supportive framework for Grade R in schools, availability of good teachers and parental support. Low and differentiated learning impact may be due to a wider endemic quality issue in schools rather than specific to Grade R. Quality thus needs attention.

Two quality dimensions relate to teachers and the curriculum. For teachers, issues include training and support, including qualifications, knowledge of *how* children learn and how to facilitate learning through structured play and mediated language experiences, and methodologies to achieve Grade R learning outcomes. Curriculum issues include practical guidelines and standards, and understanding of the curriculum.

Possible interventions to improve quality of Grade R delivery include:

- Improving pre-service training through FET Colleges and revising Current Unit Standards to ensure Grade R teachers know best practice and are trained in the most effective methods and approaches.
- Increasing opportunities for in-service training focused on providing teachers with ***practical strategies*** for supporting early learning and opportunities to see and practice best teaching.
- Development and evaluation of evidence-based learning programmes, resources and early interventions designed for the local context and appropriate for children from poor backgrounds.
- On-going structured curriculum support for teachers in implementing CAPS, particularly with practical ideas on '***how'*** to achieve learning outcomes.
- Development of ***common tools*** that can be used by teachers and researchers to assess children's language, literacy and mathematics development and to track progress in learning outcomes.
- Establishing criteria of quality that schools can use to self-assess and that can be used for M&E.
- Encouragement, of both a pecuniary and non-pecuniary nature, to attract and retain good Grade R teachers.
- Making culturally relevant storybooks in all South African languages more widely.
- Evaluating curriculum delivery, both in terms of 'structural aspects' (e.g. following lesson plans) and 'process-oriented' aspects (e.g. quality of interactions, relationship between child and teacher).
- The DBE should actively pursue its target of 100% Grade R coverage while addressing issues of quality. Relaxing the 85/15 split between public and community provision towards more community sites and active support of quality community pre-schools with strong norms and standards for monitoring these could serve both quality and access goals.

EVALUATION REPORT:

AN EVALUATION OF THE IMPACT OF THE INTRODUCTION OF GRADE R ON LEARNING OUTCOMES

1 BACKGROUND TO THIS STUDY

In 2012, ReSEP undertook a scoping study for the Department of Basic Education on whether an impact evaluation of the introduction of Grade R could be successfully undertaken with available data (Coetzee and Van der Berg, 2012). That study concluded that an impact evaluation was not possible that would be able to attribute *causal* impact to these two programmes, but that there were some data available to undertake studies on the impact of early learning (including Grade R) though causal impact would be less easy to establish. It was therefore proposed as an alternative that a retrospective survey be undertaken as part of the planned Verification part of the Annual National Assessment of 2012, on whether children participating in that study had attended Grade R, and to also ask respondents some questions on home background to control for these in an impact evaluation. However, for practical reasons, DBE did not implement such a verification process for ANA in 2012, thus this survey was not undertaken.

DBE did undertake a study as a response to determine how much could be garnered from SACMEQ, NIDS and GHS data. It then put out a call for a study of the impact of Grade R. ReSEP submitted a proposal, with the intention to use administrative data from the Snap Survey and the Annual National Assessment to assess the impact of the introduction of Grade R on learning outcomes.

This Outline Report reports on this research, as contained in the full final report. It includes a literature review of the available evidence of the impact of early learning on learning outcomes (Section 2); a re-estimation of the possible impact of Grade R or other forms of early learning based on the datasets included in the DBE report (Section 3); an impact evaluation based on the new data, the main part of the impact evaluation undertaken (Section 4); an analysis of the fiscal costs and projections thereof for Grade R (Section 5); and a conclusion (section 6).

2 LITERATURE REVIEW: EXPLORING THE EVIDENCE ON EARLY LEARNING

2.1 Introduction

This section provides a review of literature on early learning interventions. It looks at evidence regarding preschool specifically, as the avenue most closely aligned to Grade R, examines the theoretical economic case for supporting early learning and the available empirical evidence, surveys whether early learning interventions enhance educational efficiency, and critically examines the evidence that points to the importance of preschool education for future learning success. In exploring the evidence from the South African context, the review assesses the potential a preschool year holds to address some of society's intractable inequalities, and what capacity it has to have meaningful impact at scale. Finally, the review highlights the accumulated evidence which stresses the importance of high quality education programming to effect any long term change in children's cognitive, social and economic outcomes.

Science is unequivocal in its support for the importance of early childhood development. Calls for increased investment in young children cite neuroscience, developmental psychology and health. It is hazardous, however, to make a direct leap to policy recommendations. Simply because early childhood provides opportunities for more economically efficient interventions which can reduce poverty does not mean that ECD policies actually implemented are worthy investments. Firstly, it is difficult to design programmes that improve children's cognitive or behavioural development. Secondly, the costs of even effective programmes might outweigh the benefits they generate. Finally, in early childhood programmes may take decades to pay off.

There is recognition that the first few years of a child's life are a particularly sensitive period in its development, laying a foundation for cognitive functioning, behavioural, social and self-regulatory capacities, and physical health. These early determinants tend to reinforce each other (Richter et al., 2012). Interventions in the early days have the potential to shift these trajectories. Studies that are the basis for this consensus, however, differ in method, population, type of intervention (nutrition, education, parenting education, income supplementation), and type of outcome measured (anthropometric, cognitive, behavioural, school readiness), with some outcomes being short-term and some long-term (Nores & Barnett, 2010). The scientific knowledge base is constrained by limited evaluations of programme implementation; gaps in documentation of causal relations; and rare assessments of programme costs and benefits (Shonkoff & Phillips, 2000). Beyond the child health domain, information on programme effectiveness and efficacy in developing country contexts is limited, also in South Africa (Dawes, Biersteker, & Irvine, 2008). The sheer variety of programmes means that there is no consistent evidence based on common intervention modalities. Thus while there is agreement about the importance of intervening, there is less agreement about the most effective and efficient ways to do so.

2.2 Empirical evidence from benefit cost analyses and developing countries

All skills are built on a foundation of capacities that are developed earlier. Nobel laureate James Heckman and his colleagues show that returns on investment are greatest for the young because younger persons have a longer horizon over which to recover the investments, and because "skill begets skill." Motivation fosters skill and skill fosters motivation in a dynamic process. If a child is not motivated to learn and engage early on in life, it is most likely to struggle as an adult (Cunha, Heckman and Masterov, 2005). Thus the technology of capability formation has consequences for the design and evaluation of public policies. Heckman & Masterov (2007) argue that investing in disadvantaged young children is a policy with no equity-efficiency trade-off as it convincingly reduces the inequality associated with the accident of birth, and raises the productivity of society at large. Returns to later investment and remediation for disadvantaged young adolescents are low, while early investments have high returns (Heckman, 2007). Thus the phenomenon that early education programmes lead to improved cognitive scores that only last for a few years (Chetty et al. 2010) is attenuated by the fact that **learning is cumulative: even a temporary gain in cognitive ability will increase learning**. For some skills, the window of opportunity for full development is in the first three years of life (Shonkoff and Phillips 2000); other abilities such as non-cognitive skills may be relatively malleable during adolescence (Carneiro & Heckman, 2003).

There are two types of quantitative studies about ECD drawn from a limited number of studies in the US. One set studies high cost, high quality, pilot preschool programmes that provide "laboratory" evidence of possible returns to investments in early childhood. The other studies larger scale programmes such as the US Head Start preschool programme (Heckman & Raut, 2009), and the Chicago Child-Parent Center (CPC) Education Programme (Reynolds, Temple, Ou, Arteaga, & White, 2011).

Two US studies of model programmes randomly assigned children to treatment and control groups, had low dropout rates, and followed children over many years: the Carolina Abecedarian Project and the High

Scope/Perry Preschool Project. These two projects selected participants on the basis of low IQ ratings. The Abecedarian mothers were referred by welfare agencies. In addition, 98% of participants of both studies came from African American families. This convergence of low income, low IQ, welfare referrals and the targeting of ethnic minority groups, raises questions about the generalisability and relevance of the results (Penn, 2004). These two key studies were also high quality interventions, with strong programmes and low adult-child ratios of between 1:4 or 1:10, depending on the child's age. The Perry Project had a well-developed part time educational programme for four year olds, plus home visiting. Despite these considerable limitations to their generalisability, these two programmes are widely cited in the literature.

While small-scale ECD programmes can work, can special interventions like Perry Preschool or the Carolina Abecedarian Project be reproduced exactly on a much larger scale (Barnett & Ackerman, 2006)? The far larger Head Start programme draws mixed reviews: it is not of the same quality as the model interventions, and quality varied from centre to centre. Nonetheless Head Start centres are of higher average quality than other preschool programmes available to low income people (Almond & Currie, 2010). Children who participated in Head Start did better later in school than their siblings who did not benefit from the preschool intervention, and two recent studies found positive effects of the preschool intervention on outcomes measured in adolescence (Almond & Currie, 2010; Alderman, 2011). Detailed study of long term outcomes from the programme concluded that the benefits of large-scale programmes like Head Start could offset just 40-60% of the costs, a modest (but still positive) conclusion (Currie 2001).

US data suggests that ECD investment returns decline more or less continuously as income rises, and average returns for the middle class could be half of that for children in poverty (Barnett & Ackerman, 2006). Yet middle-class children can also benefit from quality ECD. For example, an evaluation of Oklahoma's universal preschool programme for 4-year olds, which is run through public schools, serves children from all SES backgrounds, and is considered a high quality programme, found substantial benefits[1] across all participants. While the programme yields the largest gains for children in lower-income families, gains for children who are not poor can be quite substantial (Barnett & Ackerman, 2006).

Reynolds and Temple (2008) noted that many programmes have assessed long-term effects into adulthood: three-quarters of the reviews reported effects at five or more years after the intervention. This indicates that lifetime impacts on economic benefits can be assessed. Secondly, the accumulated evidence includes both the model programmes, developed for research demonstration, and large-scale programmes, developed for routine implementation by schools and other institutions. Consequently, the generalisability of the evidence is much stronger today than a decade ago.

So while there is substantial empirical evidence that intensive early education interventions lead to significant short and long run benefits (Magnuson, Ruhm, & Waldfogel, 2004; Barnett & Ackerman, 2006; Karoly, Kilburn, & Cannon 2005; Belfield, 2004), much less is known about the benefits of expanding pre-primary education for the population as a whole in middle- and low-income settings (Berlinski, Galiani, & Manacorda, 2008), and little empirical evidence from developing countries has been published (Aguilar & Tansini, 2011). Alderman and Vegas (2011) highlight that this reflects the difficulty in identifying the impact of programmes from the impact of self-selection: comparisons of subsequent school achievement for those who attended preschool with those who did not, often merely show that if a family values education and is more motivated and engaged, subsequent school performance generally improves. Fairly recently, however, compelling evidence has emerged from South America.

[1] *Including a 80% of a standard deviation gain in pre-reading and reading skills, a 65% of a standard deviation gain in pre-writing and spelling skills, and a 38% of standard deviation gain in early math reasoning and problem-solving abilities.*

During the large-scale expansion of pre-primary school facilities in **Argentina** in the early 1990s, construction was targeted in poor areas with low pre-primary enrolment rates.[2] Preschool participation subsequently soared, highlighting the supply constraint bottleneck (Galiani and Berlinski, 2005). Berlinski, Galiani and Gertler (2009) demonstrated that one year of pre-primary education increased the average third grade test marks in standardised Maths and Spanish tests by 8% of the mean, or by 23% of the standard deviation of the distribution of test scores. Moreover, self-discipline, self-control, class participation, and concentration skills in third grade were also positively enhanced.

Berlinksi and colleagues (2008) evaluated the effect of pre-primary education on subsequent school performance in **Uruguay** by comparing siblings who had attended preschool to those who had not. By age 16, children who had attended preschool had obtained one more year of school education than their siblings who had not attended preschool, and were almost 30% less likely to have dropped out of school. Small gains from preschool attendance at early ages were magnified as children grow up. Aguilar and Tansini (2011) examined the performance of Uruguayan children at the start and after six years at school. Attendance at preschool was a major factor explaining school performance, leading them to conclude that preschool and children's performance in the first year at school are crucial for long term academic results.

Very few studies have examined the impact of ECD services on child outcomes in South Africa. The studies that have been done report mainly on health benefits for children, particularly with regard to nutrition and growth outcomes, and all these studies have been hindered by a lack of non-experimental data.

The Sobambisana programme found that the impact of programmes aimed at improving children's readiness for Grade R, assessed by means of cognitive, language, numeracy and academic readiness tests, was mixed. Best results were found in group programmes at ECD centres with curriculae aligned to these outcomes. It was found that, regardless of the efforts put into home-based, community and site-based ECD programmes, some factors largely beyond the programmes' control play a significant role in tempering the results (Dawes, Biersteker, & Hendricks, 2011).[3]

For this reason, there is a strong argument for recognising that educational solutions to poor general schooling outcomes can only address part of the problem. Many South African children arrive in formal school with their developmental potential considerably compromised and as a result, they are unlikely to be able to benefit much from what are often under-resourced educational settings (SAIDE, 2010). On the other hand, the school feeding programmes may bring other benefits to development for very poor children who enter Grade R.

2.3 Enhancing educational efficiency through early learning investments

Schools work with what families give them. The famous 1966 Coleman Report on inequality in US school achievement and a vast subsequent literature clearly document that the major factor explaining the variation in the academic performance of children is variation in home environments. Over the years, the ECD community has consistently argued for comprehensive and integrated services[4] for young children, and recognition that ECD encompasses sectors other than education, notably health and social welfare.

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[2] *Argentina embarked on a large infrastructure programme to increase school attendance for children aged 3-5 in 1993, and by 1999 had built enough classrooms to accommodate an additional 186 000 children (Galiani & Berlinski, 2005).*

[3] *High levels of stunting and under nutrition were recorded at all programme sites. Levels of cognitive development were below the norm for age. Both factors significantly reduce the efficacy of ECD.*

[4] *An integrated service includes provision of food, protection, health care, affectional care, stimulation, and activities to promote learning (Dawes, Biersteker, & Irvine, 2008). The National Integrated Plan for ECD (NIP) states its intention to provide, "an integrated approach for converging basic services for improved child care, early stimulation and learning, health and nutrition, water and sanitation."*

But as much of the strongest evidence for short-term gains comes from greater efficiency in primary schooling, the education sector has most to gain from making the case for more ECD programming. The key question is how much educational interventions before primary school entry can help reduce gaps so that children from all backgrounds can reap the returns from schooling.

The developmental trajectory of most children appears to be well established at school entry: schooling simply reinforces the emerging developmental trends and usually widens gaps (Feinstein, 2003). Almond and Currie (2010) suggest that characteristics that are measured as young as age 7 can explain a great deal of the variation in educational attainment, earnings and the probability of employment in later life. The developmental window of opportunity for rapid language learning is most widely open before children enter school: language levels at age 3 accurately predict those at age 10 and through high school (Gertsch, 2009; Dickinson & Porche, 2011; NICHD et al., 2005). A South African study found that language delays remained stable between Grades R to 3, suggesting that the education received was not powerful enough to make a significant difference to an already entrenched problem (Klop, 2005).

Emergent literacy during the preschool period (including the ability to manipulate phonemes and to recognise letters and letter sounds) predicts later reading achievement. Similarly, emergent numeracy skills in preschool (including counting, number knowledge, estimation, and number pattern facility) predict later mathematical competence (Duncan, Dowsett, et al., 2007; Welsh, Nix, Blair, Bierman, & Nelson, 2011). However, experimental evidence would be necessary to make claims about causation. A US national longitudinal analysis indicated that economically disadvantaged children may know only one to two letters of the alphabet upon entering kindergarten, even as middle-class children know all 26 letters. By age 3, children from disadvantaged backgrounds hear only about one quarter of the words that their more advantaged peers hear. **Starting behind they will stay behind.** This is the well-known Mathew Effect, as lifted from the biblical passage (Neuman, 2009).

The magnitude, breadth, and duration of impacts for preschool specifically have been found to be more consistent and stronger than most other remedial strategies (Reynolds & Temple, 2008), which is likely due to the greater dosage, intensity, and scope of services (Reynolds et al., 2011). Heckman and Raut (2009) show that preschool benefits especially children from poor home environments in acquiring many useful cognitive and non-cognitive skills. Self-regulatory capacities and attention skills of young children are powerful predictors of later academic success (Duncan et al., 2007; Dickinson & Porche, 2011), with earnings tending to be higher among individuals with higher non-cognitive skills (Brunello & Schlotter, 2011). Personality traits predict and cause outcomes. Heckman & Kautz (2012) describe how the Perry Preschool Programme improved the lives of its participants primarily through improving personality traits. An initial increase in participants' IQ disappeared gradually over 4 years following the intervention, but even though their IQs were not higher, the treatment group did better on achievement tests at age 14 than the controls (Heckman, 2008).

The extent to which early education represents a good investment of public funds is determined not only by early gains, but also how well subsequent classroom and school experiences serve to maintain these. Benefits of Head Start fade more quickly for black children because they are more likely to attend poorer quality schools than are white ex-Head Start children (Currie, 2001), leading some to argue that the benefits of Head Start depend, in part, on the quality of the school system, a point to note in countries with weak primary schools (Alderman & Vegas, 2011). However, using rich longitudinal data from the Early Childhood Longitudinal Study-Kindergarten cohort (ECLS-K), children who attended preschool were found to enter public schools with higher levels of academic skills than their peers who experienced other types of child care (Magnuson, Ruhm, & Waldfogel, 2007). Their findings also suggest that most of the preschool-related gap in academic skills at school entry is quickly eliminated for children placed in small classrooms, and classrooms providing high levels of reading instruction. Conversely, the initial disparities

persisted for children experiencing large classes and lower levels of reading instruction. Thus the longer-term effects of early childhood experience partly depend on classroom experiences during the first years of school. In other words, **preschool attendees achieved at relatively high levels, regardless of the type of classrooms experienced, whereas the classroom context mattered more among children who did not attend preschool** (Magnuson et al., 2007).

2.4 The quality imperative

In the same way that increasing *access* to education is no guarantee that young people will develop the *skills* they need for a rapidly changing and globalised world (Hanushek & Woessmann, 2011; Rolleston & James, 2011), a place in Grade R does not automatically boost a school career.

There is an international consensus that good quality ECD provision produces good outcomes – medium to large gains in cognitive and social skills – and conversely, poor provision leads to worrying outcomes, including negative, aggressive behaviour, poor language development (Currie, 2001), and an increase in child- or family-related developmental risks (Leseman, 2002). The effects of quality in the middle-range on child outcomes are small (Center on the Developing Child at Harvard University, 2007; Yoshikawa et al., 2007). For example, a large-scale study in the UK made the striking finding that three quarters of educational settings had not made any difference in children's vocabulary growth (Kennedy et al., 2012). In Cambodia, though, Rao et al. (2012) has found that even home-based and lowly resourced pre-school has an impact in learning in poor communities.

Quality is key: a quality curriculum, a quality teacher or practitioner (Excell & Linington, 2011), and a quality response to the particular developmental realities of children arriving in Grade R. To understand what quality in early learning may mean, it is first critical to understand how young children learn. This is especially true for Grade R, where curriculum and pedagogy are closely related and *what* children learn is as important as *how* children learn[5] (Excell, 2011). In addition, factors such as class size and children per teacher are also particularly important in this early phase. It is strongly argued by some that Grade R should be aligned with ECD pedagogical practice, and not be seen as a "mini" or "watered-down" Grade 1 (Excell & Linington, 2011). The fact that ECD programmes can be hijacked to become essentially a downward extension of uninspiring primary schools is a well-founded and internationally-shared fear (Arnold, Bartlett, Gowani, & Merali, 2007; Shaeffer, 2006).

Active, child-centred, participatory methods in which children learn by doing, manipulate concrete objects, are supported in their make-believe play in both structured and playful contexts, and are engaged in storybook reading and discussion (Kennedy et al., 2012) are often replaced by ultra-formalised methods where the child is reduced to a passive recipient. A focus on 'academics' tries to establish numeracy and literacy through a more didactic practice which favours table-top, sedentary activities such as worksheets and other largely 'inactive' activities (Excell, 2011). The more informal approach, however, is the most difficult to assimilate into the public school system because of its contrary philosophical underpinnings and requirements in teacher preparation.[6] In South Africa, the dichotomy between the two pedagogical models continues to trouble Grade R provisioning (Excell, 2011).

[5] In young children's learning, internalisation of concepts is facilitated by a three phase approach: children first experience these concepts kinaesthetically (through movement), then three dimensionally (through exploring with concrete apparatus), and only then through pen and paper activities. Play is instrumental in supporting both learning and teaching (Excell & Linington, 2011).

[6] In her interviews of numerous Grade R teachers as part of her doctoral thesis, Excell (2011) found that few could actually articulate a deep understanding of how to maximise children's learning through a play-based approach. De Witt (2009), in an assessment of 70 preschools in five SA provinces, found the lack of educational materials so complete that practitioners did no more than look after the children.

What is clear in both the international and South African literature, however, is that opportunities for emergent literacy development through exposure to reading, pictures and mediated explanations of text are especially important during this period (Richter, Dawes, & Kadt, 2007; Van Staden & Griessel, 2011; Naudé et al., 2003; Kennedy et al., 2012) because **deprivation in this area is the primary mechanism by which low income leads to underachievement** (Dearing, McCartney, & Taylor, 2009). Longitudinal evidence demonstrates the direct relationship between language skills and achievement at school, '*forming the basis for the formulation of questions, elaboration of knowledge and the reduction of ambiguity in new learning situations'* (Naudé et al., 2003). Another way of understanding this is that '*thinking is never more precise than the language it uses'* (Naudé et al., 2003). In general, learners with inadequate mediated language experiences lack higher-order thinking skills, and as a result exhibit poor associative ability and conceptual thinking, and impaired knowledge-acquisition processes which limit their potential to achieve at school (Naudé et al., 2003).

Low literacy levels are not unexpected in disadvantaged communities, and most learners from poor communities suffer from inadequate school preparation and experience 'special needs' when entering the formal school system (Naudé et al., 2003). While there is a strong link between quality preschool preparation and competency in early literacy skills (De Witt, 2009), relatively little is known about the specific features of preschool classrooms that contribute to language acquisition (Dickinson & Porche, 2011). Here the Grade R curriculum has a key role in closing gaps for children who do not come from print-rich homes; it has already been criticised for its lack of emphasis on language and emergent literacy (O'Carroll, 2011; Naudé et al., 2003) .[7] De Witt, Lessing, and Lenyai (2006) provide evidence on the limited emergent literacy preparation experienced in Grade R: 65% of Grade R learners do not meet the minimum criteria for early literacy development and will enter Grade 1 without the necessary skills or concepts to master reading. This does not mean that teachers need to introduce formal and possibly inappropriate learning situations into Grade R: letters and sounds can be taught through play and in the context of developing children's vocabulary and awareness of sounds in words (O'Carroll, 2011). But when priority is not given to teaching of letters in Grade R (though they are in the curriculum), the advantages of this important foundation remain a '*middle class secret*'.

2.5 Conclusion

Theoretically and empirically, over both short and long terms, at small or universal scale, in developed and developing countries, preschool interventions work. Direct intervention at the level of the child is a proven methodology for children of this age group, enabling them to become direct beneficiaries of state support, rather than support that is mediated through third parties. The principles of equity and social justice may better be served by investing in earlier stages of education.

Evidence points to the importance of preschool education for future learning success, the potential it holds to address some of society's intractable inequalities, and the capacity it has to have meaningful impact at scale in developing countries. Importantly, the accumulated evidence unequivocally stresses the importance of **high quality** education programming. There are few if any advantages to be gained from poor quality services (Richter et al., 2012).

While good schools can go far in helping poor children perform better, educational inequality is deeply rooted in economic problems and social pathologies that cannot be overcome by school alone. Grade R is not a 'magic bullet', yet a quality programme could be 'a powerful equaliser,' as it provides assistance

[7] Curriculum guidelines indicate that Grade R children should know 'some' letters by the time they start Grade R, but it would seem that the teaching of letter-knowledge is regarded as being primarily the responsibility of Grade One teachers (O'Carroll, 2011).

when children stand the best chance of reducing the disadvantages carried over to them from previous generations.

Yet Grade R also stands the risk of becoming nothing more than the Grade 1 of yesteryear, where the ECD goals of holistic child development and encouragement of lifelong learning become distant, an instrumentalist curriculum becomes more deeply entrenched (Excell, 2011), and educational inequality is perpetuated. This is particularly evident in language and emergent literacy development, which serve as critical determinants of children's successful adjustment to school and predictors of later outcomes in reading and written language in the higher school phases (Justice et al., 2010;Van Staden & Griessel, 2011). It is critical that the Grade R curriculum gives teachers clear messages about the important foundations for literacy that need to be laid in Grade R (O'Carroll, 2011).

Many of the concerns regarding Grade R raised in this review are not unique to South Africa and are echoed in many countries. However, given that South Africa is in the beginning phase of its Grade R implementation, there is still a window of opportunity to heed some of the cautions that have been expressed before this vital year simply becomes part of a more general education problem.

3 EXPLORING EXISTING DATASETS FOR EVIDENCE OF THE IMPACT OF GRADE R ON LEARNING OUTCOMES

Following a scoping study by the research team, the DBE undertook a study that used three available datasets, with their limitations for measuring causal impact, to ascertain what could be extracted from them regarding relationships between various forms of ECD on educational outcomes. However, two of these datasets do not contain direct questions about whether children attended Grade R, but rather focus on pre-school attendance generally, while the learning outcome measured in the third study is reported ability to read and write among 5 year olds. This section of the full report re-estimated the models found in the DBE report (DBE 2012) and tried to extend them, but arrived at precisely the same conclusions: There is evidence that suggest that there may be positive impacts of early childhood interventions on learning, but this evidence cannot show a **causal** impact, and is in most cases not directly linked to Grade R.

The main part of the impact evaluation, contained in Section 4, therefore utilises a completely new dataset obtained from linking the EMIS database, the SNAP survey and the Annual National Assessments. Given the shortcomings of the other datasets highlighted above, a major advantage of the administrative data is the fact that it is possible to distinguish between Grade R attendance specifically and general pre-school attendance. In addition, the exceedingly large dataset allows more precise measurement and therefore smaller confidence intervals. However, this dataset is also restricted in terms of how wide it allows the evaluation net to be cast. Unfortunately, household characteristics and information on child well-being such as health or nutritional measures are not contained in the data. In addition, children's learning outcomes can only be followed to Grade 6 and there is no information on their performance in the labour market. However, irrespective of these limitations, it is possible from this dataset to estimate the impact of Grade R attendance on cognitive performance, a good proxy for these other measures of child well-being. This data as well as the estimation strategy are described in the next section.

4 AN IMPACT EVALUATION USING A NEW DATASET BASED ON COMBINING ADMINISTRATIVE RECORDS

4.1 Data Description

The dataset used in the analysis was obtained by merging data from the EMIS masterlist of primary schools, the SNAP dataset that provides information on the numbers of learners registered for each grade, and the Annual National Assessments (ANA) of 2011 and 2012 that provide test performance in mathematics and home language for Grades 1 to 6. The EMIS data also provides further information on the school quintile and school fees charged in 2007, before the introduction of no fee schools, as a proxy for the socio-economic status of the learners in that schools. The dataset comprises of 18102 schools (76.4% primary schools, 20.2% combined schools, 3.4% intermediary schools).

In 2011, roughly between a third and 40% of all grade classes were both tested and their data captured in both mathematics and home/first additional language in the first Annual National Assessment (ANA). In 2012, these percentages were significantly higher, with between 78 and 84% of grade classes tested and captured in both ANA subjects. In 2011, approximately half of all Quintile 1, 2 and 3 schools failed to test any learners or to capture such tests. This compares to about a quarter of Quintile 4 and 5 schools. In 2012 there was a marked improvement in the proportion of lower quintile schools testing learners.

4.2 Methodology

4.2.1 Treatment measure

The analysis uses a (proxy) measure of "treatment", that is, the proportion of learners in a given grade in a given school that attended Grade R. Treatment (exposure to school-based Grade R) is calculated as the number of children in Grade R as a proportion of those in Grade 2 two years later. Using this formula, treatment for a Grade 5 class in a school in 2012 would, for example, be given by the number of Grade R learners in 2007 as a proportion of the Grade 2 children in Grade 2 in 2009. Grade 2 is used as denominator as high levels of repetition in Grade 1 may distort measurement.

A number of caveats need mentioning. First, the number of learners in the Grade R class may exceed the number of learners in Grade 2 if a school serves a wider catchment of Grade R learners who may move to other schools after Grade R. Where the ratio exceeded 1 it was taken to be 1, i.e. it was assumed that all children in such school cohorts had attended Grade R. A second complicating factor is that some learners may have attended Grade R at another educational facility, including at non-school based facilities. This may lead to under-estimates of treatment in such schools. Finally, where data for learners in Grade R is missing, it was assumed that there was no treatment.

4.2.2 Empirical model

The empirical model is set out in detail in the full report. The ordinary least square (OLS) regressions may give biased results due to what is known as endogeneity bias, however. For instance, there may be factors related to school and provincial decision making which affect both school performance and the likelihood of more children attending Grade R. Thus, for instance, it is possible that better managed schools would have been able to introduce Grade R earlier, while such schools may also benefit in terms of their performance. Alternatively, attempts by the authorities to expand Grade R rapidly in poor schools may have increased treatment in those schools where performance lags. Thus OLS may give biased results, because of such factors confounding the relationship between treatment and performance in the ANA tests. In order to control for the unobservable factors inherent in school processes, school fixed effects models were also estimated. What such fixed effects models accomplish is to observe the relationship

between the intervention (preschool) and learning outcomes *within* individual schools, and averaging that relationship across schools. It thereby eliminates those factors that operate across school and confound the relationship, such as differences in management, etc. (A fuller account and non-technical introduction to the use of fixed effects models is provided in Chapter 4 of the full report, particularly in Box 4.1.) Thus the existence of a number of observations of both treatment and performance (for each cohort, and for performance also across mathematics and reading) in each school offers the possibility of obtaining unbiased results using a fixed effects structure. Given that test scores are observed for Grades 1 through 6 in two years, it is therefore possible to use the variation in treatment across cohorts of learners within schools to identify the impact of treatment on test performance correcting for school unobservables.

The analysis is further also extended to quantile regressions that estimate the effect of explanatory variables on the dependent variable at different points of the distribution. This allows testing whether or not the relationship between treatment and test performance is significantly different at different points of the test score distribution. This can also be interpreted as differences with which schools of divergent effectiveness or quality are able to translate Grade R attendance into improved test performance. However, to eliminate the bias that comes from unobserved school level factors, a fixed effect version of this is again estimated with the focus on *differences* in the standardised test score and in treatment between 2012 and 2011. This first-differencing approach factors out any school fixed effects including time invariant school quality unobservables. Note that this model is based only on the sample of schools for which performance in both tests across the same grades were captured in both 2011 and 2012.

4.3 Results

4.3.1 Summary statistics for treatment measure

Table 4.1 shows that the proportion of schools with Grade R learners has been increasing over time, particularly within poorer quintiles. The proportion is the lowest in Quintile 5 and approximately doubled from 2005 to 2012 in Quintile 1, 2 and 3 schools. The expansion of Grade R provision to learners is further reflected in the average treatment by grade. Approximately 40% of Grade 6 learners in the lower quintile schools are measured to have attended Grade R, compared to about 70% in Grades 1 and 2. Quintile 5 schools have the lowest average treatment for the lower school grades. This may also be influenced by private institutions offering these services to learners from wealthier backgrounds. Treatment may therefore be under-estimated for Quintile 5 schools.

TABLE 4.1: PROPORTION OF SCHOOLS WITH GRADE R LEARNERS 2005-2012, BY SCHOOL QUINTILE

School quintile	2005	2006	2007	2008	2009	2010	2011	2012
1	43.9	51.4	63.1	72.0	79.2	83.0	85.4	86.1
2	45.3	53.6	65.1	74.5	82.3	87.0	89.2	90.3
3	50.7	59.8	67.7	73.8	80.3	85.2	87.3	89.2
4	54.9	60.8	66.4	71.3	76.4	79.6	82.3	84.2
5	57.3	60.5	64.0	66.0	71.5	75.7	77.3	78.9
All	48.0	55.1	64.2	71.7	78.5	83.1	85.3	86.6

Source: Own calculations from SNAP 2005-2012 and EMIS masterlist.

Schools with results captured in 2011 have considerably higher scores and lower exposure to Grade R than other schools. As lower quintile schools are under-represented in the 2011 sample, particularly schools from the Eastern Cape, Limpopo and KwaZulu Natal, pooling the 2011 and 2012 samples may distort the treatment effect. Thus analysis is undertaken with both pooled and separate year samples, but the analysis mainly concentrates on the more complete 2012 sample.

4.3.2 Least square and fixed effects regression results

As the dependent variable in all models is the *standardised* test score, regression coefficients can be interpreted as the *proportion of a standard deviation* change in test scores as a result of full treatment, i.e. the effect of introducing Grade R for those who obtained this treatment, i.e. a change in treatment from no treatment to full treatment.

Table 4.2 below summarises the estimated coefficient for the variable of interest, the proportion of learners who attended Grade R. The first column shows the results from a regression based on a pooled sample of 2011 and 2012 test scores. There is a positive and statistically significant coefficient on treatment of approximately 15% of a standard deviation for both mathematics and home language. Columns (2) and (3) show regressions for the 2011 and 2012 samples respectively. These indicate no significant difference association of treatment with home language test scores across the two years, but slightly smaller coefficient in 2012 than in 2011 for mathematics.

These OLS regressions may suffer from endogeneity bias, however: Factors related to school and provincial decision making may affect both school performance and the introduction of Grade R. Thus, for instance, better managed schools could have been able to introduce Grade R earlier. Alternatively, attempts by the authorities to expand Grade R in poor schools may have increased treatment most in those schools where performance lagged. Thus OLS results may be biased because such factors confound the relationship between treatment and performance in the ANA tests. To overcome this problem, the next set of regressions uses fixed effects at the school level. Standardising the test scores to have a mean of zero and a standard deviation of 1 means that all test results are expressed in the same metric, namely the relative performance of South African schools. Sample selection issues in 2011 may distort the treatment effect, thus it is best to focus especially on the better sample in 2012.

The final three columns of table 7 show the estimated impact of treatment after controlling for school fixed effects for the pooled model (column 4), the 2011 sample (column 5) and the 2012 sample (column 6). Though including school fixed effects substantially reduces the estimated treatment effect, it remains statistically significant. For the 2012 sample, treatment is estimated to have an impact of 2.5% and 10.2% of a standard deviation on mathematics and home language test scores respectively. Filmer et al (2006) regard 40% of a standard deviation as roughly equal to one grade level in school. Therefore, the estimates here indicate that having learners enrol in Grade R cause an improvement in average performance equivalent to somewhere between 6% and 25% of a year's learning across all grades, from Grade 1 to 6.

TABLE 4.2: ORDINARY LEAST SQUARES AND SCHOOL FIXED EFFECTS REGRESSION RESULTS

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Standardised mathematics test score					
Treatment	0.159**	0.199**	0.145**	0.053**	0.074**	0.025*
School fixed effects	No	No	No	Yes	Yes	Yes
Grade fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47694	14954	32740	129410	41451	87959
Dependent variable:	Standardised Home language test score					
Treatment	0.151**	0.153**	0.165**	0.093**	0.060**	0.102**
Observations	47696	14957	32739	129419	41461	87958

*Note: * p<0.05, ** p<0.01; robust standard errors in parentheses.*

As treatment may have different effects across school quintiles, school fixed effects models were re-estimated separately for each quintile. In most cases shown, treatment has no significant effect on test performance in lower quintile schools. A positive and significant effect of approximately 10% and 20% of a standard deviation is estimated for Quintile 4 and Quintile 5 schools respectively. (Full results are in the full report, and again shown in a graph in Section 6 of this Outline Report.) It therefore appears that the provision of Grade R to all learners will result in approximately half a year's learning in the wealthiest quintile, while there is statistically no indication of benefits for the lower quintiles.

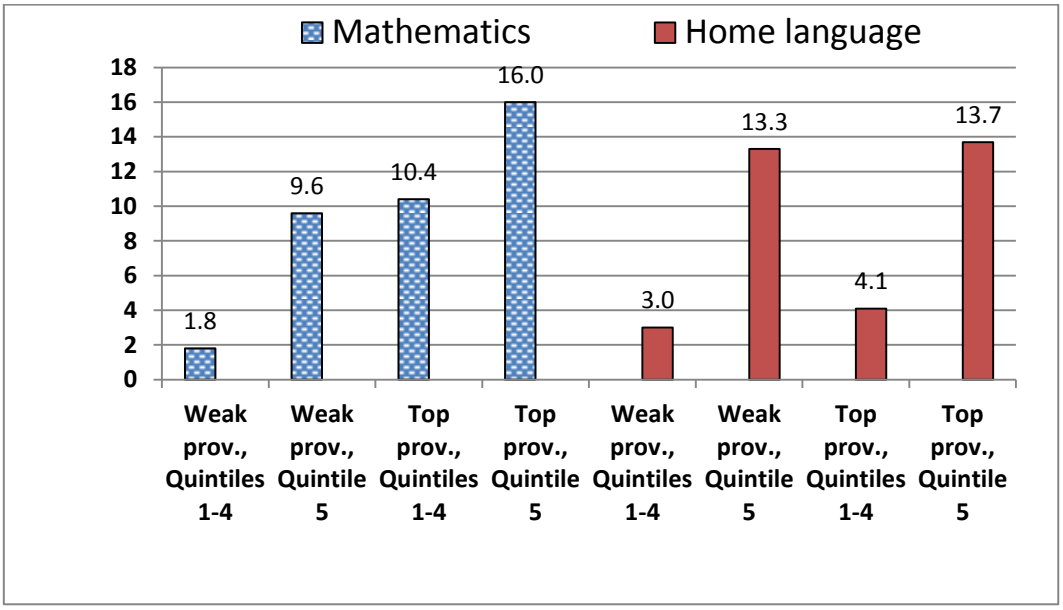
To capture possible differences in school functioning, the sample of schools was sub-divided into four groups: Quintiles 1 to 4 schools in weaker performing provinces; Quintile 5 schools in weaker performing provinces; Quintiles 1 to 4 schools in top performing provinces; and Quintile 5 schools in top performing provinces. The top performing provinces here identified were Gauteng, Northern Cape and Western Cape. This analysis was based on the premise that the top performing provinces may face fewer constraints with regard to the functioning of school based programs and the quality of the Grade R teachers they may be able to attract. Treatment has a positive and statistically significant effect across all four sub-samples, that is, also in the bottom four quintiles (table 4.3 and figure 4.1). However, there are noticeable differences in the magnitude of the effect. Treatment increases average mathematics performance by only 1.8% of a standard deviation in poorer schools in weak performing provinces, compared to an effect of 9.6% of a standard deviation for Quintile 5 schools in the same provinces. This is similar to the impact of Grade R in poorer schools in the top performing provinces. This suggests that Grade R provision provides greater benefits for mathematics learning when implemented within a well-functioning education system, even in the poorer schools in such provinces. The wealthiest schools in the top performing provinces experience the largest impact of treatment in mathematics at 16% of a standard deviation. For home language test score, the effect of treatment is also smaller for Quintiles 1-4 schools (3-4% of a standard deviation) relative to Quintile 5 schools (13% of a standard deviation). However, unlike mathematics performance, there does not appear to be any statistically significant differences in the effect of treatment across the two province groupings within the same school wealth quintiles.

TABLE 4.3: EFFECT OF TREATMENT BY SCHOOL QUINTILE AND PROVINCE, 2012

	(1)	(2)	(3)	(4)
Dependent variable:	Weak performing provinces		Top performing provinces	
	Quintiles 1-4	Quintile 5	Quintiles 1-4	Quintile 5
	Standardised mathematics test score			
Treatment	0.018*	0.096*	0.104**	0.160**
School fixed effects	Yes	Yes	Yes	Yes
Grade fixed effects	Yes	Yes	Yes	Yes
Observations	54095	3219	10786	3179
R-squared	0.002	0.030	0.009	0.239
	(5)	(6)	(7)	(8)
	Standardised home language test score			
Treatment	0.030**	0.030**	0.030**	0.030**
Observations	54094	54094	54094	54094
R-squared	0.023	0.023	0.023	0.023

*Note: * p<0.05, ** p<0.01. Robust standard errors in parentheses. 2012 ANA sample only.*

FIGURE 4.1: IMPACT BY PROVINCIAL AND QUINTILE GROUPS: FIXED EFFECTS ESTIMATES (IN % OF A STANDARD DEVIATION)



The final school fixed effects model tests for differences in the treatment effect across the different grades, using variation in treatment *within* the same school and grade. It does not appear as if there is any clear evidence of patterns across grades and effect "fade out" at higher grades.

4.3.3 Quantile regression results

There may be differences in the strength of the treatment effect between schools that over- or under-perform. A common way of teasing out such differences is through quantile regressions, which weight different points in the distribution differently. Thus, if a quantile regression is run at the 90% percentile or 0.90 quantile, the top 10% of the distribution are given 9 times the weights of other observation. The results suggest differences across the distribution of test scores, as the treatment effect is estimated to be largest at the median and smallest at the 10th and 90th percentiles. However, these results should be interpreted with caution as they may be biased because school fixed effects could not be used in normal quantile regression. Thus it is likely that they are subject to the same bias that exists with OLS.

4.3.4 First-differenced quantile regressions with fixed effects

A way around this, to make it possible to account for school unobservable factors through fixed effects and nevertheless estimate quantile rather than ordinary regressions, is to focus on a dependent variable that is the first difference between the results in 2012 and those in 2011. School fixed effects are controlled for by using the *difference* in standardised test scores across 2011 and 2012. The outcome variable is no longer the *level* of performance but the *change in performance* of a given grade from 2011 to 2012. The interest here is therefore in measuring the impact of treatment at different points of the distribution of these performance changes between 2011 and 2012. It is only possible to do this using the sample of schools for which performance was captured for the same grade across *both years*. Given this, the dependent variable is estimated using performance scores which are re-standardised using only data from this sample. Specifically, Quintile 4 and 5 schools as well as schools from the Western Cape, Northern Cape and KwaZulu-Natal are over-represented and schools from the Eastern Cape and Limpopo under-represented. When treatment effects from table 12 are plotted with 95% confidence intervals as in the full report, it becomes evident **the treatment effect is of similar magnitude across the 10th, 20th and 50th percentiles while it is significantly larger for the 80th and 90th percentiles, in both mathematics and home language.**

Thus, encouragingly, it appears that schools across the distribution that were included in this sample that was tested in both years did benefit from Grade R. Less encouragingly, however, there were indeed *stronger* effects at the top of the distribution, if one controls for school effects, and treatment – the introduction of Grade R – actually *widens* the performance gap between schools, in the sample tested in both years.

4.3 In summary: The impact of Grade R on school performance

The analysis has shown significant, though not very large, effects of introduction of Grade R on learning performance in the primary school system, and this effect does not show appear to decline with time.

It is encouraging that this analysis has now showed, without any doubt, that Grade R does indeed improve learning in both mathematics and in home language. This was made possible by the creation of a unique and exceedingly large dataset based on administrative data. The size of the dataset makes it possible to estimate effects quite accurately and generally with high levels of confidence, even for small effect sizes.

What is less encouraging, though, is that the effects of treatment are quite small and also differentiated across the system. On average, the effect is equivalent to only 6% of a year of learning in mathematics and 25% for home language, or if for a school year of 200 days of instruction, it amounts to what the average learner should learn in 12 days or in 50 days for mathematics and home language respectively.

These effects are the strongest in stronger provinces and higher quintiles, particularly quintile 5. Although the first differenced quantile regressions could only be undertaken for a sample of schools whose performance data were captured in ANA in both 2011 and 2012, this further supports the picture of differentiated performance gains. If this is the case, Grade R has widened rather than narrowed performance differentials across the school system, as schools that have gained most had started off with better performance.

Thus the gains follow a pattern that is all too familiar in the South African schools system: Positive interventions in schools to improve performance fall on fertile ground in some schools – mainly in stronger provinces and higher quintiles, where capacity may already be strong. The schools that have the largest deficits unfortunately do not gain as much and may even fall further behind. This may have much to do with the quality of interventions, as discussed in the literature review in Section 2, and the ability of schools to implement them. This will be returned to in the Conclusions.

5 GRADE R – COVERAGE, COST AND COST-EFFECTIVENESS

This component of the study focused on Gr R coverage and cost in order to build a foundation for potential cost estimates and, if possible, estimates of cost-effectivieness. Key findings are set out below.

Grade R coverage targets have been expressed in a number of different ways which has sometimes led to confusion. Targets from Whate paper 5 include two general coverage indicators (% of the cohort of five-year olds in Grade R and the proportion of Grade 1 learners who previously attended Gr R or some form of pre-school); two indicators about public school coverage of Grade R (the proportion of public schools offering Grade R and the propotion of the cohort accommodated in public schoiol Grade R) an indicator specifying an overall state funding for Grade R (75% of overall Grade R spending) and indicator focusing public sector Grade R spending per learner relative to spending per learner in other grades (a target of 70%).

There are substantial questions and anomalies with regard to basic coverage and spending data. With regard to coverage data there is a significant gap in coverage conclusions between survey and administrative data, with survey data suggesting much higher coverage of Grade R than administrative.

Grade R facilities and places have expanded rapidly in public sector schools and as a result Grade R coverage is high and increasing. A large majority of Grade R places are now in the public sector (732 755 out of 803 567 in 2011, or 91%). While coverage is high on average it is quite uneven among provinces. Some provinces therefore still face a significant challenge in universalising access to Grade R. Data seems to indicate that coverage is related inversely to average spending per Grade R learner. Those provinces that have achieved near universal coverage (in the sense of a Grade R gross enrolment rate of around 100%) therefore seem to face a significant quality challenge.

TABLE 5.1: PROPORTION OF PRIMARY AND COMBINED PUBLIC SCHOOLS OFFERING GRADE 1, 2011 BY PROVINCE

2011	Public Grade 1 Schools	Public Grade R Schools	% of public primary schools with Grade R
EC	4 626	4 478	97%
FS	988	532	54%
GT	1 370	1 132	83%
KZN	4 040	3 887	96%
LIM	2 427	2 274	94%
MPU	1 249	998	80%
NC	435	320	74%
NW	1 072	865	81%
WC	1 109	886	80%
Total	17 316	15 372	89%

Source: EMIS Annual Survey database

By 2011 the education system was rapidly approaching the target of universal GrR, either in the sense of the majority of public schools offering Grade R or in the sense of places available for the majority of the age cohort. Just less than 90% of public schools with Grade 1 offered Grade R in 2011. In all provinces 80% or more of schools with Grade 1 offer Grade R, except Free State (only 54%) and Northern Cape (74%). The Eastern Cape, KwaZulu-Natal and Limpopo all had well in excess of 90% of primary or combined public schools offering Grade R.

TABLE 5.2: NUMBER OF GRADE R LEARNERS IN PUBLIC AND PRIVATE INSTITUTIONS, NUMBER OF 5-YEAR OLDS AND GROSS ENROLMENT RATES, 2011 BY PROVINCE

2011	Gr R learners in public schools	Gr R learners in public ECD centres	Gr R learners in Independent Schools	Gr R learners in independent ECD Centres	Total Gr R learners	5-year olds	Gross enrolment rate
EC	164 925		3 821		168 746	141 780	119%
FS	30 889	223	890	3 776	35 778	55 599	64%
GT	73 807		11 008	15 510	100 325	200 438	50%
KZN	180 494	628	3 584	1 658	186 364	213 866	87%
LIM	107 502	5 237	3 394	334	116 467	133 382	87%
MPU	56 162	2 390	1 504	3 129	63 185	82 003	77%
NC	13 181	2 719	226	1 511	17 637	23 327	76%
NW	42 062	1 709	1 033	829	45 633	66 029	69%
WC	50 495	332	3 237	15 368	69 432	96 806	72%
Total	719 517	13 238	28 697	42 115	803 567	1 013 229	79%

Source: EMIS Annual Survey and Survey of ECD Centres

In terms of Grade R places (including GrRs in public and independent schools and public and independent ECD centres) compared to the cohort of 5-year olds (or the gross Grade R enrolment rate) an average

enrolment rate of 79% in 2011 again hides provincial diversity. Provincial coverage ranges from 119% in the Eastern Cape (suggesting underage enrolment) to 50% in Gauteng. Part of the gap in Gauteng and Western Cape (72% gross enrolment) might be explained by unregistered and non-subsidised facilities serving higher income groups. Thus, survey data strongly suggest that overall coverage is being underestimated via administrative data and also suggest different provincial rankings, with especially Gauteng having higher coverage in term so of the survey data.

The Grade R funding norms and standards allows for 2 approaches to public sector provision through schools. One alternative is to transfer all Grade R funding to a specific school governing body who will take full responsibility for all expenditures (also salaries to ECD practitioners) (referred to as the "transfer" model) and the second alternative is for the province to pay salaries of practitioners and to transfer the rest of the allocation to schools (funding for goods and services and payment for utilities) (referred to as the "salary" model).

The best example of the transfer model is the Western Cape: The bulk of its Grade R spending, (60% In 2011/12) is transferred directly to schools. Schools in 2013 receive a subsidy ranging from R20 per learner per day (R4 000 per learner per annum) for quintile 1 schools to R16 per learner per day (R3 200 per annum) for quintile 5 schools. The minimum subsidy per school (in the case of schools with fewer than 20 learners) is R84 000 per year. Schools are advised that the minimum salary for an ECD practitioner should be R6 000 per month or R72 000 per annum. Schools are also advised that 80% of their subsidy should contribute to teacher salaries, 10% to LTSM and 10% to payment of utilities and other daily running costs.

While the Northern Cape also transfers more than 50% of Grade R funding to schools, most other provinces seem to pay the bulk of Grade R spending in te form of salaries from the provincial head office. Personnel expenditure comprises 76% of Grade R spending in the Eastern Cape and 95% in the Free State. The situations in Gauteng and Limpopo are not clear, more than 50% of expenditure in these provinces are classified as "goods and services".

The cost per public school Grade R learner in 2011/12 was calculated as the total provincial spending on Grade R in public schools divided by the number of Grade R learners in public schools according to EMIS in 2011. The average cost, including capital spending, is R3 112 per learner per year, ranging from R845 per learner per year in Limpopo to R 7 823 per learner in Gauteng. This average of R3 112 compares to an average spending of about R10 500 per learner in public ordinary school (excluding Grade R) in 2011. The Grade R spending in all provinces is therefore substantially below the 70% benchmark set in the funding norms and standards and widely seen as cause and indicator of quality problems in the sector.

TABLE 5.3: PROVINCIAL SPENDING PER GRADE R LEARNER IN PUBLIC SCHOOL, 2011 (INCLUDING AND EXCLUDING CAPITAL EXPENDITURE)

2011	Public school Gr R spending per public school Grade R learner including capital expenditure on ECD programme	Public school Gr R spending per public school Grade R learner excluding capital expenditure on ECD programme
EC	R2 199	R1 880
FS	R2 707	R2 707
GT	R7 823	R7 820
KZN	R2 836	R1 299
LIM	R 845	R 845
MPU	R2 623	R2 104
NC	R3 736	R3 735
NW	R4 592	R3 783
WC	R4 409	R3 488

Total	R3 112	R2 500

Source: Calculations from National Treasury, Provincial Budget Database and EMIS, Annual Survey data

However, the data contained in this table appear highly suspect. The ratio of per capita spending between Gauteng and Limpopo of more than 9 to 1 cannot be accurate. Even if teacher salaries in Gauteng were 3 times as high as in Limpopo, class sizes would also have to be about three times as large in Limpopo as in Gauteng to make ratios of this magnitude in personnel spending possible (and personnel spending dominates overall spending). So both these figures may be inaccurate. Ignoring these two outlier values produces average expenditure of around R3 300 per child, a figure of the same order of magnitude as the average calculated from the data, so the calculated average will be used in further fiscal calculations. However, it would be well to remember that it is likely to err on the low side, as inaccuracies in accounting procedures are more likely to record Grade R spending as general school spending than the other way round.

If one deducts all capital expenditure in provincial education Programme 7 (ECD) from spending on Grade R in public schools, it reduces the per learner per year spending in 2011 to approximately R2 500 per year. Because of very large capital expenditure in KwaZulu-Natal it reduces per learner recurrent expenditure form R2 836 to R1 299 per year.

Given the significant differences between provinces in terms of coverage and cost of provision of a Grade R place, projections of an overall spending gap may not be particularly useful. If government were to fund 90% of Grade R places (for 5-year olds), another 212 000 places may be necessary in the public system. At an average cost of R3 112 per place that will require about R220 million per year extra over the next three years or a cumulative R660 million after 3 years. If average spending is to be increased, the cost of universal coverage will obviously increase as a number of provinces spend less than the average at this stage.

South Africa has made remarkable progress over the last decade in providing access to Grade R in the school system in general and in the public school system in particular. However, questions remain about coverage (given different approaches to target definitions and uncertainties about data) and about quality (with spending data suggesting widely varying spending per learner and spending significantly below the target of 70% of spending per learner in grades above Grade R).

Coverage estimates using administrative data and population projections confirm rapidly expanding coverage but raise questions about population estimates on the one hand (with some provinces having coverage above 100%) and, on the other hand, whether all types of institutions are satisfactorily covered by the data (there is unexpectedly low coverage on the basis of administrative data in a number of provinces such as Gauteng, Free State and Western Cape).

Issues with regard to spending and unit cost include extremely low estimated spending per learner in some provinces, possibly suggesting “cross-subsidisation” of Grade R from other programmes or data inaccuracies due to the way spending that flows to Grade R is categorised.

Before costing models can be refined and estimates of cost-effectiveness can be attempted it is important for the basic data about Grade R enrolments and spending on Grade R to be improved. It is therefore necessary to get agreement on targets, data requirements and key data sets such as population number. In addition, provincial data should be regularly interrogated and discussed to resolve anomalies and get a clear picture of provincial performance, in order to inform planning. Understanding of what has been attained in terms of coverage and of spending will be enhanced by better setting out of the different provincial delivery models.

6 SUMMARY AND CONCLUSION, AND SOME POLICY RECOMMENDATIONS

6.1 Summary and conclusion

This study set out to provide a literature review if the impact of early childhood development generally, and Grade R specifically; to re-analyse the datasets that were analysed in the DBE report that found some, though limited, evidence supportive of a possible positive impact of ECD and Grade R attendance on learning; to create a new dataset from administrative data and to use this to estimate the impact of Grade R on subsequent learning ; and to assess some fiscal issues around Grade R, and in particular its cost effectiveness.

The literature showed that there is a wide consensus in the literature that ECD potentially has beneficial impacts that are strong and long lasting, with repercussions into adulthood, and that important equity gains result from such interventions. In this analysis, it became apparent that the quality of ECD interventions is crucial, and that Grade R does not simply mean an earlier start to school, but requires a very specific type of intervention to be successful with such younger children. In particular, there is a critical role for language and emergent literacy in Grade R, to ease children into the formal schooling process and to lay the foundations for learning in subsequent years.

The re-estimation of models using data from NIDS, SACMEQ and the GHS broadly confirmed what the DBE report had already found, that the association of ECD with the learning outcomes that could be measured in these datasets provides suggestive evidence of an impact on learning, but that no causal links could be extracted, due to limitations with the data, an issue already made clear by this research team in the scoping study undertaken in 2012 (Coetzee and Van der Berg 2012).

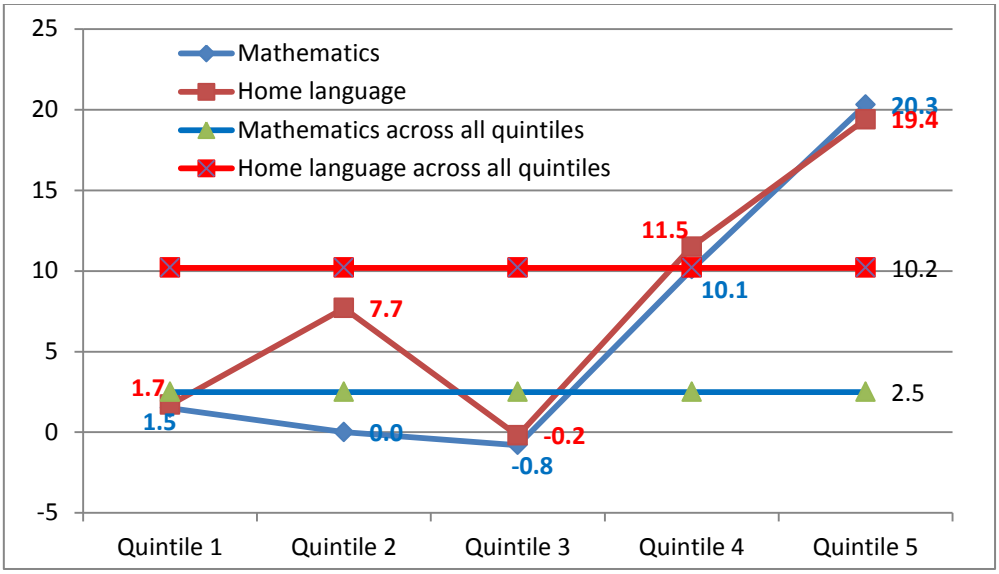
The creation of a new dataset by combining information from various existing datasets made possible a new impact evaluation. Due to the repeated measurement in each school (ANA results from Grade 1 to 12) and different treatment intensities that could be measured for different cohorts of students, it was possible to turn to fixed effects models to overcome many of the problems of endogeneity that plague such evaluations. Thus it became possible to conclude, with strong evidence, that there were significant, though small, effects of Grade R exposure on learning in subsequent years. There is no clear evidence that the benefits of such learning faded out in the first six years of primary school beyond Grade R.

To put the impact of the Grade R programme into perspective, exposure to Grade R increased mathematics scores in subsequent years on average by 2.5% of a standard deviation, and home language scores by 10.2% of a standard deviation. In a review of preschool programmes in the United States, Reynolds and Temple (2008) found average effects to be about 42% of a standard deviation on cognitive outcomes shortly thereafter. In comparison, Oklahoma's universal preschool programme (pre-K) for 4-year olds, considered a high quality programme, had experienced a 80% of a standard deviation gain in pre-reading and reading skills, a 65% of a standard deviation gain in pre-writing and spelling skills, and a 38% of a standard deviation gain in early math reasoning and problem-solving abilities (see discussion in Chapter 2). In Argentina, it was found that one year of pre-primary education increased the average third grade test marks in standardised Maths and Spanish tests by 23% of a standard deviation of the distribution of test scores (Berlinski, Galiani and Gertler 2009).

In Oklahoma, as in South Africa, these effects were much larger for middle class children (Barnett & Ackerman, 2006). In South Africa, effects were more substantial for the higher quintiles (10.1% of a standard deviations for Quintile 4 in Mathematics, 20.3$ for Quintile 5; 11.5% for Quintile 4 in Home

Language, 19.4% for Quintile 5), but close to zero in most cases for the other three quintiles in both subjects. Figure 6.1 summarises the results.

FIGURE 6.1: SUMMARY OF FIXED EFFECTS ESTIMATES OF IMPACT BY SUBJECT, 2012 (MEASURED IN PERCENTAGE OF A STANDARD DEVIATION IN LEARNING OUTCOMES FROM GRADE 1 TO 6)



Thus there is a net positive impact of Grade R on learning outcomes in South Africa, and the effect is much stronger in the more affluent schools, while effects in weaker schools are extremely weak. It was also shown that effects appear to be stronger in certain provinces, namely Gauteng, Northern Cape and Western Cape. First differenced fixed effects in used with quantile regressions further support a view that impact is higher at the top end of the socio-economic and performance spectrum. Grade R further extends the advantage of more affluent schools, rather than acting to reduce inequalities.

Together this seems to point to a possibility that impact is associated with capacity. If this is indeed the case, capacity could perhaps manifest itself in the supportive framework for Grade R, in the availability of good teachers, and in parental support. Clearly, however, there is a quality dimension that needs to be investigated in order to ensure that Grade R has a greater impact, and that it serves to narrow rather than widen existing inequalities.

The impact measured in this study was only in terms of learning (cognitive) outcomes. As Section 2 showed, good early childhood development programmes can also contribute to non-cognitive outcomes, which were not measured here. Some learners probably gained from attending Grade R through improved nutrition, but the very limited gains in cognitive outcomes make it unlikely that improved nutrition was an important channel through which learning gains occurred.

Chapter 5 of the report deals with coverage of Grade R, costs and cost effectiveness. Coverage has expanded greatly, particularly in poorer schools, and the gross enrolment rate has reached 80% of 5-year olds. Further expansion to universalise Grade R is well under way and within reach, and the slowing down of fertility has also slowed the expansion of numbers of children who need to be accommodated. Against the rapid expansion must be put a warning that success should not be measured by access alone, but by what is actually being achieved (Technical Assistance Unit: National Treasury, 2008).

Cost per public school Grade R learner in 2011/12 was calculated at R3 112 per year, compared to R10 500 in public ordinary schools excluding Grade R, thus well below the 70% benchmark. Actual spending may be higher, given inaccuracies in recording Grade R spending. If government funds 90% of Grade R places, 212 000 more places may be needed. This may require R220 million per year extra over the next three years, but that may be an under-estimate. An accurate picture is complicated by weak administrative and

population data, and low recorded spending per learner suggests cross-subsidisation of Grade R or inaccuracies in how Grade R spending is categorised.

As the impact evaluation in Chapter 4 has shown that Grade R learning gains are for mathematics only 6% and for home language 25% of what can be regarded as normal progression for a year of learning, even the low and probably under-estimated costs of providing Grade R places shown in that chapter constitute a still a much higher proportion of cost per non-Grade R learner than their relative learning. Thus, despite the limitations of the cost data, it is clear that compared to learning and costs in other grades, a year of Grade R is not cost-effective in terms of improving learning outcomes. More accurate and thus higher cost estimates for Grade R would further strengthen this conclusion. Such a statement on cost-effectiveness is in terms of cognitive outcomes only, and does not consider possible non-cognitive gains. Also, this statement is relative to cost-effectiveness in the rest of the school system, which is also not high.

Yet Grade R has now become an important part of the school offering and it would be **unthinkable not to continue with universalising Grade R**, in the light of the international literature on the value of Early Childhood Development in reducing learning deficits, international evidence that such early interventions can be most cost-effective, and the great efforts made to institute this programme. The challenge now is to deal with the low quality of the Grade R programme and to ensure that it makes the contribution to early childhood development that it was intended to do. Rapid roll-out put great strains on quality of provision, and turning this around ***before*** the system settles into low quality is essential. Though this is not the focus of this report, the recommendations that follow do draw from existing research and earlier reports to provide some guidance on desired interventions to improve quality. This is the only route to improve cost-effectiveness, as the cost of providing Grade R places is already quite low and may have to rise to deal with some of the quality concerns. ***To improve cost-effectiveness would thus require greater learning gains resulting from enhanced quality.*** This needs to be put into place with great urgency.

6.2 Recommendations

Dealing with quality

The findings of this impact evaluation point to problems of implementation in the quality of Grade R, despite the great success with access and roll-out. To some extent the relatively rapid roll-out may have contributed, but to a large extent the problems of Grade R that emerged from the analysis – a modest overall learning impact and benefits being far less in poorer schools – may indicate that these are more endemic issues that cannot really be laid at the door of implementation of Grade R in particular. In addition, factors such as class size and children per teacher are also particularly important in this early phase.

Nevertheless, it is possible to use this opportunity to reiterate once again some of the known issues and problems of implementation and policy choices in ECD. Readers are particularly referred to previous work such as the findings and recommendations emanating from the National Treasury research (2008), the research done for the Gauteng Department of Education (2009), the Eastern Cape Provincial Department of Education (2008) and the SAIDE Grade R research project (2010).

Although many factors influence quality of pre-school or Grade R provision, research seems to suggest two key quality dimensions that may differ across parts of the system. The first relates to teacher training, their quality and the support they receive from both the department and their schools, their qualifications and the pedagogical rigour of these, and their knowledge of *how* children learn and consequent understanding of how to facilitate learning through structured play and mediated language experiences, and the expected methodologies to achieve Grade R learning outcomes. In interviews of numerous Grade R teachers, Excell (2011) found that few practitioners could actually articulate a deep understanding of

how to maximise children's learning through a play-based approach. It is recommended that opportunities for in-service training are increased, focused on providing teachers with ***practical strategies*** for supporting early learning and opportunities to see and practice best teaching, including observations, simulations, role-plays and working in contextually appropriate model environments. Importantly, this needs to be supported with on-going, on-site ***mentoring***.

Linked to this is the recommendation to improve pre-service training through FET Colleges. The current Unit Standards limit the extent to which teachers develop the skills and knowledge to support early learning. There is a need for compulsory, evidence-based early childhood education content in all ECD qualifications. Revisions to Unit Standards and Learning Programmes are essential to ensure that Grade R teachers are conversant with best practice around supporting early learning, and trained in the methods and approaches that have been shown to be most effective. Finally it is recommended that encouragement, both pecuniary and non-pecuniary, be given to Grade R teachers to ensure that good and qualified teachers do not aspire to move into other Grades in the Foundation Phase, to the detriment of the quality of Grade R provided.

The second quality dimension that requires attention is the curriculum, and specifically, **practical curriculum guidelines and standards**, and confidence in teachers' knowledge and understanding of the curriculum. Here, on-going structured curriculum support for teachers is recommended with regard to the implementation of CAPS, particularly with practical ideas on '***how'*** to achieve the learning outcomes stipulated in CAPS. It is essential that schools that are DSD registered (i.e. community preschools that are currently only registered to provide ECD with the Department of Social Development and are working towards registration with DBE) receive support to deliver CAPS. Many of the factors such as safety, cleanliness, and organisation of the child's environment and impact on learning are already being measured as part of the formal registration processes. Thus there is a need to evaluate the delivery of the curriculum – do teachers show fidelity to ***both*** the 'structural aspects' of curricula (e.g. using specified materials, following lesson plans) and 'process-oriented' aspects (e.g. quality of the interaction and relationship between child and caregiver)? In the South African context, quality of provision is also affected by the availability of materials that support the implementation of the curriculum. De Witt (2009), in an assessment of 70 preschools in five SA provinces, found the lack of educational materials so complete that practitioners did no more than look after the children.

It is also recommended that ***common tools*** are developed that can be used by teachers and researchers to assess children's language, literacy and mathematics development and to track progress in learning outcomes. The establishment of quality criteria, including indicators and measures, that enable both schools and ECD centres to self-assess, and which can be used for M&E at provincial and national level is vital, as is provincial and district support staff. Criteria for evaluating the suitability of potential interventions could include evidence-based content that has been written for the local context, addresses the needs of disadvantaged children and children learning in a second language, and whether interventions or tools can be used effectively by educators with little training, are compatible with a variety of delivery contexts, and are relatively inexpensive.

Finally, it is recommended that recognition, resources and funding be given to support the significant role played by home-learning environments, including potential awareness-raising campaigns to help parents/caregivers understand and value their role in supporting early learning in the home. To this end, culturally relevant storybooks in all South African languages should be made more widely available to parents/caregivers, in particular through community libraries.

Coverage

The DBE should actively pursue the target of 100% Grade R coverage while simultaneously addressing issues of quality. Given the evidence on the importance of early learning and the long term impact of not investing in the early years, one cannot be prioritised over the other.

A relaxation of the 85/15 split between public and community provision of Grade R towards more community sites, and the active support of quality community pre-schools could serve both quality and access goals simultaneously.

Researching Grade R

There is currently little systematic evidence on teaching and learning in Grade R and the quality of Grade R in terms of developmental needs (see Chapter 2 in this regard). DBE should encourage research in these matters, including funding of independent classroom based research in Grade R, and of the progression of children from Grade R to Grade 1. Such research would improve the evidence base for policy and interventions to enhance quality.

Data needs

It is essential to improve the data and knowledge base for the provision of Grade R. This requires more attention to population estimates and projections, improvements to but especially greater use of the official enrolment data (EMIS) to address under-age enrolment, and especially attention to the accounting procedures and classification relating to the cost of Grade R provision.

The dataset created from administrative data has shown the power of the Grade R testing as a way of measuring performance throughout the education system. It is crucial that the Annual National Assessments should be testing accurately over time as well. This requires more attention to equating of the difficulty level of these tests over time, utilising advanced techniques to ensure proper calibration and measurement of progress.

Though **cognitive testing at Grade R level** is complex to do for large numbers of children (individual testing may be required) and it is therefore not yet desirable to expand the ANA tests to Grade R, **systemic testing** is required to understand more about the quality of Grade R and the learning deficits that many children experience at the beginning of their school career. Such testing should be on a large enough scale to measure performance and progress across the system.

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