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ABSTRACT

Primary languages can make an important contribution to the aims of the Curriculum and Assessment Review Group. Drawing on our Digital Empowerment in Language Teaching (DELTEA) research project, we show how digital technology can enhance teacher competence and confidence while developing children's linguistic skills alongside crucial twenty-first-century competencies such as creativity and empathy. We argue that primary languages education can play a vital role in the Review's vision for developing in all learners essential skills for modern life, when supported by appropriate digital tools and investment.

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Introduction

The curriculum review

In November 2024, the UK Government launched a Curriculum and Assessment Review, articulating ambitious aims for education reform. The Review seeks to 'provide a curriculum that exemplifies excellence; secures the knowledge and skills young people will need in their future lives; enriches and motivates learning; and adapts to the changing needs of the environment they will navigate' (Curriculum and Assessment Review 2024: 4). The Review emphasizes inclusivity, with particular attention to students from socioeconomically disadvantaged backgrounds (low SES), those with SEND, and other vulnerable groups. It also foregrounds creativity development and poses key questions about using technology 'to improve how we deliver the curriculum, assessment and qualifications in England' (Question 53, p. 33).

The contribution of primary languages

The Review's emphasis on developing knowledge and skills for future lives aligns perfectly with what language education can offer, particularly if the focus encompasses not only traditional academic knowledge but also what the OECD (2024) identifies as Social and Emotional Skills. These competencies include open-mindedness (creativity, tolerance, curiosity) as well as collaboration (empathy, trust). They are crucial for life and work in the twenty-first century and also underpin academic success and well-being OECD (2024).

Significantly, language learning has unique potential to develop these competencies in ways that directly address the Review's priorities. Language learning inherently involves cognitive and linguistic reorganization, reshaping conceptual networks and enhancing associative thinking, figurative creativity and divergent thinking (Bergs 2019) – the ability to generate multiple solutions and

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perspectives. While such arguments apply to language learning in general, research evidence suggests that creativity is hampered and indeed declines in contexts where there is a heavy focus on high-stakes testing as well as educational transitions (Said-Metwaly et al. 2021). That makes it particularly important that creativity is fostered at primary school, especially at the end of Key Stage 2.

Similarly, learning a second language requires students to 'see the world through two different conceptual systems' (Ghonsooly and Showqi 2012: 162) and to 'take on a new identity … to step into a new and perhaps unfamiliar pair of shoes' (Guiora et al. 1975: 48). This process also directly develops perspective-taking – the most teachable aspect of empathy – which starts to emerge around 4 years of age, grows rapidly at the start of primary school, but thereafter more slowly (Chatterjee Singh and Duraiappah 2020). Hence its cultivation at primary school seems especially vital.

Challenges and opportunities for primary languages

In Spring 2025, however, an Interim Report published by the Review Group presented a concerning assessment of primary languages, highlighting what it termed a 'lack of efficacy in Modern Foreign Language teaching in primary and transition to secondary' (Curriculum and Assessment Review 2025: 6). This raises issues regarding primary language education precisely when it could contribute significantly to the Review's broader educational goals.

We know from research that high levels of 'efficacy' in primary languages education are only possible with the right conditions. These can be narrowed down to providing learners with linguistic input of sufficient quality and quantity, from teachers who have the pedagogical expertise and confidence to support it. In those conditions learners can and do make progress (Graham et al. 2017; Kasprowicz 2025), as well as having the confidence and motivation to make a more successful transition to secondary school (Courtney et al. 2017). Yet we also know that it is precisely those conditions that teachers themselves acknowledge are lacking in many schools, as successive reports from the Language Trends survey make clear, and especially in contexts of lower socio-economic status (Collen and Duff 2025). Furthermore, primary teachers' lack of confidence in robust assessment of learners' proficiency (Kasprowicz and Graham n.d.) compounds problems around transition, even where they are eager and willing to share assessment data with secondary colleagues. This may result in secondary teachers expressing pessimistic views on preparedness for KS3 language learning (Collen and Duff 2025).

What, then, might be a potential solution for these longstanding challenges? Arguably they present opportunities for digital solutions that align not only with the aims of the Review in terms of developing twenty-first-century skills across all learners, but also with the government's Vision for Technology and AI. That includes the Department for Education commitment to a 'digital revolution' using tools to support teaching, reduce workload, and personalize learning (DfE 2025). In what follows, with reference to our Digital Empowerment in Language Teaching (DELTEA) project, we outline three key ways digital technology can be part of a solution for primary language education, not only tackling the issue of pedagogical 'efficacy' but also meeting the Review's wider aims:

1. Teacher Empowerment: Digital professional development can address teacher confidence and competence issues while building sustainable networks of practice
2. Enhanced Learning Outcomes: Multimodal digital resources can simultaneously develop linguistic skills and twenty-first-century competencies like creativity and empathy
3. Equity and Access: AI-powered tools can provide high-quality language input and personalized feedback regardless of teacher linguistic expertise.

Our project

Funded as part of the ESRC's Education Research Programme, DELTEA has focused, first, on whether online, digital professional development (DPD) can enhance primary languages teachers' sense of competence, autonomy and relatedness central underpinnings for teacher motivation and hence efficacy within Self-Determination Theory (Deci and Ryan 2000). Second, DELTEA has explored whether digital, multimodal stories and an AI app can enhance primary language learners' linguistic (vocabulary, reading comprehension, phonological decoding) and non-linguistic outcomes (including creativity and empathy). In this article we do not report findings in full (these are being published elsewhere, e.g. Turner et al. 2025; Porter and Graham forthcoming) but instead focus on how our methods and broad results offer solutions to the issues highlighted by the Interim Report. We end by highlighting how digital technology can only be a viable solution if schools are better resourced than they currently are.

Teachers and technology

For teachers to exhibit pedagogical efficacy in any subject, their basic psychological needs of competence, autonomy, and relatedness must be met (Deci and Ryan 2000). Primary language teaching poses particular motivational challenges across all three areas. Generalist teachers often lack linguistic proficiency, threatening their sense of competence (Holmes and Myles, 2019), while specialist teachers may lack primary pedagogical expertise (Ayres-Bennett and Carruthers 2020). Limited curriculum time constrains teacher autonomy in planning meaningful learning opportunities (Collen and Duff 2025) and language teachers may feel isolated from their school communities, lacking relatedness (Seymour 2018).

DPD has the potential to be particularly effective in providing the sources of self-efficacy support identified by Bandura (1994): mastery experiences, vicarious learning from relatable teachers, and supportive feedback. That is because it allows participants to: learn about and experiment in a scaffolded environment with new approaches, before trying them out in their own classroom; view the successes of other teachers like themselves and to learn from them about how they solved difficulties (Beach 2017); and receive rapid feedback and affirmation from course facilitators and other participants through tools such as discussion forums (Haukås et al. 2022). DPD has been found to support a sense of relatedness from communities which facilitate teacher network development (Karlsson and Godhe 2016) and a non-hierarchical sense of belonging (Lantz-Andersson et al. 2018). Finally, teacher autonomy appears to be positively impacted when DPD offers teachers 'rich opportunities to make choices' from the DPD tasks and themes (Haukås et al. 2022: 5).

DELTEA's DPD programme

DPD is especially well suited to fostering primary language teachers' sense of self-efficacy, autonomy, and relatedness because it tackles the particular challenges they face by extending interactional spaces beyond the school premises and classroom hours (Minea-Pic 2020). It also presents opportunities for different levels of interaction and feedback amongst teachers and researchers, which are designed to promote interactional quality (Dede et al. 2016). Our DPD programme was built on these understandings to maximize both the practical and interactional affordances that digital PD provides. These included active learning, modelling, and structured opportunities to experiment with practice, to reflect on and evaluate changes made (Darling-Hammond et al. 2017). Also key to the DPD design was its longitudinal nature, which supported development in iterative cycles of discussion, implementation and feedback (Laurillard 2012).

A nine-month programme of online DPD formed Phase 1 of the DELTEA project, involving 34 primary language teachers from England and Scotland. It covered how to develop learners' language literacy, creativity and empathy, particularly through multimodal technology. It offered roughly one

hour's engagement every two weeks and was designed so that teachers could pick up and put down content as their professional and personal circumstances allowed. It should be noted, however, that for some teachers it was a challenge to devote even that amount of time to the DPD.

The resources included the latest research findings presented around relevant themes, delivered in accessible formats such as short video clips, interactive screencasts, and research summaries. We also built in opportunities for reflection on current practice, alongside practical tasks for experimentation and evaluation. To encourage collaboration among teachers and reflection as well as creativity and autonomy, we used a range of digital tools such as Edpuzzle, Goconqr and Nearpod, so that they could respond to activities in a range of ways, including voice recording.

Impact of DPD on teachers

We assessed the impact of the DPD on teachers through a questionnaire they completed at its start and end. We found statistically significant improvement in several areas. These included aspects of teachers' sense of autonomy, their overall sense of competence, and how competent they felt in teaching reading and culture, creativity and empathy in particular. Although there was no quantitative shift in teachers' sense of relatedness, comments like this one at the end of the DPD suggested that they had experienced an increased sense of connectedness, and in a format that worked for them:

> I liked that I could tackle each module in my own time and revisit things when necessary. […] I felt that despite completing the content on my own, I still felt part of a community due to the regular opportunities to read others' answers/thoughts and I found this both useful and motivating as I felt part of a team of committed professionals.

Learners and technology

Multimodality

Some of the strongest benefits of digital technology for language learning come from its frequently multimodal nature, with a growing body of research showing its benefits for vocabulary development and language comprehension (see Wi and Boers 2025, for a recent review). Multimodal materials like captioned videos allow access to interesting and authentic content, while the combined use of text, sound, and images provides support for comprehension and learning, as explained by Mayer's Cognitive Theory of Multimedia Learning (2021). When learners receive input through both auditory and visual channels, understanding and hence retention of the language presented may be enhanced.

For primary age children, multimodal input that aligns well with what they experience in the rest of the curriculum and their out-of school lives can include digital stories as well as captioned videos. Digital stories give opportunities for 'listening while reading' which has been shown to produce gains in receptive and productive L2 vocabulary (Montero Perez et al. 2013). Such stories include illustrations that provide 'salient sources of information that children process in conjunction with text' (Pike et al. 2010: 253). In other words, they support learners in accessing linguistic content that is just above what they can produce themselves, and which crucially is motivating and engaging enough to encourage sufficient processing of the input for learning to occur (Troyer et al. 2019). The same applies to captioned videos, which a study of young Spanish learners of English has shown to improve listening and reading skills as well as vocabulary knowledge (Avello 2023). Finally, multimodal materials are also recommended for learners with specific learning difficulties such as dyslexia because the judicious use of spoken word and images can lessen the processing burden of reading alone (Kormos and Smith 2023).

Multimodality in DELTEA

Multimodality was integral to Phase 2 of DELTEA, consisting of a classroom intervention built around the use of three digital stories by ten teachers, in either French or Spanish. All teachers had completed

the DPD delivered in Phase 1. These stories, sourced from storyweaver.org, exposed pupils to rich, engaging language and blended written, visual, and auditory elements to aid comprehension. Each story was simplified and vocabulary analyses conducted to check for level (beginner) and word frequency (80% of words at 1-2k bands). Multimodality afforded what DELTEA termed 'supported challenge', namely high-quality and plentiful linguistic input coupled with scaffolded tasks to unlock meaning (strategy use) and higher-order thinking: creativity and empathy.

During the intervention, teachers used the digital stories either in whole-class mode (i.e. with the story displayed on the classroom central screen) or on individual devices, all facilitated through the learning platform, Nearpod, in which the materials were embedded. Engagement with challenging language was supported through collaborative reading as well as multimodality. Initially teachers modelled the process of unlocking meaning through using particular comprehension strategies. Following this, learners were encouraged to work in pairs on individual devices, applying the strategies that had been modelled and drawing on their knowledge of foreign language phonics, vocabulary and grammar to come to informed decisions about the meaning of the texts. Wider learning was supported through opportunities for learners to develop creative thinking. This involved encouraging them to use their imagination to think beyond the text 's words. For example, children read a story in either French or Spanish about a dog who is abandoned by its first owner's father. They were asked to imagine they were walking down the street and saw the dog, to think about what they would do and say, and give a brief written response in English so that they had more freedom to express their feelings and emotions than a target language response might have given.

Technology also afforded the development of creativity through design. Digital tools allowed learners a sense of agency to choose response type – written, spoken or drawn. Other activities used drag and drop type tasks that scaffolded target language use. In one, for example, children selected and ordered different target words and phrases, to show the emotional journeys of different characters in the story, or to choose words/phrases that described a character's priorities in life as well as their own. Hence such activities aimed to foster empathy by encouraging children to consider different perspectives for any given situation, as well as considering what they might have in common with characters in stories that were set, for example, in Francophone or Hispanic Africa.

Impact of digital stories on learners

We measured the impact of the stories through a range of tasks completed by learners from the ten intervention schools and also by those from 15 control schools. The linguistic tasks (vocabulary, reading) were based on those developed in Kasprowicz's Progression in Primary Languages project (see, for example, Morea et al. 2024 for vocabulary) while the non-linguistic tasks (creativity, empathy) drew on instruments acknowledged in the field to be valid and reliable measures for primary aged children. The creativity task (Torrance 1974) required children to undertake drawing-based activities that were then scored using a standardized manual, and the empathy task involved the completion of a validated questionnaire (Overgaauw et al. 2017). Overall our findings indicate, first, that the digital stories led to significant linguistic and non-linguistic improvements in children's learning. Second, we used linear mixed effects models that allowed us to analyse how well children in different types of schools and sub-groups progressed over the intervention. Such analyses showed that EAL and non-EAL children, SEND and non-SEND children were not disadvantaged during the teaching intervention. Indeed, by post-test both EAL and SEND children in intervention schools outperformed similar controls on creativity and self-efficacy. That applied regardless of the level of Free School Meals eligibility in the school they attended, which our analyses allowed us to control for. In other words, there was empowerment for children in the intervention group regardless of background.

AI

AI has received considerable attention in the media for the risks it can pose on ethical, environmental and intellectual property levels. Similarly, within the language learning community, drawbacks and limitations are recognized. If not used with appropriate teacher scaffolding, AI programmes may steer learners towards transactional communication that lacks linguistic or cultural depth, rather than fostering creativity and reflection (Kern 2024). Likewise, algorithms and training data mean that learners might not encounter the linguistic variation and culturally-rich input that is more conducive to empathy development and intercultural understanding (Crompton et al. 2024).

Nevertheless, there is a growing amount of research indicating AI's benefits for language learning. Much of this research has focused on improvements in writing for advanced, adult learners (see for example Feng et al. 2025), through corrective feedback offered by written evaluation and/or feedback, machine translation, intelligent tutoring systems, and idea generation (see also Kern 2024). Such uses of AI, while aligning with what seems to be envisaged for feedback and overcoming barriers to success by the DfE and DSIT, Department for Science, Innovation and Technology (2025a) and offering viable solutions for secondary school language learners, arguably have less relevance for primary languages education, where safety concerns are also an issue.

By contrast, AI technology that supports pronunciation and phonological decoding has greater applicability. The latter, the ability to map sounds to their written form, underpins many aspects of language learning, including reading and vocabulary development (Woore 2022). It is also at the heart of phonics teaching which is central to curriculum requirements at both primary and secondary level. AI technology has potential first for developing learners' knowledge and skills in those crucial areas, and second, for assessment purposes. As such it offers solutions to lack of high-quality input, and primary teacher linguistic and assessment expertise. Recent advances mean that AI-assisted pronunciation training offers real possibilities for supporting learners to make progress in skill areas that require considerable practice, classroom contact time, and personalized feedback, as demonstrated for adult learners of English by Issa and Hahn-Powell (2025).

Yet as for research into AI support of writing, very little if any to date has focused on young language learners. While adults can benefit from metalinguistic explanations and the like (Issa and Hahn-Powell 2025), primary learners require different approaches. As shown in Courtney and Graham (2019), digital language support and assessment tools need to be aligned with the kind of teaching learners typically experience in the classroom, to have a game-like, more concrete rather than abstract basis, and to offer challenge at the same time as supportive feedback.

AI in DELTEA

Within Phase 2 of our DELTEA intervention, learners also accessed a phonics and pronunciation app, Speacher, which uses AI feedback coupled with bespoke software to improve student pronunciation. The app used a broadly multimodal approach to present sounds and sound/spelling links. A strong gamification element was included, for example student avatar creation and mini-games such as a 'blow out the candles' breathing warm up game. Each lesson (7 in total per language, each lasting around 10 minutes) focused on a particular target language sound and offered a range of activities which blended visual, auditory and textual elements. For example, sounds were modelled using native speaker audio files whilst children also viewed the mouth of a person saying a particular word or phoneme. Learners were then invited, where appropriate, to learn and reflect on how certain sounds are formed (for example, using your nose for a French nasal vowel) and to discriminate between novel target language sounds and their close counterparts. They were then encouraged to produce target language words containing the sounds they were learning, which the app then recorded. Crucially, the app then generated a word level feedback score by using a combination of AI transcript evidence and a bespoke, language-specific scoring software, which compared children's utterances to a native speaker exemplar (groundtruth). This word level score covered sound, intonation,

pitch and timing, with sound weighted more than the other facets. A percentage score was then displayed to each learner accompanied by narrative feedback, for example, 'you've nailed that nasal sound!' or 'that didn't sound quite right, can you try again?'. Importantly, the AI analyses and feedback were all performed within the app, meaning audio data did not need to be sent to an external online AI model, enhancing data security.

For assessment of learner progress, the app contained pre- and post-tests at the start and end of the programme of lessons which were based on low-frequency and non-words in each language. Within lessons, it allowed the tracking of changes in production of both practice exemplars and unfamiliar, low-frequency words. Statistical analyses are underway, involving comparison of app generated word-level scores (pre–post test) as well as (human) auditory coding at both word level (target-like/non target-like), both within lesson and at pre–post time points. Furthermore, use of the app has generated well over 50,000 instances of children's production of target language words. These can be analysed acoustically to explore progress through the use of the app and the extent to which native-like production of target languagesounds is feasible. Initial analyses of such data have found that the app improved reading aloud accuracy. It also compared quite favourably with human auditory assessment of target-like production of specific grapheme/phoneme correspondences (Turner et al. 2025), offering a potential solution for assessment of crucial phonological decoding skills regardless of teacher expertise.

Equity and digital technology

Our findings hence indicate that digital technology offers affordances that can benefit teachers and learners regardless of their SEND, EAL or SES status. It is important to note, however, that considerable investment is required to support the use of digital tools in both primary and secondary school classrooms. These concerns are recognized in the Government's Digital Inclusion Action Plan (Dfe and DSIT 2025b) and consultation exercise to investigate the Digital Divide in education. Survey work to date has identified differences in access for educational phases (primary/secondary) and school types. For example, primary Local Authority schools are less likely to have a school technology strategy than their academized counterparts (DfE 2023).

DELTEA teachers also varied in their confidence using digital devices and problem-solving , as well as their access to technical support. There is a noted dearth of digital upskilling for teachers overall (DfE 2023) but our research indicates that such CPD should develop teachers' confidence in using laptops or tablets, alongside training in how to embed software and pedagogic tools in existing pedagogic repertoires.

Perhaps most importantly, schools participating in our teaching intervention occasionally found that access to laptops and/or tablets was problematic. For example, children had to share tablets, which were sometimes too old to function well. Since the COVID-19 pandemic highlighted that digital equity is a global issue (Gottschalk and Weise 2023), considerable work has been undertaken in England to improve the availability of technology in schools. Recently, 77% of primary schools reported that their learners can access a tablet (DfE 2023).

Yet there is also anecdotal evidence that some schools recommend that parents buy children their own devices (https://www.educationlawadvice.com/2024/05/31/school-causes-outrage-asking-parents-pay-309-laptops/), which can unwittingly lead to further inequalities. For example, in DELTEA we found that use of the app, which required higher levels of processing capacity, could be impeded when children used older, multiple-user school devices. Hence they were at a disadvantage compared to children in their class who had their own device.

Digital divides in schools hence go beyond children's ability to access a tablet and extend to **quality** of access/user experience. Indeed, an analysis of large-scale survey data found digital divides particularly around high quality (e.g. deeper reflection/engagement) and frequent use of digital tools in classrooms. These in turn fostered the development of digital skills (Loh et al. 2025) that are known to be weaker in students from less advantaged backgrounds (Scherer and

Siddiq 2019). In other words, it seems that infrastructure, in the purest sense (e.g. internet availabilityand hardware) is only part of the solution.

Conclusions and recommendations

Through DELTEA's primary languages research we have identified considerable opportunities for improved, more equitable provision through access to high-quality FL pedagogic tools and language input. This leads us to make the following recommendations for consideration by the Review group:

1. Primary languages should be viewed as an important vehicle for the development of twenty-first-century skills.
2. Efficacy in teaching can be improved through digital professional development that focuses on the fostering of teacher sense of competence, autonomy and relatedness. Time to engage in such DPD needs to be built into teachers' workloads.
3. Digital empowerment for learners needs to focus on the provision of high-quality, plentiful linguistic input. This is achievablethrough multimodality, which can support linguistic and non-linguistic learning outcomes, through rich engagement with language and scaffolded tasks which support imagination, perspective-taking, cognitive and affective empathy and contemplation of societal challenges.
4. At primary school level, AI may be usefully employed to provide support for the development and assessment of pronunciation and phonological decoding.
5. While these uses of technology can help overcome inequitable access to high-quality input and language teaching, due attention needs to be paid to teacher development in using basic devices like tablets, to technical support in schools, and to ensuring equality in quality of access/user experience.

Hence mindful investment in infrastructure, resourcing, professional development for teachers and careful selection of digital tools for learners are essential to support primary languages education, by improving the quality and quantity of the input learners receive. With that support, we can achieve the more consistent outcomes at the end of Key Stage 2 that are vital for more effective transition to secondary school language learning.

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