

**Bringing the Brain to Bear on Context and Policy in Primary  
Languages Practice in England**

Magdalen Phillips  
Manchester Metropolitan University, the United Kingdom

### **Abstract**

The learning of modern languages in primary school (PL) was recently promoted to statutory status in the curriculum of England and Wales, but practice remains patchy. Low PL capacity amongst primary school teachers and constraints on curricular time persist. Viewed through the lenses of policy, learning theory and context, current PL practice can be problematised to find solutions. Neurobiological evidence attests to how the young brain learns language, particularly its heightened sensitivity to language phonology. Additionally, policy documents' currently eclectic approach is discussed. Activity Theory's framework is employed to interconnect such contextual and theoretical factors. The evidence suggests that without optimising the PL environment, learning may be at least ineffective, or at worst, detrimental to pupils' future language learning.

Keywords: primary languages; age-dependent aptitudes; neurobiology

## Introduction

The delivery of language learning in primary schools (PL) in England has been statutory for Key Stage 2 pupils (aged 7–11) since September 2014. Current practice is reportedly patchy and occasionally non-existent. This study problematises the situation. Problematisation may take different forms but essentially critically confronts a situation or premise in some way in order to find solutions (Sandberg & Alvesson, 2011). Language learning is a complex process. In order to critically confront issues affecting current PL practice, multiple perspectives need to be recognised within an analytic framework that reflects their interrelationship. This article addresses three broad considerations: the influence of rhetoric and governmental policy on PL; language learning theories and approaches and the teacher beliefs they encourage; and the implications of neurobiological studies' findings for such learning.

Over recent years, various policies have affected teachers' own level of modern language skill and hence their degree of confidence towards supporting their class's PL learning. Teachers' statutory time for planning, preparation and assessment (PPA) (DfES, 2005b) often results in schools buying in PL expertise. Class teachers' resultant lack of involvement in their pupils' PL learning misses the opportunity of remedying their low confidence levels. At secondary school, with only Key Stage 3 pupils (aged 11–14) statutorily required to learn a modern language (DfES, 2004a), current teacher trainees tend to demonstrate low PL capacity and little confidence. Few previous studies of PL practice, and seemingly none in PL in England and Wales, bring neurobiological findings to bear on the current situation. This would seem to be an important aspect, given the differences between young language learners' and adults' brain architectures. As the vast majority of school-based studies have been conducted in secondary schools, due to language learning being the domain of secondary schools until 2014, any age-dependent factors need essentially to be identified, and subsequently taken into account in terms of their contribution to, and/or influence upon, other factors in the learning environment. These age-dependent aptitudes, notably young pupils' temporary sensitivity to language "phonology" (Schumann et al., 2014), suggest the appropriateness of a focus on pupils' oracy skills which, according to one study, teacher trainees identify as a modern language skill in which they are least confident (Phillips, 2012). Thus, while policy claims to aim to increase language capacity, the nature of that capacity requires further study.

Teachers often remain unaware of pupils' innate, but temporarily heightened, aptitude for language phonology (Schumann, 1998), thus are unlikely to harness it, instead applying their own beliefs about language learning, influenced by their own experience and non-qualified claims for pupils' greater "receptivity" at a certain age (King, 2007). Important pointers from neurobiological studies suggest "brain-friendly" ways of PL learning but currently, these are neither echoed in government policy, nor generally implemented within schools' practice. With language learning, until recently, virtually the domain of secondary schools, secondary practice is likely to inform the beliefs of teachers supporting PL learning. In secondary schools, subjects are timetabled alongside each other, thus the different timings required for procedural, rather than substantive, learning are unlikely to be accommodated. To acquire modes of synchronous communication, procedural learning of skills is required. The different learning environments of procedural and substantive knowledge, respectively, are not accommodated within the timetabling of such learning. While Krashen (1982) recognised specific factors influencing language learning and/or acquisition, the distinction is rarely

recognised in governmental surveys (Tinsley & Board, 2017) of school learning environments.

By problematising PL practice, multiple contributory factors and their influence may be taken into account. This study aims to identify issues, and potential outcomes of current practice, by drawing largely on the literature. Additionally, my experiences as PL and secondary school modern foreign languages (MFL) teacher, current university teacher training in PL, and researcher (Phillips, 2010, 2015) bring insider knowledge of both the actualities of PL practice and theoretical underpinnings. Current practice generally has low expectations of pupils' PL skills; it receives little attention from OfSTED, an inspecting body who produce public publications of schools' performance against certain standards. With schools' accountability judged mainly on performance in the core subjects of English and Maths, other subjects, including PL, need positive outcomes to maintain their curricular time allocation.

A further threat to PL practice has to do with brain plasticity which essentially describes how neural pathways in the brain are built according to the activities undertaken. Predilections established during PL learning are thus likely to affect pupils' language learning in the future. The implications for PL practice are therefore significant, laying considerable responsibility on this new policy initiative. The establishment of counterproductive learning habits and pupils' negative attitudes could jeopardise their next stage of learning at Key Stage 3. Added to this risk is the phenomenon of synaptic pruning of underused brain pathways. These phenomena suggest the importance of better understanding of the influence that language skills have on each other.

## **Literature Review**

### **Context**

Because PL practice is only recently statutory in the curriculum, a brief historical account may better explain its underlying tenets, as well as the influences of stakeholders involved in current PL practice. Many real-world studies are contextualised but may not include the influence of the context within their analysis. A further consideration is that of previous practice, the historical influence of which may remain unchallenged in current practice. Such inherited "rules" or "norms" of practice can be taken into account by including them within an Activity Framework, explained later in this paper.

PL was made statutory in England and Wales within the primary curriculum for Key Stage 2 pupils (aged 7–11) in September 2014, some 50 years after the abandonment of a previous pilot study (Burstall, 1974). Brief governmental guidelines for PL learning (Department for Education (DfE) 2014) allude in the broadest terms to desired skillsets for pupils to attain, rather than to learning approaches to be adopted. This contrasts with a previous government's publication, the Key Stage 2 Framework (Department for Education and Skills (DfES) 2007), which suggests lesson content alongside activities and skills to be attained across the intended four years of learning, namely oracy, literacy and intercultural understanding. Both the current and previous documents imply that four language skills of listening, speaking, reading and writing should be learned concurrently. As Key Stage 1 pupils (aged 4–7) are still heavily involved in learning these skills in their first language, this may be a reason for omitting this age-group from statutory PL learning. Whereas previously 24 units of topical learning and grammar knowledge were outlined (Qualifications and Curriculum Authority (QCA) (2007)), the current national curriculum describes desired attainment in the broadest of terms. Within

its 2-page programme of study for PL, there is very wide scope for interpretation of expected outcomes, including the relationship between language skills.

### Primary Languages Practice

With standard inspections of PL practice by the Office for Standards in Education (OfSTED) yet to be published, and current PL practice reportedly patchy and diverse (Tinsley & Board, 2017), it is the *processes* of PL practice which urgently require review. The British Council annually surveys language practice in schools in England and reports:

Almost all primary schools in England now provide at least some teaching of languages to pupils throughout Key Stage 2, and just over one third of schools now have access to specialist expertise in the teaching of languages within the school. However, there is evidence that some schools are finding it challenging to provide the kind of systematic and consistent language teaching envisaged in the national curriculum (Tinsley & Board, 2017, p. 10).

One interpretation of this statement could be that “systematic” and “consistent” teaching require more specific guidance for teachers involved in this essentially new initiative. ‘Specialist expertise’ should include both subject knowledge of the chosen language as well as experience of young children’s learning aptitudes, identified as requirements for effective learning to take place (Driscoll, 1999). As original funding sources for training primary teachers have largely dried up, the training of future teachers may fall mainly to schools themselves even though these are apparently short of PL expertise.

Although the generic form of a modern language is its spoken form, the national curriculum’s suggested option of learning an ancient language (DfE, 2014) suggests that it is acceptable for pupils to learn the historic culture of the ancient language rather than undertake language learning *per se*. A wide interpretation of the goal of such learning is thus possible. With low confidence levels in PL, particularly in speaking, teachers may be tempted to choose the dead language and its cultural collateral, delivered in English, rather than refresh their own knowledge of a living language including its spoken form.

The 2016/17 survey (Tinsley & Board, 2017) includes case studies which identify curricular time constraints, and teachers’ confidence as factors commonly challenging schools in implementing PL in the curriculum.

### Primary Languages as a Set of Skills

Language learning is commonly conceptualised as involving four skills, namely listening, speaking, reading and writing, within both current (DfE, 2014) and previous (DfES, 2007) governmental guidelines for primary and secondary language learning. Both documents’ assumption that these four skills are mutually supportive is reflected in OfSTED reports and is rarely challenged or discussed. Neurobiological insights can provide evidence of distinct neural pathways for declarative and procedural knowledge. While the natural sequence of L1 acquisition is to comprehend, articulate and manipulate the phonological form before tackling literacy skills, many schemes of work introduce the written form soon after, or even concurrently with, imitating and articulating the targeted language in spoken form. The virtually simultaneous introduction of written and spoken forms of vocabulary is suggested in the (now archived) Qualifications and Curriculum Authority (QCA) schemes of work, and

overtly recommended in the Key Stage 2 Framework (DfES, 2005a), a scheme compiled by a previous government in preparation for the new initiative.

Many arguments support the simultaneous exposure to learners of the written and spoken forms. Many adults prefer to write vocabulary down to help them memorise the language. However, this assumes they can access the spoken form from the recorded written form, a skill that requires knowledge of the relationship between the phonemes and graphemes. However, few secondary pupils have learned the phonics system of the targeted language. The chance to imitate the language's sounds may also have been missed, due to the prioritising of the written form. While English cognates bring the advantage of easier comprehension of them, this does not guarantee comprehending *spoken* forms. Thus, understanding written words does not guarantee progress in oracy skills unless the phonics system is learned.

In primary schools in England, a renewed emphasis on systematic phonics for learning (English) literacy skills advocates daily discrete phonics sessions in Reception and Key Stage 1 classes (pupils aged 4–7); this practice recognises that associating graphemes with phonemes, blending and segmenting them, as well as developing the motor skills involved in articulating and writing them, require “little and often” sessions. By contrast, *PL* phonics is reportedly rarely discretely learned in either primary or secondary school language learning; recently, amongst 78 student teachers under my auspices, only one remembered undertaking such learning. This signifies a discrepancy between the “rules” or “norms” of learning literacy skills between each language, the L1 and PL. Young pupils decoding the orthographic form of the PL need support in discrete learning of PL phonics. Logically, when L1 and PL orthographies employ the same alphabetic code, pupils may apply L1, rather than PL, phonics rules for decoding the PL, as they are well rehearsed in the former (Palacios, 2015b) and the PL's orthography seems unfamiliar. Because learning of a phonics system cannot be undone, its effect has been likened to “brainwashing” (Blakemore & Frith, 2005). Applying L1 phonics to a distinct phonics system, such as the PL's, results in mispronunciation. In my study of 51 trainees' perceptions of the challenges of preparing to be future deliverers/supporters of PL learning (Phillips, 2012), pronunciation was most commonly identified as contributing to their confidence levels as future PL teachers.

Studies asserting the beneficial effect of literacy skills on language progression are commonly reported for near- or post-pubescent school pupils, or adult learners (Kuhl, 2010). Because younger learners' brains are at a different stage of development and therefore of aptitude than adults, these findings may not be presumed to represent the young learners' case. Additionally, such studies presume the reciprocal benefit of learning of any one skill on any other, because they give little account of the apportioning of time spent on each skill. However, as our senses are represented in different neural systems (Blakemore & Frith, 2005), it cannot be assumed that our ability for reading and writing skills necessarily enhances auditory language skills. The benefits for *general* language skills claimed for adults learning literacy skills may not apply in equal measure to young learners (Kuhl, 2010; Kuhl, et al., 2003). The claimed benefit of learning literacy skill requires further scrutiny: whereas literate adult learners are able to manipulate the phonemes within a word, for example, take the /v/ from the front of Vatican, illiterate adult learners reportedly lack this ability (Kuhl, 2010). Kuhl's study involved testing learners in their L1, in which meanings of words are presumably secure; it therefore remains to be shown whether, in a *targeted* language, the manipulation of phonemes might potentially weaken the meaning associated with the phonological form. There is scope for further research on primary school pupils' attainments

in different language skills after literacy learning. While oracy skills are innate, literacy skills are not and therefore require a greater cognitive load. Thus, claimed benefits for adults may not apply to primary school pupils still learning the literacy skills of their first language (L1). The possible assumption that pupils' initial inaccuracies in pronunciation will improve over time poses risks on several fronts. Firstly, pronunciation is likely to affect comprehension (Khaghaninejad & Maleki, 2015; Ahangari et al., 2015) and therefore the importance of its accuracy should not be underestimated. Poor pronunciation may disadvantage subsequent learning. Palacios (2015a, p. 2) claims that “reading too early impairs acquiring second language (L2) pronunciation”. In my experience of teaching year 6 pupils (aged 10-11) in brief weekly 20-minute sessions, their application of English phonics when decoding orthographic forms of French negatively affected their pronunciation. Some skills may therefore be inappropriate for learning at a particular age and/or stage. These opinions thus challenge assumptions of two respected policy-bearing documents, firstly, that the four broad skills are mutually supportive, and secondly, that there is no particular order in which they should be learned. Figures 1 and 1 below sum up the differentiated foci on oracy and literacy skills, respectively.

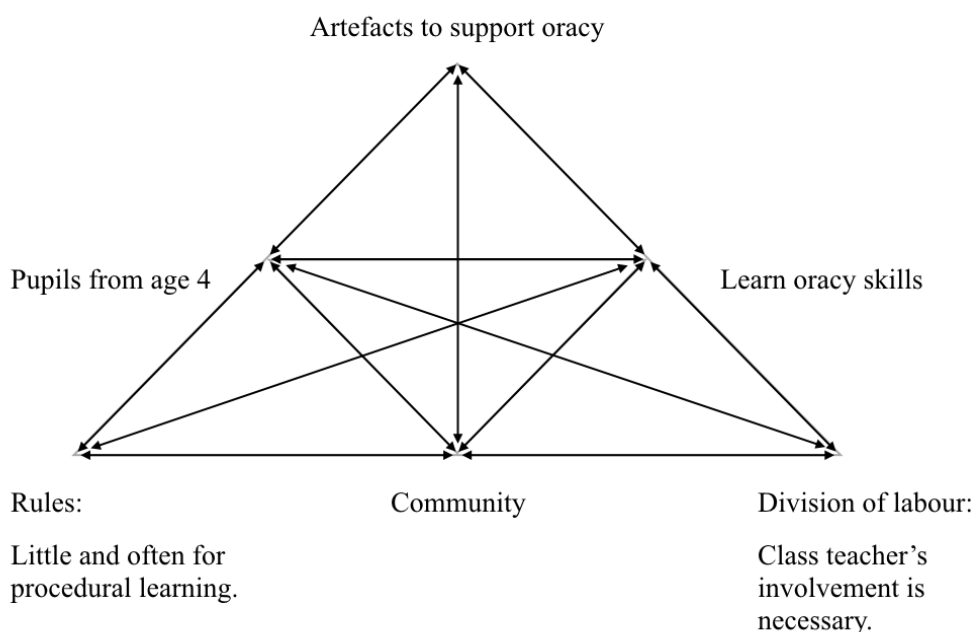


Figure 1: Oracy skills as the main “artefact” of primary languages learning.

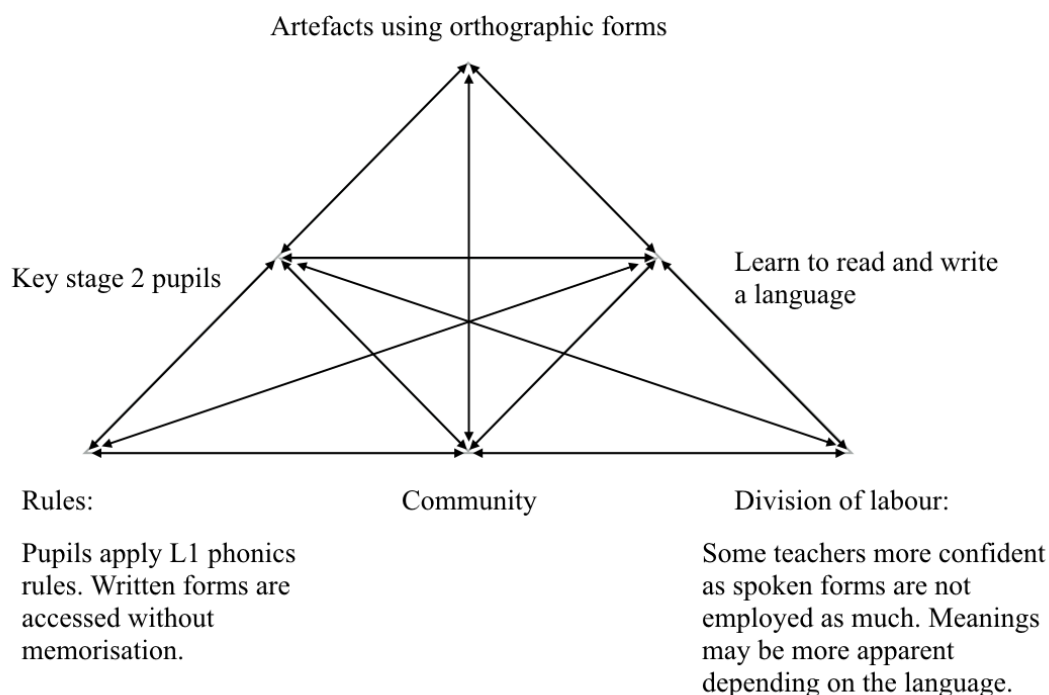


Figure 2: Literacy skills as the main “artefact” of primary languages learning.

### Language Skills: Accessing Meanings

The generic form of a modern language is its spoken form, a phonological code for experienced events. As Stevick (1978, p. 145) observes, “Pronunciation is the primary medium through which we bring our use of language to other people”. Not only is accurate pronunciation needed for other people to understand it, but also it affects the learner’s *own* comprehension (Ahangari et al., 2015). From this, we surmise its seminal importance. Because a PL is learned *after* the L1, which has already encoded life experiences, a PL pupil may resort to translating the PL into the L1 to access meaning. However, the habit of accessing meanings through the L1 logically requires more time than coding an experience directly into the PL.

To avoid translation, using the learners’ L1 to access meanings, requires some sort of contextualisation of the spoken language. To overcome the limitations of contextual clues in the classroom, vocabulary can be semantically primed to ensure understanding of words prior to learners’ actively responding to/using them. Bloem & La Heij (2003) compare the semantic priming strategies of using either context words or context pictures. They deem the latter more effective, not so much due to the speed taken to access meanings from a picture, but due to its priming of a pre-verbal concept. “Words in different languages access a common conceptual representation” (Kroll, 1993, p. 55) whereas the lexical representations are activated independently. If pictures were used for semantic priming, there was a virtually simultaneous onset in the brain of “access to phonological information...with semantic processing”. (Miozzo et al., 2015, p. 3343) This strategy for accessing meaning avoids translation, similar to the way young learners acquire their first language (L1A), when events are experienced (or represented by an image) alongside spoken language.



The time factor indicated may apply equally in PL learning where authentic communication could take place *in context*. A language learning theory proposing the mapping of language onto experienced events, known as usage-based linguistics (Tomasello, 2003), is briefly discussed among other language learning theories in this article.

### **Time and Timing in the Learning of PL Language Skills**

Previous PL guidelines indicated the amount of curricular time to be devoted to PL learning.

A minimum of 60 minutes per week is needed for children to make progress, but this can be spread across the week. A “little and often” approach is ideal as it enables children to recall languages and reinforce their understanding and skills at regular intervals (DfES, 2007, p. 2).

By contrast, current guidelines make no allusion to curricular time allocations. With one in ten schools “not providing a minimal 30 minutes per week language teaching”, a considerable disparity in PL provision can be seen (Tinsley and Board, 2017, p. 41). Language learning in primary schools in England tends to be timetabled; learning sessions are commonly weekly events. The previous section on policy noted how class teachers miss opportunities to learn subject and pedagogical knowledge due to their PPA rights and subsequent absence from class. Therefore, pupils may lack the reinforcement needed to retain and recall ephemeral phonological forms learned in weekly specialist-led sessions. The “little and often” basis is assumed as essential for learning English phonics but overlooked in PL, thus affecting pupils’ speaking skills detrimentally.

Time and timing of sessions may affect more than the memorisation and recall of language. Visiting “specialist experts” may bring secondary modern foreign language (MFL) traits or “rules” into primary practice. In secondary schools, for example, sessions of commonly 45 minutes or more often involve learning all four language skills. However, this length of time is probably unsustainable for PL pupils, partly due to their shorter attention spans but also because a focus on oracy (speaking and listening) skills requires briefer sessions.

These sections have explored the parameters of certain policies and the resulting “rules” of PL practice, pointing out how timing and timetabling affects both the division of labour amongst teachers supporting PL learning in some capacity, the approach they may adopt, and the skills that are learned. Importantly, without the “little and often” proviso for effective learning, which necessarily involves the class teacher, learning may be ineffectual.

The next section provides an overview of commonly understanding of language learning theories, as they are likely to influence current practice and beliefs.

### **Divisions of Labour Amongst Teachers**

This section discusses the variety of potential roles played by teachers in supporting or delivering PL, which may involve a division of labour amongst them. Language has a distinctively social nature: it codes meanings into phonological form so that human beings can communicate with each other. As social behaviour underlies our ability to acquire language, it requires other interacting human beings (Maye et al., 2002; Saffran et al., 1996; Kuhl et al., 2003). In a PL classroom setting, the teacher’s likely role in modeling spoken

language and providing a counterpart in meaningful communication requires their confidence to take on these roles. With potentially only three statutory years of language learning at secondary school, teachers may not feel confident in undertaking these roles. Teachers identifying their PL speaking skills as in need of development may find it challenging to find native speakers with whom to speak the PL. With English the “lingua franca” of world trade and culture, speakers of other languages are likely to have had far greater exposure to their targeted language (English) than the native English speaker to her/his. The resulting discrepancy in speaking skills is likely to bias the odds for the more advanced language to be used (unless a protocol for practice is implemented). The question arises, then, of a potential division of labour for supporting and delivering PL learning.

Effective PL learning requires a “little and often” approach (DfES, 2007, p. 2). This requires the class teachers’ cooperation for reinforcing pupils’ learning between their weekly lessons. “Improving the confidence of classroom teachers who teach languages” (Tinsley & Board, 2017) is one of four principle challenges for PL practice recently reported by schools. However, in England, there is a lack of time and budget for professional development of necessary skills (Tinsley & Board, 2017). A suggested division of labour between so-called specialists and generalists concludes that this could be a successful combination (Rowe et al., 2011); by rehearsing/practising with their class teacher the skills learned in the weekly, specialist-led session, pupils learn effectively.

A “general reduction in the forms of support used by primary schools” (Language Trends Survey, 2017, p. 41) reports that 30% claim no access to specialists, compared with 23% in 2015 (Tinsley & Board, 2017, 62). However, outside expertise in subject knowledge does not guarantee pedagogical knowledge and skills for supporting the learning of oracy skills (Driscoll 2000). The success of such a division of labour may depend on timetabling, as the skills learnt have different requirements of time and timing (Palcios, 2015b).

Teachers’ confidence levels within different skills are likely to influence their choice of activities in supporting/delivering PL sessions in class. A study of languages teachers’ opinions in England found:

Of the four language skills, the one that our teachers felt there was most need for research to illuminate was speaking (Macaro, 2003, p. 6).

Non-specialist teachers lack confidence in *speaking* a targeted language. Teacher trainees reportedly are unable to decode the written language into its phonological form, their secondary school learning having involved predominantly the orthographic form, but no explicit phonics instruction (Phillips, 2012). Furthermore, with access to the written form, little memorisation of language is required. For those opting to take a GCSE (General Certificate of Secondary Education) in PL, with its spoken section usually facilitated by the pupils’ own teacher, memorisation of two pages of prepared spoken sentences reportedly sufficed to secure a pass on that section. Trainees report that this prescriptive memorisation has been subsequently forgotten. While orthographic forms can be reproduced without knowledge of the phonological forms, oracy skills necessarily require some form of articulation and secure pronunciation. The potential solution of a division of labour, with a specialist modeling spoken forms in weekly lessons, and non-specialist class teachers facilitating follow-up activities, meets logistical challenges due to the teacher’s absence from the classroom during PPA time.

The so-called “specialist expertise”, which here includes a native speaker or a member of staff with a degree in the language, should be qualified by the guarantee of effective learning of oracy skills.

## Policy

This section considers the effect of policy on current PL practice within its “community” of teachers and pupils. It then discusses the National Curriculum requirements for pupils’ PL learning, with particular regard for the skills to be learned. It then focuses on expectations implicit for teachers’ capacity to support, if not deliver, pupils’ learning.

The initial declaration of the intention to implement language learning in primary schools (DfES, 2004a), hitherto largely the domain of secondary schools, coincided with its demotion at Key Stage 4 (pupils aged 14–16) to optional status (DfES, 2004a). The legacy of such a demotion is that current cohorts of primary teacher trainees may have undertaken only 3 years of language learning. Their subsequently low confidence levels due to lack of PL subject knowledge and/or pedagogical skills (Tinsley & Board, 2017) is a likely reason for schools to expect to staff PL provision through someone *other* than the class teacher.

As outside visiting teachers are often deployed during class teachers’ planning, preparation and assessment (PPA) time, a statutory right for minimally 10% of a teacher’s timetable (DfES, 2005b), there are several implications for PL practice. Firstly, the ring-fencing of PPA time indicates that class teachers are unlikely to be present at the specialist-led PL session; their confidence for supporting pupils’ PL skills between specialist-led lessons is thus unlikely to develop. This represents a missed opportunity for class teachers’ involvement to build their capacity as specialists can help to improve non-specialists’ confidence (Rowe et al., 2011).

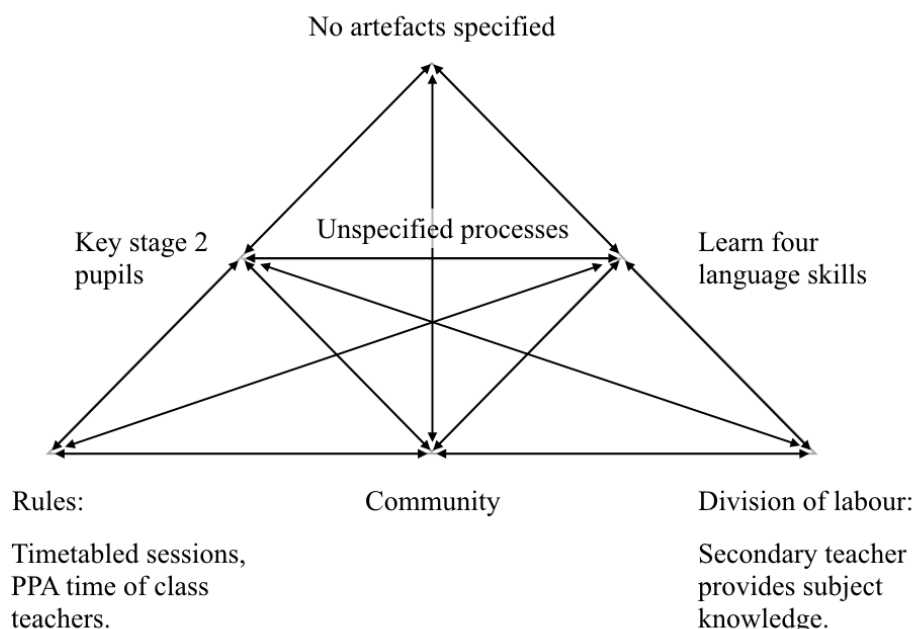


Figure 3: Activity Theory framework showing the situation due to policy, circumstances, and inherited beliefs or “rules” from previous language learning practice.

Apart from low PL capacity amongst class teachers, there is a shortage of specialist teachers. Furthermore, OfSTED (2008) acknowledges that once-a-week sessions do not ensure that

language learning is effective and retained. Secondly, the timetabling of PL sessions during PPA sessions, normally weekly and often for 30 minutes or more, are more likely to result in pupils' declarative rather than procedural learning. Each of these forms of learning have distinctive requirements, therefore the learning environment has an impact not only on the efficacy of pupils' language learning, but also on the skills learned.

The National Curriculum requirement for “substantial progress in one language” (DfE, 2014, p. 213) is unlikely to be met if pupils study more than one language, because of limited curricular time. The statutory four years' PL learning (for pupils aged 7–11) puts greater demands on teachers' subject knowledge/expertise; this, in turn, may increase schools' reported struggle to staff their PL provision. While an “appropriate balance of spoken and written language” is cited (op. cit.) for learning a PL, no stipulation is given of what that balance might be. A neurobiological premise of age-dependent aptitudes suggests the “balance” may differ according to learners' age but again, the National Curriculum does not specify those differences or on what basis the “balance” is affected. The “rules” of practice are therefore insufficiently defined or understood within policy, nor are the skills specified which are necessary for teaching to be effective for pupils' learning.

The National Curriculum ascribes different stipulations for those choosing ancient languages as a PL:

The focus will be to provide linguistic foundation for reading comprehension and an appreciation of classical civilization . . . [pupils] take part in simple oral exchanges while discussion of what they read will be conducted in English (DfE, 2014, p. 240).

This descriptor contrasts markedly with the “appropriate balance” of skills prescribed for *modern* language learning, which are often broadly categorised as listening, speaking, reading and writing. The characteristics of each skill present different challenges. For example, teacher trainees' identification of pronunciation as the skill in which they had least confidence (Phillips, 2012) suggests the particular challenge of speaking a language. Surprisingly, perhaps, the National Curriculum's provision of choice of an ancient, rather than modern, language allows the avoidance of such a challenge. The predominant use of English implicit in the DfE specification above questions the premise of learning a language. Declarative learning, such as knowing *about* classical civilisation, requires a different pedagogical approach to knowing *how to use* the language, which constitutes procedural learning.

The policies discussed in this section signify potentially lower teacher capacity to support/deliver PL learning, and also, lack definition regarding the processes for PL learning. One of these involves the relationship of language skills, addressed in the next section.

### **Language Learning Theories**

In problematising the reportedly scant and disappointing outcomes of current PL practice in England, greater insight is needed about the *processes* of how young learners learn languages. Logically, to ensure effective learning, a language learning theory should be adopted to provide integrity to policymakers' decisions regarding practice. However, policymakers have been wary of advocating any one approach, perhaps in deference to teachers' lack of confidence and the perceived resulting need to accept whatever they can offer.

There are a number of mechanisms and tools which can be utilised as a menu to deliver the strategy (DfES, 2002, p. 7).

Both in this relatively newly instigated statutory practice, and within a retrospective view of the previous Pilot Study (Hawkins 2005), no single method of learning is advocated. This section starts with brief discussion of language learning theories likely to influence teacher beliefs, and therefore their practice. It proceeds to discuss the distinction of procedural and declarative knowledge, followed by neurobiological findings recently gained about how the young brain learns languages.

Studies of recent PL over the last decade rarely address the actual process of language learning, a knowledge considerably enlightened by neurobiological studies. Having noted Chaudron's (1988) similar opinion, Ellis claimed that "there still is no theory of L2 acquisition" (Ellis, 2012, p. 341). However, this claim now demands reconsideration. Divergent theories of language learning can now be scrutinised through a neurobiological lens, arguably an irrefutable source of influence, due to the visually captured images it can provide of brain aptitude, and its age-dependent nature (Klein et al., 2014), of particular significance for PL learning.

Over the last decades, research literature has straddled the fields of both language learning and neurobiology. Avoiding the more complex terminology associated with studies of the brain, neurobiological literature from reputable sources has become accessible to educationalists. The dangers of misinterpretation or overgeneralisation can result in popular neuromyths which then affect school practice but this potential trap should not deter practitioners from such an important insight (Sharples, 2009).

The "rules" adopted from previous PL learning practice and school protocols are contextualised within current PL learning in the next sections.

### **A brief Overview of Language Learning Theory**

Repetitive mimicry, which has long been part of a primary school "oral tradition" is representative of the behaviourist tenet of learning through habit formation (Skinner, 1957). Thus, its application to oracy skills is particularly pertinent for a young age-group. However, while behaviourism dominated language acquisition beliefs from the forties to the sixties, actual practice evolved further characteristics such as the need for repetition until perfection is reached: this tenet applied equally to *written* language. When applied to, and practised on, the new computers in the 80s, such behaviourist-driven written tasks eventually became known as "drill-and-kill" (Warschauer & Healey, 1998). Schumann's (1998) Neurobiological Theory of Affect cites novelty/satiation as one of 5 factors contributing to motivation levels. Arguably, balancing the need for repetition against the risk of over-satiating pupils is one of the biggest challenges facing language educators. Thus, while there are useful tenets to be recognised within behaviourism, pupils' affect needs to be taken into account.

Chomsky's innatist position (1959) directly confronted behaviourist theory; he questioned how children could imitate and produce complex language forms in the face of restricted language input. He proposed that a human language acquisition device (LAD) in the brain has a natural ability, a universal grammar (UG) which can process any language's grammar. The brain's ability "to contain all and only the principles which are universal to all human

languages” (Lightbown & Spada, 1999) underlies a largely positivist view of language learning, evidently still in existence but also now refuted:

[...] research on the brain has found it very difficult to identify any areas or circuits that might constitute UG [universal grammar] (Schuman et al., 2014, pp. 1–2).

Scans of the working brain show that many areas of the brain are employed in the complex task of language processing. This suggests that the complex networks that are used for language skills are also employed for multiple other functions. Despite strong challenge from neurobiology (Kuhl, 2010) and more recently proposed theory, this innatist view is still widely embraced. Teachers may mistakenly believe from Chomsky’s theory that the LAD is set into action merely by exposing pupils to the language. Where this might have seemed to be the case in acquiring the first language, it has been largely challenged by usage-based linguistics, a theory that language is essentially the symbolic mapping of experienced events, with grammar a derivative of that process (Tomasello, 2003). Intention-reading and pattern-finding may propel language processing through contextualised acts of communication. Far from Chomsky’s rationale of a poverty of input, “. . . mature linguistic competence . . . is a structured inventory of constructions” (Tomasello, 2003, pp. 6-7).

Tomasello suggests that:

The implications of this new view of language for theories of language acquisition are truly revolutionary . . . it is possible that children’s early language is largely item-based and yet they can still construct an adult-like set of grammatical constructions originating with these baby constructions . . . a much closer and more child-friendly target than previously believed (Tomasello, 2003).

Over several years of training future teachers, no trainee has heard of usage-based linguistics before commencing the course. Thus for teachers in post, their language learning beliefs are likely to be built on, and constrained by, outdated theory. The tenets of usage-based linguistics suggest that if authentic acts of communication took place in and beyond the classroom, pupils’ temporary aptitude for acquiring their first language may be harnessed for PL learning. Teachers would need to create opportunities for this learning to take place, with approval from policymakers. The learning of functional language in authentic acts of communication might not only more closely match National Curriculum requirements for serious study of a language, but also produce programmes which void being “too noun based” (Macaro, 2003a, p. 201).

Two further distinct forms of learning, declarative and procedural are discussed in the next section, and the implications of this distinction for PL practice.

### **Declarative and Procedural Knowledge**

An important paradigm of learning distinguishes declarative and procedural knowledge as distinct forms of knowledge or memorisation. Declarative knowledge (knowing *what*), or factual information, is distinguished from procedural knowledge (knowing *how*), or skill; the latter requires frequent practice until very little cognitive effort is required to perform the skill and the learning has become automatised. “Automatisation is another name for acquiring procedural memory” (Lee, 2014). It is a process of “exercising to help diminish the time necessary in order to access information and to operate the encoding” (Annoni et al., 2012).

Thus the two forms of learning, declarative and procedural, have distinct requirements for practice and activate different pathways in the brain (Schumann et al., 2014). Speaking skills must involve some procedural learning and “cannot rely on declarative knowledge” (Macaro 2003, p. 183). Therefore, frequent practice is important for progress in oracy skills in order to reduce the cognitive load of learning and to achieve automatisisation. This need for frequency may not be reflected in schools’ curricular timetabling. Where outside expertise is brought in once weekly, and without the class teacher’s involvement between those weekly sessions, the likely resulting emphasis is on literacy skills, which do not rely on synchronous memorisation. If the different forms of learning are not recognised, the most likely result is ineffective timing for pupils’ oracy skills.

### **Neurobiological Implications for Language Learning**

While in the past, not enough was understood from a cognitive perspective as to how children may learn or acquire a language, or how “the child’s intellectual development” (Crystal 1987: 234) may be harnessed, nowadays, findings can shed light on the innate characteristics of the human brain by scanning it in action. To avoid being “25 years behind the times” (Schumann et al., 2014, p. 179), any study of learning *processes* needs “to draw more links between the neurobiological mechanisms and second language acquisition” (Ellis, 2002, xi). This is because “psychological models must be answerable to their neuroanatomy and neurophysiology” (Schumann et al., 2014, p. 179). To further problematise PL practice in England, this section discusses findings regarding young pupils’ language learning aptitudes, in particular, oracy skills.

### **Brain Plasticity**

Brain plasticity is the brain’s ability to adapt its neural pathways, even into old age. This is because the brain is architected according to the activities it undertakes.

There are intrinsic forces that contribute substantially to brain development, probably providing more than just scaffolding for cognitive development, in the sense that they can also shape the directions in which further development can occur (Greenough & Black, 2013, p. 155).

Undertaking activities not only forges the architecture of the brain, but also sets a predilection for future learning, by reinforcing synaptic connections in the brain. Furthermore, once a predilection is established, it may be difficult to change. This casts considerable responsibility on policymakers and practitioners in their choice of a suitable pedagogy, particularly for procedural memorisation which requires repetitive activities to reach automatisisation.

The *order* in which a modern language is learned relative to acquiring the L1 also affects the brain’s structure. A study of fMRI scans of brain structures of 22 monolinguals and 66 bilinguals categorised the latter within various different L2 learning stages, namely: simultaneously with the L1; after proficiency in the L1, in early childhood; in late childhood; or later (Klein et al., 2014). They found that “learning a second language after gaining L1 proficiency, modifies brain structure in an age-dependent manner whereas simultaneous acquisition of two languages has no additional effect on brain development” (Klein et al, 2014, p. 20). This implies that during the period for L1 acquisition, the same pathways may be utilised in acquiring another language as those for the L1, when spoken language is

mapped onto authentic experienced events. The “age-dependent manner” (Klein et al., 2014) in which this may occur suggests that young learners’ brains are better placed to acquire a PL in a similar process as first language acquisition (L1A).

Because neuroanatomy evidences different “routes” or brain pathways for undertaking distinct language skills (Lee, 2014), the transfer of learning between them should not be assumed (Palacios, 2015a). Learning to read PL words even reshapes the brain’s neural organisation of previously learned languages (Mei et al., 2014). Reading and writing are not innate aptitudes. Indeed, in the case of an emphasis on *literacy* skills in PL learning, the resulting strengthening of particular neural networks potentially sets predilections for future learning arguably inappropriate to the young learner. The setting of predilections is exacerbated by a further property of brain plasticity; synaptic pruning is a severing of synaptic connections which naturally occurs when pathways fall into disuse over time. This is discussed in the following section.

### **Plasticity and Learner Age**

A neurobiological stance on the significance of learners’ age on their learning outcomes claims:

Evolution has designed the brain to acquire grammar and phonology by about four years of age through natural interaction with others. Some margin of heightened adaptability probably extends this learning period to the middle of the second decade of life. Once that period has passed, the brain can be viewed as “damaged” with respect to the skill to be acquired (Schumann, 1998, p. 38).

The temporary nature of children’s heightened sensitivity to phonology advises its harnessing at an appropriate stage of life between 4 and 14 or so years of age. PL learning is currently statutory from the age of seven, three years after Schumann’s suggested peak age (Schumann, 1998). Current policy thus fails to exploit three years of prime time for acquiring language. Kuhl (2010) claims that “exposure to language in the first year of life influences the brain’s neural circuitry before infants speak their first word.” This suggests the immediacy of a child’s language development. She suggests that a goal of future research

[. . .] will be to document the “opening” and “closing” of critical periods for all levels of language and understand how they overlap and why they differ.’ ‘Vocabulary development “explodes” at 18 months of age, but does not appear to be as restricted by age as other aspects of language learning – one can learn new vocabulary items at any age (Kuhl, 2010).

The accessibility of vocabulary learning for any age-group implies it could also dominate language lessons throughout school learning. Indeed, an indicator of progress in schemes of work such as the Key Stage 2 Framework is commonly an accumulation of vocabulary, evidenced through written forms which are quicker to assess than spoken recordings.



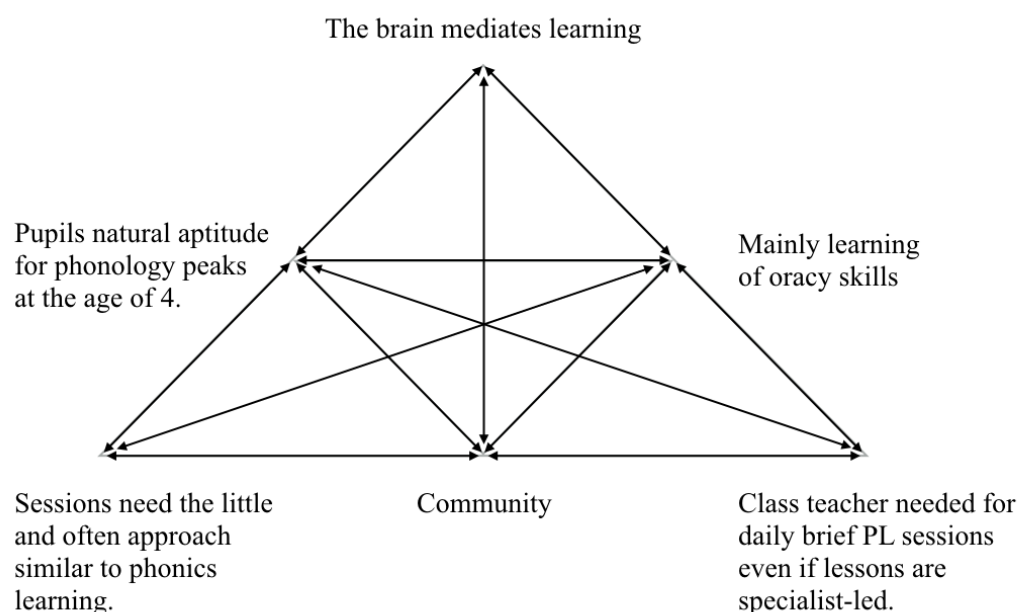


Figure 4: The neurobiological implications for age-dependent PL provision.

Previous sections discussed Schumann’s clarification of young learners’ aptitude for the *phonology* of the language. Listening and speaking are innate capabilities, hardwired in the brain whereas reading and writing take many years to learn (Blakemore and Frith, 2005). The claimed age-sensitivity for acquiring grammar and phonology could be harnessed for PL pupils in the classroom using the PL for authentic communication in experienced contexts. However, as previously discussed, this would require teachers’ confidence and pedagogical knowledge. In cases where teachers bravely agree to learn alongside their pupils, the disparity between teachers’ and pupils’ language learning aptitudes may pose a challenge.

Degrees of age-dependency in language learning exist. “The machinery of synaptic pruning” (Takesian & Hensch, 2013, p. 7) shows that brain circuits can be pruned even to the point of redundancy, during a critical or sensitive period. So despite the brain’s potential for plasticity, learning can be affected by “brake-like factors” (Takesian & Hensch, 2013, p. 23), a realisation that effectively dismisses “the traditional view of a fixed, immutable circuitry that is consolidated early in life” (Takesian & Hensch, 2013, p. 23). Not only do language learning activities shape the brain’s architecture in strengthening synaptic pathways but also, where some activities take precedence over others, underused pathways are pruned. Where policy, and thus in all likelihood teachers’ beliefs, supposes that language skills are interdependent and reciprocally supportive of each other, the question arises as to whether the visual nature of literacy knowledge may suppress those of oracy skills. Literacy is formed of visual, enduring data which can be decoded non-synchronously, whereas spoken forms are ephemeral and therefore must be decoded synchronously, relatively more demanding on cognitive load.

The written form of language can be stored and therefore does not require repetitive practice. By contrast, the spoken form is often committed to memory through learned “habits” or repeated procedures; these are difficult to change. Continued years of “repetition . . . are resistant to alteration or suppression; they function independently of executive control, and are cognitively impenetrable” (Lee 2014, pp. 67–68). Thus, great caution is needed to vary pupils’ learning and ensure its progress for any particular age-group. Adult aptitudes, no

longer include particular sensitivity to language phonology, are thus at variance with their pupils”. Given the paucity of primary school teachers confident in their modern language skills, particularly in speaking, any improvement of their skills may experience the “automatic and involuntary” nature of the “previously learned processing habits” (Blakemore & Frith, 2005). Such teachers may perpetuate learning processes that they, themselves, experienced at secondary school. The subsequent danger of the PL statutory requirement being a “watered down” version of secondary practice (Martin 2008), is real in the absence of specific governmental directive, or feedback from OfSTED.

## Methodology

This study’s particular aim of problematising a practice by confronting its situation takes it beyond the confines of actual classroom research, and into the effects of policy and the broader learning environment in which practice is likely to take place. As such, its aim diverges from many previous studies of language learning which have tended to focus on specific aspects of practice, and often of secondary school or adult learners.

The wide range of theoretical opinion concerning language learning environments, and their very complexity, make it necessary to identify factors which influence them. A schema is needed to demonstrate the possible interrelationships between such factors.

The methodological question arises as to how the factors are to be identified. Studies gathering data in real world learning environments could explore the interrelationships of commonly occurring factors contributing to PL learning. However, because PL practice is patchy (Tinsley & Board, 2017), a broader viewpoint is required to explain the variety of existing practice. My own insider experience and insight of both school PL practice and teacher training includes visiting schools to quality assess schools’ provision. Guided by these experiences, I undertook a literature review to ensure that a broad range of perspective and opinion could be included.

The standing of literature reviews within established research traditions is discussed in order to both explore its strengths and weaknesses, attesting to its validity and acknowledging its weaknesses.

A literature review may constitute one component part of an account of research, its purpose to foreground the issues embodied in the study undertaken. By contrast, this study comprises a literature review in order to gather an intentionally eclectic range of data: contemporary PL practice and policy; a brief PL history leading up to an unprecedented statutory PL status in England and Wales (DfE, 2014); and theoretical underpinnings. This eclecticism may satisfy the need to apply research findings to classroom practice, or “awareness raising” (Ellis, 2012, p. 145).

The review “has a long pedigree as an area of academic research and endeavour” (Booth et al., 2016, p. 9); while some journals may decline review articles, others welcome annual reviews, or overviews. The literature review can be a generic term for more specific review processes, including critical, mapping, meta-analysis, evidence synthesis, rapid, scoping and systematic reviews (Grant & Booth, 2009). Its terminology may be pinpointed more precisely through identifying the purpose of the study. “Qualitative evidence synthesis” (Grant & Booth, 2009.) integrates findings from qualitative studies and may employ conceptual models, or theories; it may also employ purposive sampling, to meet its intended aim. In this

study, the identification of component factors to fulfil Activity Theory's nominators, in a sociocultural language learning scenario, may constitute such purposive sampling. However, in fulfilling such a purpose, it may also be said to be critical, because it "seeks to identify [the] most significant items in the field" (Grant & Booth, 2009). The interpretation of such "significance" is likely to match the researcher's own viewpoints, and may therefore be said to be a weakness of such an approach. In this study, this possible weakness is acknowledged only insofar as interpretation is involved; in citing quantitative data gathered by other researchers' empirical studies, my own views of current statistics are overridden.

Traditional quantitative or qualitative research designs have, respectively, either a confirmatory approach of some initial premise, or a descriptive purpose (Ellis 2012: 21), with many designs incorporating elements of both. This study's premise of the sociocultural element of language learning seeks a framework by which to represent multiple contributory factors. Activity Theory nominates such factors and schematises their interrelationships. This contrasts with both the establishing of correlations by analysis of data sets through a quantitative approach, and a qualitative approach of analysing expected and emergent themes from the data. Instead, a literature review is able to widen its remit through literature relevant to PL learning, in identifying factors nominated by Activity Theory. The broader lens afforded by literary sources can incorporate logistical real-world learning environments of different institutions, the age of the learners, historical comments regarding PL in England, the effects of recent policies, and the modern language capacity of class teachers. Additionally, theoretical underpinnings can be included as they influence stakeholders' beliefs and their implementation of the complex process of language learning. However, by including quantitative data to provide descriptive statistics, the review employs mixed methods which "harness the power of stories alongside the power of numbers" (Pluye & Hong, 2014).

### **The Place of Theory in a Literature Review**

The multiple opportunities offered by literature reviews for engagement and interaction with theory allow theories relating to a particular issue to be examined through an evidence synthesis (Campbell et al. 2014). This, therefore, lends a wider scope of engagement than a study involving data drawn only from real world scenarios. Because of the tendency for research to be carried out and reported within defined fields of interest, recognised as hindering the impact on practice of a study's findings (Sharples, 2009), the opportunity for recognising reciprocal influences between the fields of primary languages and neurobiology arises through a synthesis of evidence.

### **Systematicity**

Amongst the essential qualities of a literature review is "systematic, explicit and reproducible metho" (Fink, 2005), or alternatively, "clarity, validity and auditability" (Booth et al., 2016, p. 19). Systematicity may be variously interpreted but is generally considered a process requisite for achieving validity, or a study's defence against the potential of bias. "Selection bias", a predilection on the part of the reviewer to select studies that support her stance, may apply in this study although, as stated previously, the quantitative data gathered is from large surveys representing established views, from well-respected policy documents, or from neurobiological findings. Additionally, the range of literature dealing with the PL age-group is relatively limited and therefore more likely to be representative than if there were more sources. Different degrees of systematicity (Booth et al., 2016) may be identified amongst

several genres of review, including the “integrative review” which synthesises findings from previous studies. Amongst several advantageous characteristics of such reviews are the yielding of findings for practitioners and policymakers in providing an overview of impact, or the appropriateness of strategies for future practice (Sweet & Moynihan, 2007) as is the case of this study, to identify the interrelationships of issues facing current PL practice in England and Wales. “Auditability” (Booth et al., 2016, p. 19) refers to the reliance on the reviewer’s conclusions to be transparent and grounded upon the data it alludes to. This concern may be partially satisfied by direct reference to the sources of opinions.

### **Insider Research**

“Formal” research is “conducted by an external researcher drawing on one or more of the established research traditions” (Ellis, 2012, 21), motivated by theoretical or pedagogical issues. By contrast, “practitioner research” is undertaken by the practitioner in the classroom of her/his practice. This study brings both to bear; firstly, literature reviews are recognised as an established research tradition. My own action research as school teacher, and subsequently reflecting on trainees’ experience and conditions of practice, are essentially reflective practices.

As a practitioner amongst other PL stakeholders, at a time when significant policy changes have affected primary languages (PL) practice, my experience and reflections are as a partial insider researcher. The influences of my own previous PL practice in school, recent accounts of trainees under my supervision, and school teachers that I visit in schools in northwest England, are acknowledged as influencing the writing of this study. However, in all my previous capacities, fortunate opportunities to reflect on practice, take feedback from others and manage change subsequently, have ensured adaptations within those practices. “Teachers need opportunities to become researchers in their own classroom as well as consumers of research...through action research and exploratory practice” (Ellis, 2012, p. 145). Furthermore, this combination of insights may help to bridge a perceived “gap” between theory and practice.

All insider research has to acknowledge the extent to which the researcher’s own experiences, aptitudes, and practice may influence research decisions. Even the positivist’s aim for value-free data is posited on some initial hypothesis upon which the research is designed. Such quantitative research studies cannot be considered to be entirely value-free. While insider research may be considered to be biased, hence threatening the validity of the study, the teacher/researcher can synthesise theory and practice (Ellis, 2012) with insight.

Where small-scale studies undertaken in the real world might identify traits of effective learning, the insights they might provide may not be generalised, due to their small-scale nature. This study accesses these insights through the literature, and applies them to the scrutiny of an analytical framework. As stated at the outset, the problematisation of a situation has the ultimate aim of finding solutions. However, rather than suggesting solutions, this article confronts PL practice by nominating factors contributing to its current state, and implying the relationship between them.

Most particularly, it points out the anomalies contributing to the current, patchy situation: these are summarised in the Results section of this paper. While alternatives to some current beliefs and practice point to changes that could be made, this is beyond the scope of this

article. Further research needs to be undertaken to test out a usage-based linguistics approach perpetrated in the primary school environment.

Activity Theory provides such a framework and is outlined in the following section.

### Activity Theory Nominators: An Analytic Framework

Any study of a collaborative learning *practice* requires a framework which reflects the complexities of the learning environment. Rather than adopting the premise of measuring outcomes of a direct linear relationship between an applied stimulus A provoking the response B (Figure 5, below), Activity Theory recognises an interconnected system of multiple factors of influence. Leont'ev (or Leontijev) (1981) proposed that the tool (or instrument) of any task exerts an internal psychological influence; a conceptual triangular relationship is proposed between the stimulus of the activity, the response and the tool mediating it.

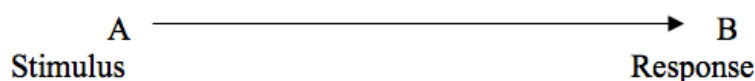


Figure 5: Unidirectional “cause and effect” dynamic in which stimulus A provokes a response B

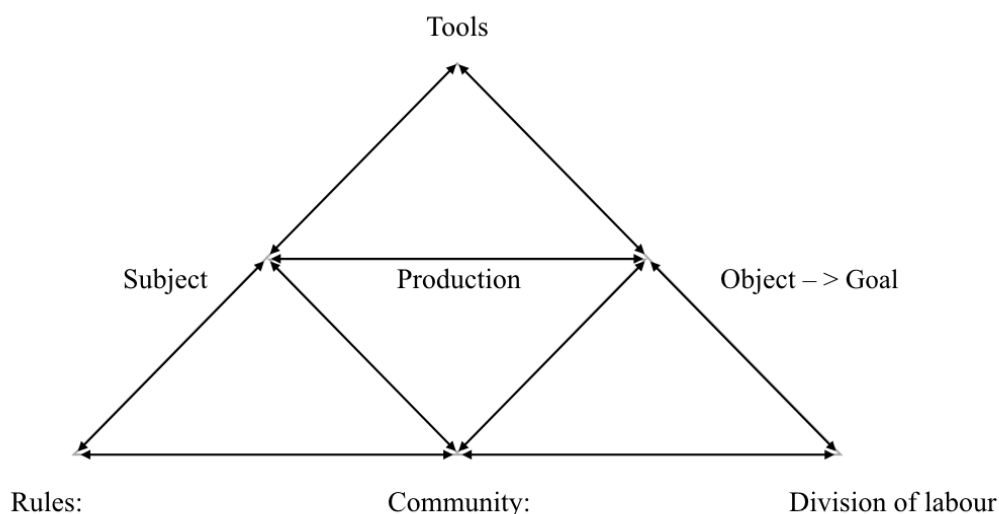


Figure 6: Activity system (from Jonassen and Rohrer-Murphy, 1999, p. 63).

By recognising the inseparability of learning and doing, Activity Theory recognises the activities themselves within a system of interdependent, contextual factors, in the case of this study, identified within the learning environment of PL practice. The activities of other human beings and social relations within a community of people engaged in realising a common goal are represented within a *socially* mediated context (schematised in Figure 6). In the case of PL learning, the “subject/subjects” are pupils, while the “object” of the activity/activities is learning PL, which is mediated by certain “tools” or artefacts. Norms or “rules” of previous practice are likely to be inherited from previous, normally classroom-based practice, and influenced by governmental rhetoric and policy. The “community”

involved in PL practice may consist of not only pupils and teacher/s but also the extended community of parents and other stakeholders, including governmental policymakers.

This study looks particularly at policy, as well as language learning theories, as important contributors influencing the “rules”, or accepted norms of practice. A potential division of labour in staffing PL provision arises in the face of primary teachers’ broad generalist knowledge as compared to secondary teachers’ expertise in usually one curricular subject. On the upper triangle of the activity system, “tools” or “artefacts” mediate the activity in question. This study adopts a particular form of mediator, namely, the young learner’s brain and how it may be deployed effectively to learn language. The insightful information enabled by modern technology’s brain scanning techniques provides useful insights about how young pupils’ learning, and the relationship between the processes involved in learning different language skills. These are interconnected with other factors influencing the complex process of learning a language (Figure 7 below).

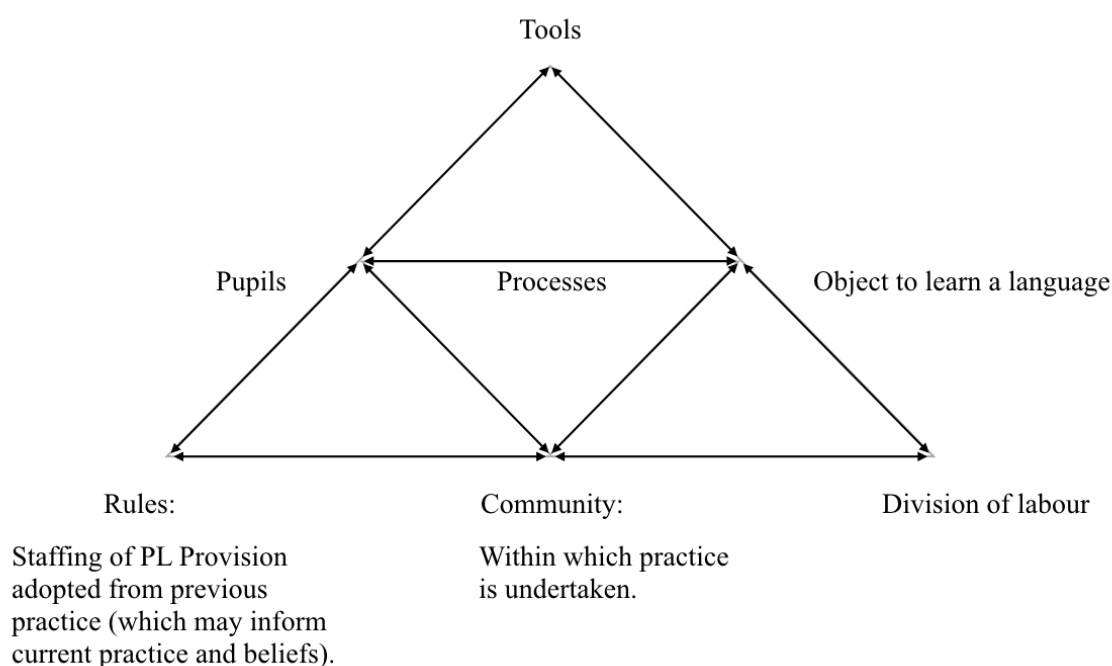


Figure 7: PL practice schematised within Activity Theory.

This study explores the potential interrelationships shown within the Activity Theory framework; this provides interconnected conceptual levels for consideration. The baseline represents the school’s learning environment and provision in response to policy; the mid horizontal level is explored through various objects, and different mediating artefacts or “tools” of the brain are considered at the apex. While these relationships are discussed in the Literature Review, the Results section schematises the broad conclusions.

## Results and Discussion

In this section, the outcomes of the literature review’s discussions are summarised in schematic form within an Activity Theory framework and a written overview. The first three outcomes (figures 8, 9 and 10) show the impact, or “rule”, of governmental policy on different factors within the activity system of Primary Languages provision. They suggest the effects of these policies on the community involved, as well as raising questions about the kind of PL practice, or approach, resulting from them. Figures 11, 12 and 13 take the

indications of the first figures and insert them as “tools” schematically to track likely outcomes for adopted teaching/learning approaches. Indications taken from figures 11,12 and 13 are applied as “rules” to each of Figures 14, 15 and 16, and the human brain is represented as the “tool” of learning.

In the Activity framework, arrows indicate the interconnectedness of all of the factors within it. The labeling of each figure provides a brief overview to show factors contributing to the Activity system: this section is merely representative of the discussions in previous sections. The Activity framework is used to input data drawn from the literature in order to identify and analyse aspects of the activity. In problematising PL provision, little discussion of adopted approaches is evident. In each of figures 8 – 10, therefore, the learning approach is surmised from the other factors taken from the literature review. These approaches are then applied as the “rules” in figures 11 – 13, so that their implications may then be surmised within the other factors of those systems, in particular, the characteristics of the learning environment. For figures 14 – 16, the implications of the neurobiological “tool” of the human brain are described within other aspects of the Activity system, particularly the learning environment. The symbol // on a line showing the interconnectedness of two factors at each end of the line indicates a suggested disruptor between those two factors.

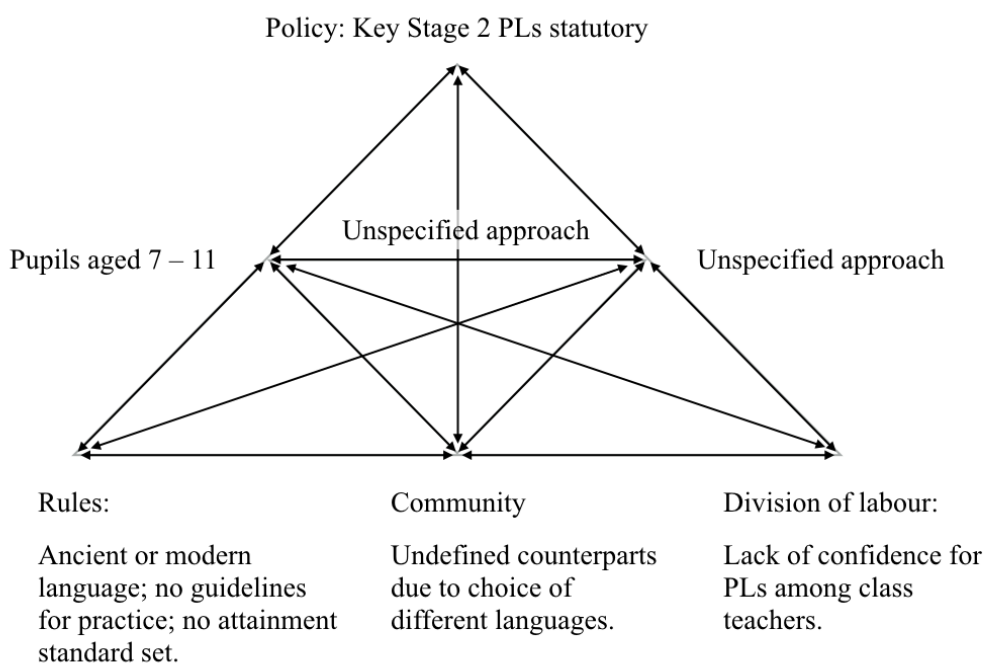


Figure 8: Primary Languages: The effect of policy, statutory provision for Key Stage 2.

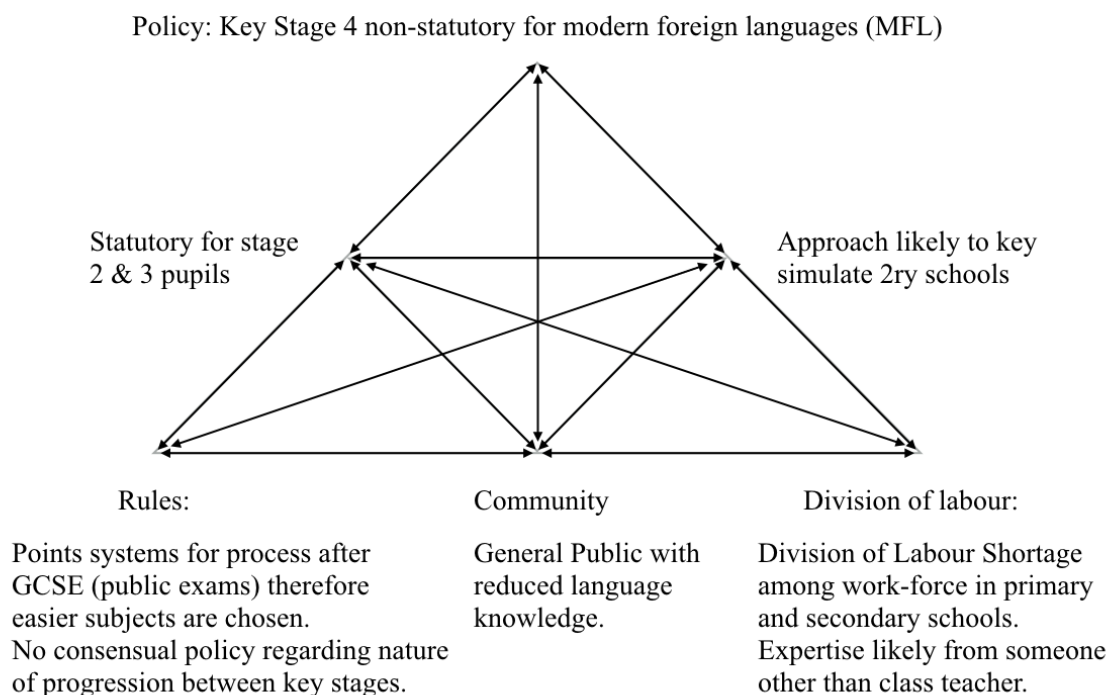


Figure 9: Primary Languages: The effect of policy, Key Stage 4 MFL becomes non-statutory.

The change of status of Key Stage 4 MFL from statutory to optional (DfES 2004b) has resulted in varying levels of confidence but not uncommonly, current generations of teacher trainees have only three years of MFL study behind them. Those who started at primary school usually started again at the beginning when transitioning to Key Stage 3 in secondary school. Class teachers are thus likely to be inadequately equipped for supporting PL learning.

Language learning requires time. In particular, the acquisition of oracy skills requires a ‘little and often’ basis. Schools struggling to release in-house staff other than once a week may buy in outside expertise on a weekly basis. The upshot, therefore, is that class teachers are not expected to be part of the PL community. Furthermore, they do not witness the sessions delivered to their pupils. The Languages Trends 2016/17 study (Tinsley & Board 2017) documents increasing numbers of schools accessing ‘specialist’ expertise, but omits to say which skills and approach are being adopted. It also has no comment on the approach adopted by schools for PLs to be learned.



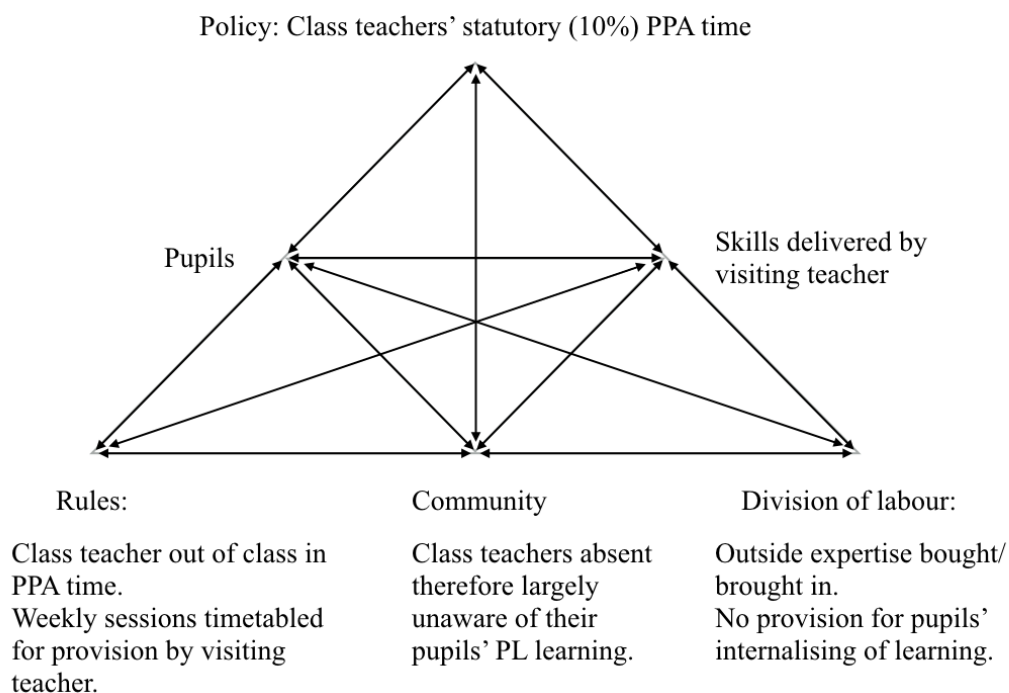


Figure 10: Primary Languages: The effect of policy: Planning, preparation and assessment (PPA) time statutory for class teachers.

Timetabled weekly sessions require internalisation of learning for pupils' successful memorisation and recall of language. However, the PPA effect (fig. O3) effectively excludes the class teacher from the PL community in school; while the visitor teacher belongs, s/he is a part-time member of the school community. These factors are likely to exacerbate a low profile for PL in comparison with other subjects. The visitor teacher is likely to deliver in the same way that s/he learned, likely a secondary school model involving the concurrent learning of all four skills (This is because the statutory status of PL in the curriculum was only recently endowed.)

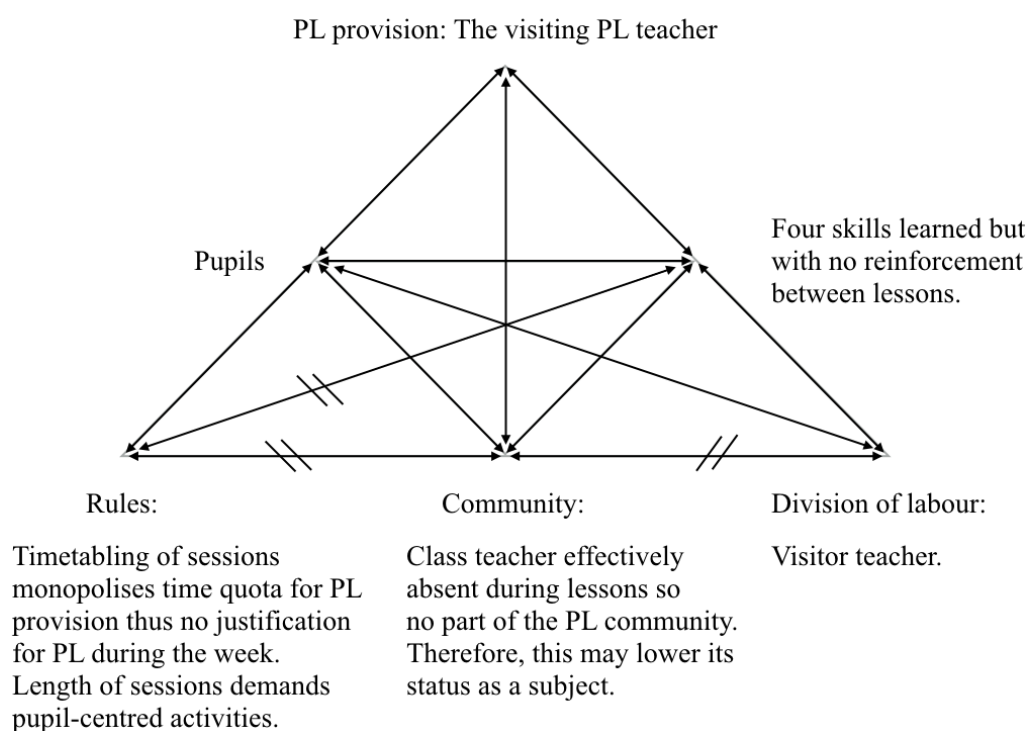


Figure 11: PL provision: Outside PL ‘expertise’.

Due to human brain plasticity, visitor teachers are likely to deliver the subject in a similar way that they themselves learned it, unless they receive training in alternative approaches. Added to this, current PL resources rely heavily on the written form of language. The visual form of orthography may supersede the ephemeral auditory form. Adult members of the community may be more attracted by this emphasis on written forms. OfSTED reportedly look for written labels and orthographic forms of the language in their inspections. One result of the concurrent learning of skills is a bottom-up approach.

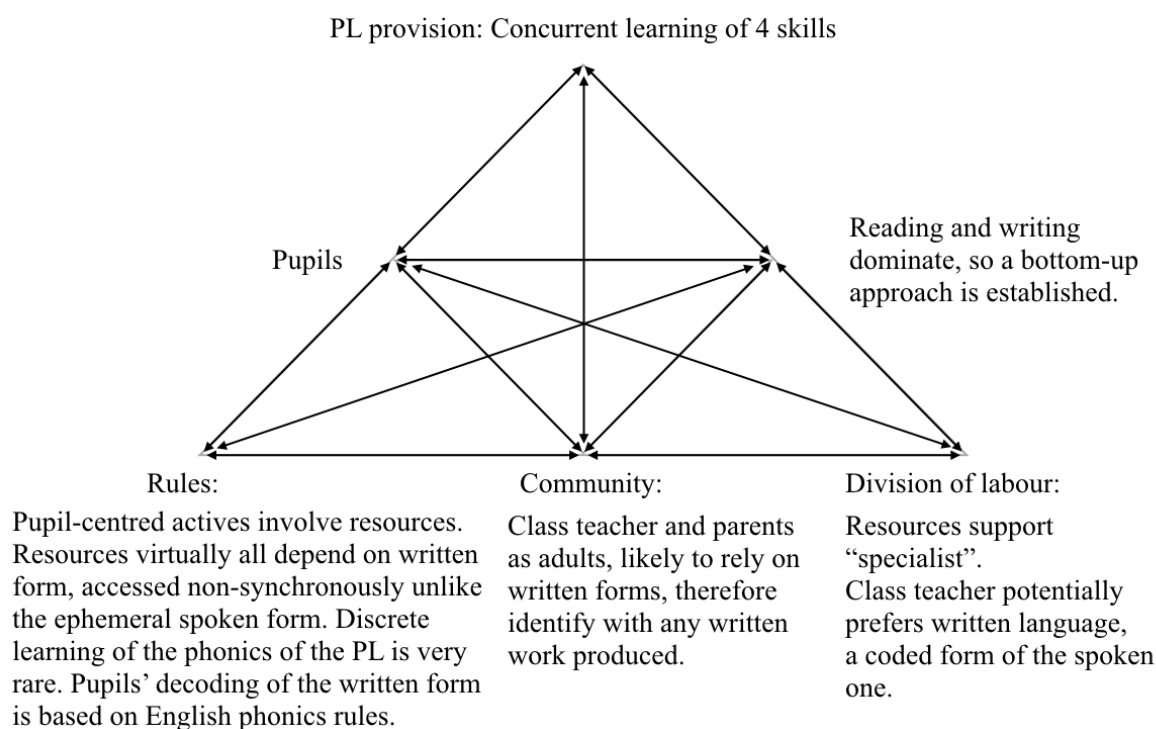


Figure 12: PL provision: Concurrent learning of 4 skills.

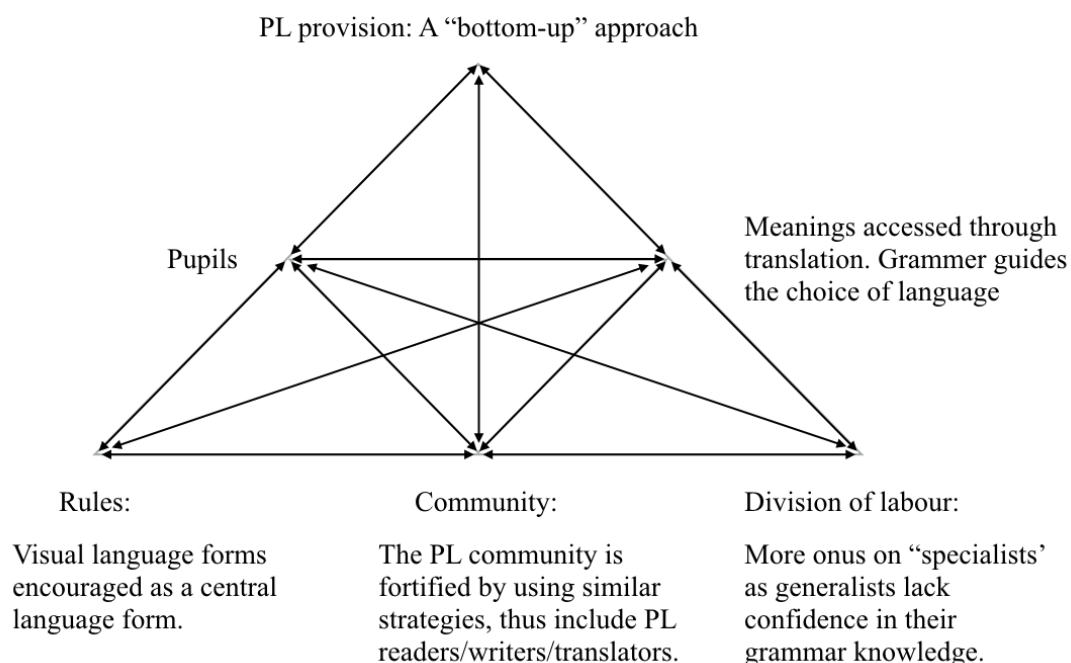


Figure 13: PLs provision: The effect of a ‘bottom-up’ approach.

A bottom-up approach involves learning separate lexical items which are then built up into functional sentences (This compares with a top-down approach in which functional soundstreams of language are learned as a unit, and subsequently analysed so that its constituent parts can be manipulated to make new meanings). To construct such sentences usually involves accessing meanings via the first language (L1), namely through translation. Because languages do not correspond on a word-for-word basis, generating functional meanings from lexical items may rely on guidance from grammar rules. However, the required cognition for this may require greater maturity in pupils than those in Key Stage 2.

The following three overviews summarise the neurobiological implications of the 3 approaches implicit in figures 11, 12 and 13.

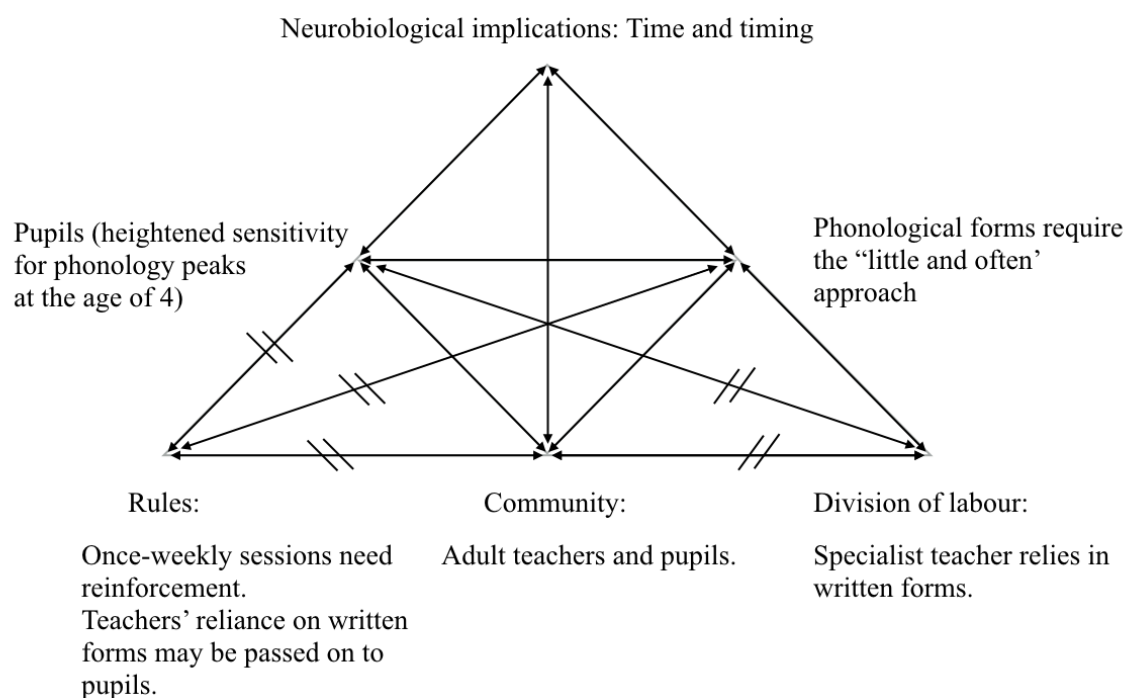


Figure 14: PLs: The neurobiological implications of once-weekly sessions.

Pupils’ heightened sensitivity to language phonology peaks at the age of 4, and thus 3 years of this valuable opportunity to learn oracy skills may be bypassed, if pupils start to learn a PL statutorily through Key Stage 2. The ‘little and often’ approach required to learn oracy skills is currently scarce in primary schools, due to class teachers’ PPA time.

Two significant brain behaviours are associated with its plasticity. Not only are synaptic pathways built and reinforced by the activities that the brain undertakes, but they are also pruned back if underused. As visual data can be accessed non-synchronously, whereas auditory data is ephemeral, the greater accessibility of the former in a time-constrained curriculum may set synaptic precedents in the brain.

These predilections may set preferences for future learning which are difficult to change.

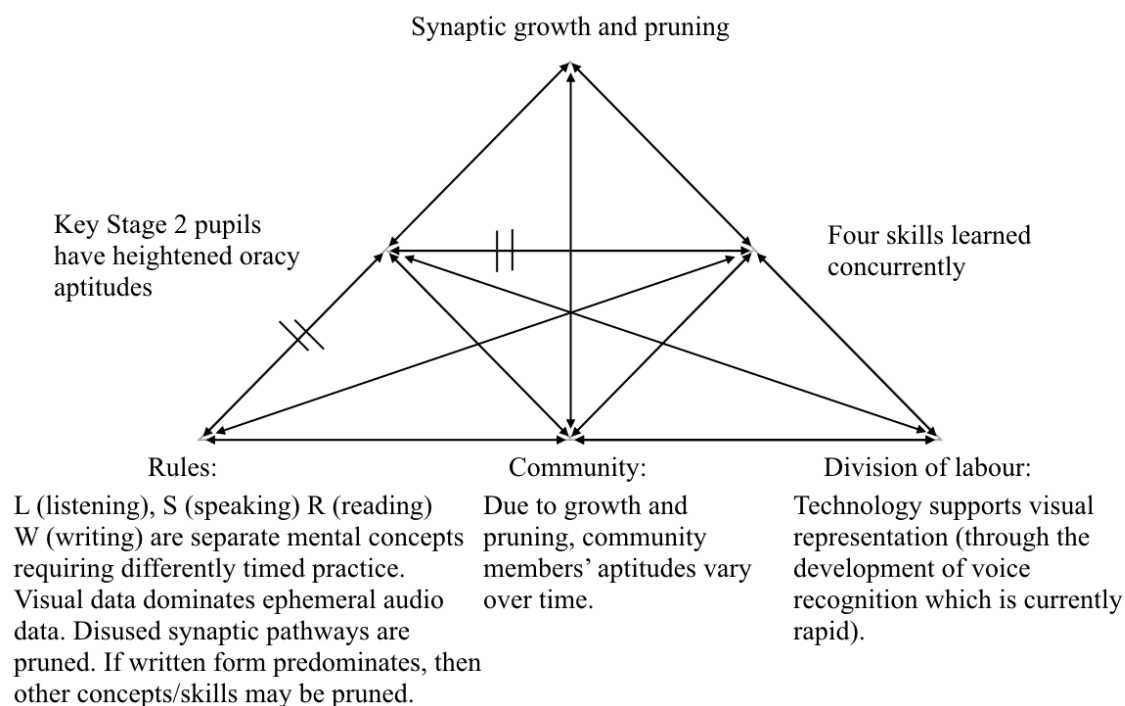


Figure 15: PLs: The neurobiological implications of learning four skills concurrently.

Pupils' developing cognition may be immature for the sophisticated task of building sentences based on a set of grammatical rules. While pupils in England and Wales now learn grammatical terminology in English, the rules governing word classes in English may not apply in the same way to the PL. Although pupils have innate oracy skills that the brain has evolved, a bottom-up approach is different; pupils' cognition may be insufficiently developed to apply grammatical rules with reasonable success. Furthermore, their PL learning is undertaken in limited time.

Significantly, if literacy skills supersede oracy skills, the latter may be 'pruned', due to the brain's plasticity.

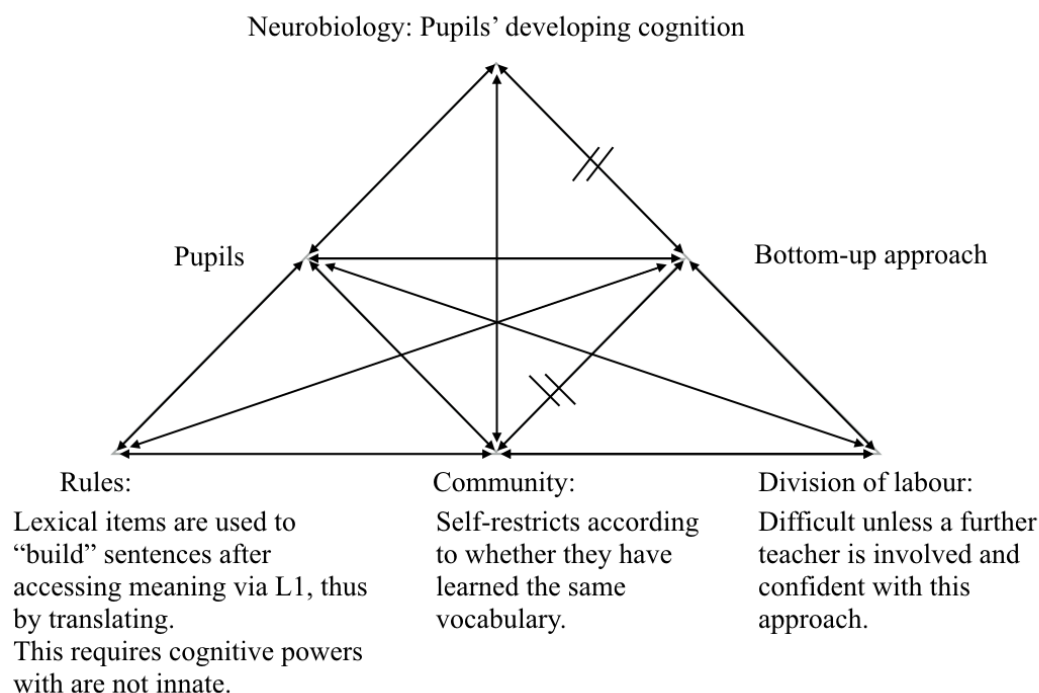


Figure 16. PLs: The neurobiological implications of a bottom-up approach.

### Conclusion

In this study, problematising PL provision in England, the nominators and framework of Activity Theory are employed to analyse factors within that collaborative activity. The current situation of PL practice in England suggests that its recently endowed statutory status within the curriculum does not guarantee its effectiveness. Rather, it is endangered by several factors, not least, class teachers' lack of confidence to support the 'little and often' practice necessary for learning procedural skills. Class teachers absenting themselves from specialist-led sessions timetabled during their PPA time, fail to witness speaking and listening exercises from which they might learn and build capacity. Visiting teachers' approach may be based on both their own secondary school learning and possibly outdated theories, and also, timetabling effects.

Current beliefs about language learning should be repositioned by neurobiological findings such as children's temporarily heightened sensitivity to the phonology of the language, said to peak at four years of age. Currently, statutory PL learning applies only to Key Stage 2 (pupils aged 7 – 11) and thus fails to harness three years of pupils' prime aptitude. Future research may reveal more about critical and sensitive periods for different language learning skills. Meanwhile, because vocabulary learning has no particular neurobiological age-dependence, it risks over-exploitation. This is evident in previous schemes of work imitating secondary school models, in which the accumulation of vocabulary may continue to be the main criterion of progress.

Policy influences, if not drives, the 'rules' of PL practice in schools. When timetabling of PL sessions is within class teachers' PPA time, bought-in expertise may result in sessions of 30 minutes or longer, bringing a heavy reliance on literacy skills to fill the timespan. The call for greater focus on PL literacy skills in preparation for secondary school learning (Nuffield

2014) may set predilections for literacy skills over oracy skills, as the brain adapts itself to the activities it undertakes. Without ‘little and often’ reinforcement, this predilection is compounded. Where mental concepts are stored as written forms, no memorisation is required nor is there a necessity to associate a phonological form with the written one.

While there is much to be celebrated in the setting up of PL learning in England since September 2014, undefined learning processes remain a central factor, as indicated on the activity system diagrams. The brain’s pathways, architected according to the activities undertaken, and also, the synaptic pruning of certain underused brain pathways, reinforce the predilections of practice and of pupils’ learning. If the mental concepts of language that pupils are encouraged to use effectively interfere with their natural, but temporary, aptitude for phonological forms, there is potential detriment afforded to children starting a PL in Key Stage 2. PL practice needs to learn from these Essential neurobiological pointers suggest strategies to develop children’s natural aptitudes so that they can successfully build their coding skills for orthography.

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**Corresponding author:** Magdalen Phillips

**Contact email:** M.Phillips@mmu.ac.uk