1 What should be included

Baseline assessment is not a new concept – it was used widely before the introduction of the Early Years Foundation stage Profile. Evidence from practice and from research suggests that the following aspects of development and learning should be included in a school-entry assessment, to form the baseline for the measurement of pupil progress throughout the primary phase:

- literacy and language
- numeracy
- attention / self-regulation (subject to a review of the evidence - see below)

Examples from the research literature, providing evidence of positive relationships between these aspects of development at school entry and later attainment, are outlined below. One important consideration in deciding on the content of the baseline is the strength of the relationships between particular aspects of development and later attainment. For example, some aspects of personal, social and emotional development may be important in identifying children’s learning needs but may be only weakly associated (correlated) with later attainment. Even where it has been shown that there is a statistically significant association when measured independently, this correlation may become insignificant when other more powerful relationships are taken into account.

A practical example from a very different area of research is provided below.

In 2010, NFER reported on a longitudinal research project exploring the potential use of the College Board's SAT (the HE entrance test used in the USA) as an additional entry tool for admission to UK universities. When measured separately, performance on the SAT predicted weakly both university participation and degree performance. However, when GCSE and A Level performance were added to the statistical model (i.e. all three were considered together), the SAT did not add any predictive power to the other two measures in predicting students' later achievements (Kirkup et al, 2010).

In the case of baseline, it makes intuitive sense that the best predictors of later attainment in English and mathematics will be early skills in literacy and numeracy.

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Despite claims that it is extremely difficult to assess school-entry children reliably in these skills, there is evidence that it is possible to do so. The NFER Reception Baseline Scheme achieved an internal consistency of >0.90 (Cronbach’s Alpha) for each of its components and an overall test re-test correlation of 0.96 (Pearson correlation 2-tailed), both excellent levels of reliability, taking into account the length of the assessment and the time between test and retest. Other aspects of development, such as attention skills (e.g. following instructions, task perseverance, etc), should be measured only if there is sufficient robust evidence to justify their inclusion. This evidence should address both their predictive strength and the reliability with which such skills can be measured. In other words, is the strength and reliability of the progress measure increased sufficiently to justify a longer and therefore more time-consuming baseline assessment?

Consideration also needs to be given as to how the assessment will be administered and scored. Subjective best-fit judgements, such as those used within the Early Years Foundation Stage Profile, will not offer sufficient differentiation in scores between children to be used as a baseline against which progress can be measured. Subjective judgments may also be prone to bias with teachers relying on stereotypes of performance across particular pupil groups. When used for accountability, there will also be an incentive for teachers to depress scores (consciously or unconsciously) if judgements include any element of subjective decision making. Criteria need to be objective, clearly defined and easily scored.

2 Key assumptions

The content recommended above is based on the following assumptions:

- The baseline will be measured at the cohort level and will be used for accountability only.
- Formative assessment will continue to be used as now to gain a more detailed picture of children’s development, skills and understanding in all other areas of the Early Years curriculum; therefore it will not be necessary to measure all areas of learning within the baseline.
- The required scheme will be required to provide the maximum information needed to measure progress reliably (e.g. good predictive validity) from a simple and manageable assessment.

3 Research evidence

Some of the evidence on which the above recommendations are based is detailed below. This has been modified from our original submission to the Department for Education (DfE) in response to their Reception Baseline Assessment Tender (December 2014), assuming slightly different criteria for the replacement scheme. However in order to respond quickly to the Education Select Committee, it has not
been possible to carry out a full systematic review of the recent academic literature in this area. **It is recommended that this should be done prior to any final decision on the final content specification for a revised baseline scheme.**

### 3.1 Language and literacy

Research has shown that language development is central to a child’s ability to access the curriculum and develop literacy skills (Bowman, Donavan & Burns, 2000). Evidence shows that both receptive and expressive oral language skills are strongly related to literacy development (Cooper, Roth, Speece & Schatschneider, 2002). Children whose oral language is compromised are at risk of academic failure (Kieffer, 2008), and it is therefore important to measure early language and communication skills on school entry in order to provide practitioners with information on which to plan their teaching to meet individual needs.

The *Simple View of Reading* provides a useful and well established framework for the understanding of reading development (Hoover & Gough, 1990). This model proposes that there are two sets of skills which contribute to reading: word recognition abilities and language comprehension abilities. Research has shown that reading accuracy is predicted by single word reading ability, phonological awareness (Oakhill, Cain & Bryant, 2003) and additionally by letter knowledge (McGill-Franzen, 2010; Muter, Hulme, Snowling & Stevenson, 2004). Furthermore, there is strong evidence to show that phoneme manipulation skills, rather than onset-rime awareness, predict later literacy skills (Savage & Carless, 2005). Reading comprehension is predicted from the ability to draw inferences, the understanding of story structure, comprehension monitoring ability (Oakhill, Cain & Bryant, 2003) and also from vocabulary knowledge and grammatical skills (Muter, Hulme, Snowling & Stevenson, 2004).

### 3.2 Numeracy

Competence in early mathematics is crucial for later school success. The relationship between early number competence and later mathematical achievement has been well established (Aunio & Nremiverta, 2010; Jordan, Kaplan, Ramineni & Locunial, 2009) and there is clear evidence that numeral identification is related to the acquisition of numeracy skills (Wright, Martland & Stafford, 2006). However, there is also a substantial body of literature that shows a strong relationship between numeracy skills and early literacy skills (Welsh et al, 2010). Research shows that early knowledge of numbers and mathematical concepts are not only strong predictors of later achievement in mathematics, but also of word identification and reading (Duncan et al, 2007, Scanlon & Vellutino, 1996). Studies report that numeral and letter identification are correlated at an early age and that both are equally predictive of word identification (Scanlon & Vellutino, 1996). Underpinning this is the ability to understand and manipulate symbol systems (Cook, 1996) and the fact that numbers and letters share similar perceptual qualities. The assessment of numeracy
in young children must therefore also be understood in the context of both language and literacy assessments.

In addition to number and letter recognition, counting skills, such as number-word sequence skills and enumeration skills, an early understanding of relations in shape, order or quantity and general number knowledge have been found to be good predictors of later performance in mathematics (Aubrey, Dahl & Godfrey, 2006; Aubrey & Godfrey, 2002). There is also increasing evidence that an awareness of mathematical pattern and structure is crucial to mathematical competence in young children (Mulligan & Mitchelmore, 2009). More recently, a longitudinal study by Nunes, Bryant, Barros and Sylva (2011) identified that both mathematical reasoning and arithmetic make independent contributions to the prediction of mathematical achievement, with mathematical reasoning being the strongest predictor. This includes children’s abilities to understand and make relational statements, compare, classify and understand one-to-one correspondence and seriation.

### 3.3 Attention / self-regulation skills

Teachers tend to conceptualise school readiness in terms of children’s social and emotional skills rather than their cognitive abilities. Recent research has focussed on the concept of self-regulation and the ways in which it is closely interrelated with cognitive abilities (Blair and Raver, 2015), possibly mediated through a ‘positive adaptation to school’ (Blair & Diamond, 2008). It has further been claimed, in a review of the literature (Whitebread and Basilio, 2012) that self-regulatory and metacognitive activities are not only important to later academic achievement but are also teachable skills.

Self-regulation, in particular the regulation of attention (e.g. following instructions, resisting distractions, etc) may contribute to later academic attainment; although the strength of the association appears to be much weaker than the more direct links detailed above for early literacy and numeracy skills. In a meta-analysis of six international studies (Duncan et al, 2007), early skills in reading and mathematics were most closely associated with later academic achievement. However, the ability to sustain attention was ‘modestly, but consistently, associated with achievement outcomes’ even after controlling for cognitive ability and background factors. Other aspects of social and emotional development, including social skills, did not predict later academic performance.

A thorough review of recent literature should be considered to decide whether such aspects of development should be included in a baseline measure to be used for accountability.

### 4 Implementation

There was considerable opposition to the introduction of baseline schemes in 2015. However, even if it is difficult to achieve, the benefit it brings in making a progress
measure possible is worth the effort. In advance of the introduction of a replacement, it may be useful for the DfE to provide support and training, to help teachers to understand both the rationale for its introduction and the research evidence underpinning the choice of content. It may also be helpful to recruit pilot schools to provide case studies illustrating how the new baseline can be incorporated within current practice. Finally, the introduction of a baseline assessment measure is likely to be easily accepted if it could be balanced by a reduction in teacher workload elsewhere.

5 References


