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The effect of different teacher literacy training programmes on student's word reading abilities in government primary schools in Northern Nigeria

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ABSTRACT

This study in Kano State, Nigeria, uses a quasi-experimental design to investigate the effectiveness of two teacher training programmes (ESSPIN and Jolly Phonics) in 536 government primary schools. In total, 5,449 children were tested using the phonics screening check to determine which teacher training programme positively affects learning. The effects are greater when teachers have completed two different programmes using adaptive instruction and include elements of coaching and mentoring. A pupil whose teacher has undertaken both training programmes will score 6.062 ($p < 0.001$) points higher in Primary One and 4.344 ($p < 0.01$) points higher in Primary Two. English spoken in the home, being a boy, and being older in your year group have a significant positive effect on word reading score. This research highlights the importance of meaningful and impactful teacher training on children's reading development in English, the medium of instruction in Nigeria from the 4th year of primary school.

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Systematic phonics; literacy; early reading; Nigeria; reading intervention

Introduction

In Nigeria, learning to read is a significant concern not only for parents, schools, and communities but also for policymakers and the international development community. Illiteracy¹ accounts for just under 10 million young people (15- and 24-year-olds), representing 44% of the total population (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020). Regional education quality indicators, such as the recruitment and retention of teachers (Humphreys & Crawford, 2014; Kontagora et al., 2018), school attendance and primary school completion rates (National Bureau of Statistics [NBS] & United Nations Children's Fund, 2018; National Population Commission [NPC] & International Finance Corporation [IFC], 2019) are polarised between urban and rural areas. Estimates suggest just over half of Primary Six children demonstrate adequate reading comprehension (NPC & IFC, 2019) with children facing a deep learning crisis especially

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in remote areas (Adeniran et al., 2020). Low adult English literacy levels in rural areas (NBS, 2020) suggest the home language environment is not providing structured reading experiences for children in partnership with their schooling.

Research conducted in various African countries (Ghana, Kenya, Mali, Nigeria, Senegal, South Africa, Tanzania, and Uganda) identifies the difficulties in preparing and developing teachers' knowledge to cultivate learning experiences (Akinbote, 2007; Akyeampong & Stephens, 2002; Pryor et al., 2012; Taylor, 2019). This includes preparedness and early exposure to literacy and reading strategies. Teachers entering classrooms tend to be underprepared for skills-based teaching and lack critical insight to solve complex learning issues (Evans & Popova, 2016).

Teacher training in Nigeria has been criticised owing to overcrowded lecture halls (Adekola, 2007; Allsop & Howard, 2009; EDOREN, 2015) with the majority of students standing outside, unable to hear the lecturer or participate in the session (Humphreys et al., 2020). This results in poor interactions between the student teacher and the lecturers (Barnes et al., 2019; Olusola & Rotimi, 2012; Oritsebemigho, 2014). There are some concerns regarding the student teachers' own abilities in literacy and academic skills (Akinbote, 2007) with some low-quality teacher candidates being admitted onto teacher training programmes (Barnes et al., 2019; Oritsebemigho, 2014). With large numbers of students, there are inadequate learning resources (Burke, 2009; Edelenbosh & Short, 2009; Federal Ministry of Education [FME], 2009). Humphreys et al. (2020) found, in their study with 338 trainee teachers in two colleges of education in Nigeria, that there was an overwhelming desire for more learning resources. The students believed these were the most critical factor for improving Nigerian Certificate of Education (NCE) courses (p. 6). Typically, teacher training given in Nigeria lacks practical elements and teaching aids and is non-participatory (EDOREN, 2015; Humphreys et al., 2020). Student teachers are not prepared for the complexities of classroom instruction (Barnes et al., 2019).

A recent baseline assessment of pre-service teacher training in North Nigeria found there to be a lack of explicit literacy and reading instruction (Barnes & Boyle, 2018). In Nigeria, the English curriculum has included literacy instruction since 2012 (e.g., phonemic awareness and decoding skills). Explicit reading instructions in the Nigerian early primary curriculum tend to be haphazardly implemented and unconsidered (Barnes et al., 2019). Skills-based pedagogies, such as teaching phonics, requires teachers to understand the fundamental principles of basic language constructs (Binks-Cantrell et al., 2012). These principles are important as there is robust evidence that language development is influenced by the quantity of language input when exposed to a second language, which in this Nigerian context is English (Deanda et al., 2016).

Learning the reading code

Effective reading programmes task the emergent reader with a range of code-related activities. These include learning basic alphabet principles and providing meaning-based experiences to help learners comprehend words (Davis & Evans, 2021; Gabas et al., 2019; Lesaux, 2012). For the L2 reader, both top-down and bottom-up experiences are complex, as the rules learnt in the L1 may affect L2 reading acquisition experiences.² There is consensus in the literature that identifying and making links between letter characters and their sounds is critical for reading success (Shanahan & Beck, 2006). Children

who develop proficiencies in becoming phonemically aware are predictably more likely to become skilled readers, whether they are L1 or L2 learners (Shanahan & Lonigan, 2010). Specific to this study, whilst all Nigerian languages share the English alphabetic system, children's exposure to learning its core principles remains a challenge. For example, there is a debate surrounding the impact and use of a standardised Nigerian English phonology to facilitate the transfer from the speaker's L1 to English, but this remains inconclusive (Adetugbo, 2004; Jowitt, 2007).

Phonics is a system and a pedagogical tool for accelerating reading mastery. As a system, it includes symbols and letters commonly used to form spoken components of a language (Joshi, 2019; Mesmer & Griffith, 2005). Teachers instruct learners to make connections between letters and symbols, found in the system, to construct words (Castles et al., 2018; Ehri et al., 2001). Teaching instruction has varied over many years and continues to foster debate on which type of phonics instruction is a useful precursor to reading (Bowers, 2020; Buckingham, 2020; Torgerson et al., 2019). Phonics pedagogy is varied in the literature referring to systematic, explicit, embedded/implicit, and holistic/intrinsic methods (Bowers, 2020; Mesmer & Griffith, 2005; Rupley et al., 2009). Systematic–explicit methods involve teaching a sequence of letter–sound correspondences delivered within a broad curriculum. It typically involves synthetic techniques, which incorporate blending and decoding skills to promote early exposure of word construction. Implicit–intrinsic methods are quite the opposite, typically taking an inductive-analytic approach to word construction. In this way, learners will not segment letter sounds or learn them in isolation. Various meta-analysis and systematic reviews have found positive effects in systematic–explicit phonic approaches that have led to improved reading skills (Ehri et al., 2001; Jeynes, 2008; Richards-Tutor et al., 2016; Torgerson et al., 2019).

Studies that have evaluated phonic interventions in English as a second language (ESL) environments also report positive effects of systematic approaches (Jamaludin et al., 2016; Stuart, 2004; Vadasy & Sanders, 2010). A recent pilot study involving kindergarten children who all spoke different languages found explicit group instruction had positive effects on children's blending, segmenting, and real word reading (Dussling, 2018). In Hyderabad, India, Dixon et al. (2011) recruited over 500 children from 22 schools to take part in a 6-month intervention comparing traditional (whole-word/rote) and synthetic approaches. All teachers who delivered the phonics intervention were initially trained in synthetic pedagogies before teaching children for 1 hour each day. Dixon et al. found positive effects on reading, spelling, phonemic awareness, segmentation, and decoding with children from the synthetic phonics group outperforming the control group. Analysis of individual teacher effects on all measures indicated no statistically significant difference. This demonstrates teachers to be applying the same "systematic" approaches and thus provides further justification that instructional practices that are structured, fast-paced, and child-centred can accelerate children's reading acquisition (Dixon et al., 2011; Ehri & Flugman, 2018; Ehri et al., 2001). There is evidence that structured learning environments and intensive teacher training in phonic pedagogies have a positive effect on reading achievement (Ehri & Flugman, 2018).

The effectiveness of teacher training programmes in the global south

Typically, quality-teaching instruction for young children from developed countries leads to improved success in school and later in adult life (Chetty et al., 2011). This is also the

case in developing country contexts. Research shows the importance and value that quality teacher training can have on children's successful learning (Conn, 2017; Evans & Acosta, 2021; Glewwe et al., 2014; Kremer et al., 2013; McEwan, 2015). Meta-analytical reviews report various teacher-training strategies across Sub-Saharan Africa and other developing countries. McEwan (2015) reviewed 77 experiments with 111 interventions carried out in primary schools in global south countries. Data show that effective teacher training produces a mean effect size of 0.12 *SD* ($p < 0.001$) improvement in children's learning. Interestingly, where the intervention carried out introduces instructional materials only (such as textbooks), the impact on children's learning is not as large as when combined with teacher training and the use of a well-articulated instructional model (Banerjee et al., 2007; Friedman et al., 2010; Lucas et al., 2014). A meta-analysis synthesising 56 articles consisting of 66 separate experiments with 83 pedagogical interventions carried out in Sub-Saharan Africa by Conn (2017) shows adaptive instruction sessions that include elements of coaching and mentoring are statistically significantly more effective than non-adaptive instruction ($p < 0.1$). The effect size is approximately 0.30 *SD* greater than all other types of programmes combined. Lucas et al. (2014) found statistically significant effects in children's oral literacy in Kenya and assessments on oral and written literacy in Uganda. In both countries, teachers were trained using local language instruction materials, received continuous adaptive mentoring support, and were provided instructions for on-going assessment monitoring.

Some studies report sizeable gains in literacy achievement when teacher training combines instructional techniques and the application of resources (Brunette et al., 2019; Piper et al., 2018). Other studies identify that teacher training methods need to be simplified focusing on practical skills (Evans & Popova, 2016; Pritchett & Beatty, 2015). Christina and Vinogradova (2017) compared three literacy programmes across Rwanda, Senegal, and the Philippines. Drawing upon data from the three study locations, they reported that teacher training methods that incorporate oral language activities and promote language skills and authentic writing experiences improve learning outcomes.

Teacher training reliant on non-adaptive instructional methods where trainee teachers learn techniques independently of the training and with limited support are less effective (Ganimian & Murnane, 2016). Limited one-off service teacher training events, typically organised as teacher-training conferences, have been shown to be ineffective. Teacher training interventions are effective when adapted to teachers' and learners' needs. Teacher training interventions have been shown to be more successful in improving pupil outcomes when they recognise adaptive pedagogies and a changing learning dynamic. Teacher training interventions are more effective when they are repeated, supported through on-going mentorship, and linked to a pedagogical tool. The evidence suggests successful teacher training programmes require on-going support and mentorship that can adapt to learners in classroom environments. Teacher training resources and the application of these materials also seem to be key in improving literacy skills (Conn, 2017; Evans & Acosta, 2021; Evans & Popova, 2016; McEwan, 2015).

The present study

The present study concerns two overlapping literacy interventions implemented in Kano State, Nigeria. Kano state is one of 36 states and is located in the northern region of the

country. It is the most populous in Nigeria and is made up of 44 local government areas. The first intervention was the Education Sector Support Programme in Nigeria (ESSPIN). This was a UK aid-funded programme, implemented from 2008 to 2017 in six selected states, including Kano State (ESSPIN, 2013). In Kano, ESSPIN reached 6,218 schools between 2013 and 2017, which equates to almost every school in the state, and 68,302 Grade 1 to 5 teachers (ESSPIN, 2017).³

The second intervention is Jolly Phonics (JP), which has reached all states in Nigeria. The Jolly Phonics Project was initiated in Kano State in October 2017, when 538 Primary One teachers were trained. In December 2018, the project was expanded to reach a further 975 Primary One teachers. In March 2019, the project was then expanded again to reach 528 Primary Two teachers in the initial schools. This means that the Primary Two teachers in this study had been using Jolly Phonics for one term, but their pupils should have received a full year of Jolly Phonics teaching in Primary One.

There were some similarities between the two interventions – ESSPIN and JP. The model for training and supporting teachers was generally the same under each intervention. Initial workshops were followed by continuous school visits by School Support Officers (SSOs), the aim being to build on the gains achieved in the workshops. Both programmes also teach phonics in a systematic way. The same 42 sounds of the English language were taught independently in each programme and in a similar order. They both teach the skills of learning the letter sounds, letter formation, blending, segmenting, and “tricky words”. There are similar activities for teaching these different skills, such as a story for each sound, the use of flashcards, and interactive formation strategies. Through these strategies, both programmes also emphasised the need for teaching to be child-centred, multi-sensory, and participatory.

There are also substantial differences between the two interventions. Importantly, ESSPIN selected teachers with the highest qualifications and a specialism in either English or mathematics (Cameron et al., 2016). There were no selection criteria for Jolly Phonics teachers. The ESSPIN teachers were then mostly provided with separate classrooms with better facilities and resources, and had more time dedicated to the teaching of literacy on their timetable (Cameron et al., 2016). This was not the case for the Jolly Phonics teachers that were not also part of ESSPIN. All Jolly Phonics teachers did receive teaching and learning materials. Importantly, pupils taught by a Jolly Phonics teacher were given a pupil workbook, whereas the ESSPIN-only pupils were not provided with dedicated literacy workbooks.

The model adopted for the training of teachers also differed. ESSPIN utilised a step-down approach⁴, with the core technical team training government officials, mostly SSOs, who then trained teachers (Cameron et al., 2016). All Jolly Phonics training was provided directly to the classroom teachers by professional trainers, who had been recruited based on their level of technical expertise and experience of teaching Jolly Phonics in Nigerian classrooms.

The main focus of the teacher training within the ESSPIN programme was on key teaching skills. These included the use of teaching aids, giving feedback, pupil participation, differentiation, and classroom organisation. The aim was to develop a teacher with more proficient classroom skills, rather than focus on the literacy lesson content (Cameron et al., 2016). In contrast, the Jolly Phonics training worked through each of the phonics lessons one by one, focusing on ensuring that teachers developed knowledge

and skills specific to the teaching of systematic phonics, such as practising the letter sounds and numerous blending activities, rather than developing broader teaching skills.

There were also differences in the content of the literacy lessons. Jolly Phonics intensively focused on word reading and writing development through a systematic phonics approach. This was only a small starter aspect of the ESSPIN lesson plans, which presented a more holistic approach to teaching English by also covering speaking and listening and more vocabulary and comprehension development. The ESSPIN lesson plans were more closely aligned with the broader Nigerian curriculum and conventional methods used in Nigeria's schools.

As a result of the more limited focus, the Jolly Phonics lessons had a simpler lesson structure. In Jolly Phonics, each of the 42 letter sounds was introduced with the same 8 steps: (1) Story, (2) Action, (3) Flashcards, (4) Formation, (5) Blending, (6) Sounding, (7) Dictation, (8) Jolly Song. This was followed by two repeating lesson structures for the later content. The narrow focus provided more teaching strategies for the teaching of each skill, particularly for blending and segmenting. Jolly Phonics teaches one sound per day, and by the end of Primary Two covers a range of reading and writing content including alternative spelling of the sounds, tricky words, and other spelling rules. Jolly Phonics used a pure systematic synthetic phonics approach.

In the ESSPIN plans, the same structure is generally followed in each lesson: (1) Letters and Sounds, (2) Introduction, (3) Main Activity, (4) Plenary. The type of activities within each component varies from day to day, with there being much more content to cover. Within each lesson, there tends to be one brief whole class blending activity with a limited strategy in place for each of the components. ESSPIN introduced one new sound per week and adopted a more whole-word approach to the teaching of reading and writing. Activities included the matching of words to pictures and whole class sentence reading. Some words used in these activities included sounds that children had not yet been taught. In this respect, ESSPIN adopted a more mixed-methods approach to the teaching of English literacy.

Method

The research question to be explored was: *To what extent do different types of literacy training programmes affect word reading abilities in government primary school pupils in Northern Nigeria?* This research utilised a quasi-experimental design and was undertaken in June 2019 with 5,449 Primary One and Two children. These children were attending 536 schools across 42 of the 44 local government districts in rural, semi-rural, and urban areas of Kano State, Nigeria. They were tested on their word reading ability in English.

In order to ensure that the selection of schools was unbiased, independent academics from the Nigeria Centre for Reading Research and Development, Bayero University, Kano, were asked to randomly select 13 schools in each local government district from a list of schools. Due to local logistics on the ground, a total of 536 schools took part in this research. Assessment training took place, which covered how to randomly sample classes and pupils and how to ensure that pupils were comfortable and assessment environments were conducive. The assessors were then provided with a list of schools and a timetable for when they should visit the schools to conduct the assessments. There was a mix of school characteristics within the sample, including schools from

across urban, rural, and semi-rural contexts, and schools with varying levels of conduciveness for learning in terms of their facilities and building quality. This random sample also provided a mix of none, ESSPIN-only, Jolly Phonics-only, and both ESSPIN and Jolly Phonics interventions received amongst the teachers. The assessors were instructed to test a random sample of a maximum of 10 pupils in each class. In total, 5,449 pupils in Primary One and Two were assessed. The assessors informed the children they could stop the test at any time and that participation was voluntary.

Prior to the data gathering, schoolteachers, headteachers, and parents were invited to attend sessions where the concept of the research was explained. The Nigeria government granted permission for the study. All children and teachers volunteered to participate in this project. Parents/guardians were informed through their school that the purpose of the exercise was to compare different teacher training programmes within Kano State, that participation was voluntary, and the results of the assessment would be kept strictly confidential and for research use only.

The word reading test used was the UK Government's "Phonics Screening Check" from 2018.⁵ This test assesses the pupil's ability to read 40 distinct words. These words contain both invented decodable words, such as "jub", and common decodable English words, such as "chop". Decodable means that the sounds in the words follow the standard English sound system, and so do not contain any irregularities in their spelling. If a pupil can read the words, it generally means that they know the grapheme–phoneme correspondences and have the phonemic awareness to be able to blend the different sounds together to read words.

The pupil stimulus for the test was displayed on a smartphone, via a dedicated assessment app, with each word appearing in large font on the app one by one. The assessor marked the child's answer as "correct", "incorrect", or "no answer", meaning that the data were instantly collated and synced to a central database. The assessors were SSOs that had been trained in the use of the app and phonics.

Results

SPSS statistical software (Version 26) was used to analyse associations among variables. Multilevel modelling was also performed to take account of the hierarchical structure of the data (district, school, and pupil) using Stata (Version 15). Before proceeding to the full analysis, it is worth considering some basic descriptive statistics. There is about a 50:50 split in gender in both year groups, with 50.1% ($n = 1,384$) girls in Primary One and 49.6% ($n = 1,340$) girls in Primary Two. In Primary One the mean age is 7.2, and in Primary Two the mean age is almost 9 years old (8.73 years). The majority of children (52%) are from rural areas (Table 1).

In Primary One and Primary Two, very few families are using English at home, with almost 70% in both groups stating they never use English at home (Table 2).

Table 3 shows that the language of instruction in school is typically a mixture of mother tongue and English in both Primary One and Two (97%). Table 4 shows the number of pupils being taught by teachers trained by the different programmes, that is, none, ESSPIN only, Jolly Phonics only, both Jolly Phonics and ESSPIN. Around half of the children in each year group have teachers that experienced both ESSPIN and JP training programmes.

Table 1. Pupil's in rural and urban areas.

	Year 1		Year 2	
	Frequency	Percent	Frequency	Percent
Rural	1,441	52.2	1,386	51.6
Semi-rural	518	18.7	493	18.3
Urban	791	28.7	797	29.6
Total	2,750	99.6	2,676	99.5
Missing System	10	.4	13	.5
Total	2,760	100.0	2,689	100.00

The boxplots in [Figures 1](#) and [2](#) show how children score in Primary One and Two in the word assessment in relation to the training their teacher has received. These diagrams show initially, when comparing the raw data scores, that children that have teachers that experience both programmes seem to perform better than the others. However, having a teacher who has experienced some training provides an advantage in assessment scores. It is interesting to note that for Primary One and Two, there are no outliers for those being taught by teachers who have received both training programmes. In the case of Primary One, this is also true for those taught by teachers receiving only Jolly Phonics training.

Checks were performed for normality, and the word assessment score was in an acceptable range (skewness = 1.389, Kurtosis = 0.769). The one-way analysis of variance (ANOVA) is considered a robust test tolerating violations to its normality assumption well, as long as departure from normality is moderate (Humble, 2020; Keppel, 1982; Montgomery, 1991), the populations have the same distributional shape (Kirk, 2013), and the sample sizes are large and equal (Winer et al., 1991). Blanca et al. (2017) provide empirical evidence of the robustness of an ANOVA in a wider variety of non-normal distributions. Initial analysis using an ANOVA shows that various teacher training methods have a significant effect on the word assessment score in Primary One ($F(3, 2739) = 126.366, p < 0.001$) and Primary Two ($F(3, 2679) = 70.466, p < 0.001$). This is clearly illustrated by a post hoc Scheffe Test ([Table 5](#)) that demonstrates the significant subsets of mean scores for the individual training methods and the combined training method in Primary One and Primary Two; the mean word assessment scores for combined training being significantly higher than individual or no training.

[Figures 1](#) and [2](#) and [Table 5](#) seem to show that there are differences between teacher training programmes, and these are significantly affecting children's reading ability as taken by the reading test scores. However, it is important to consider a more sophisticated

Table 2. The child's family use English at home.

The pupil's grade		Frequency	Percent
Primary One	never	1,875	68.0
	unsure	273	9.9
	some of the time	583	21.1
	all of the time	28	1.0
	Total	2,759	100.0
Primary Two	never	1,888	70.3
	unsure	254	9.5
	some of the time	531	19.7
	all of the time	14	.5
	Total	2,687	100.0

Table 3. The language of instruction in school.

The pupil's grade		Frequency	Percent
Primary One	Mother tongue only	47	1.7
	Unknown	20	.7
	Mixture mother tongue and English	2,687	97.4
	English only	6	.2
	Total	2,760	100.0
Primary Two	Mother tongue only	26	1.0
	Unknown	20	.7
	Mixture mother tongue and English	2,633	97.9
	English only	10	.4
	Total	2,689	100.0

Table 4. Pupils being taught by teachers who had experienced different training.

Teacher training method		Year 1		Year 2	
		Frequency	Percent	Frequency	Percent
Teacher training method	None	206	7.5	273	10.2
	ESSPIN only	541	19.7	629	23.4
	Jolly Phonics only	525	19.1	540	20.1
	Both Jolly Phonics and ESSPIN	1,471	53.7	1,241	46.3
		2,743	100.0	2,683	100.0
Missing		17		6	
Total		2,760		2,689	

multilevel analysis before attempting to draw any conclusions. The research issue which is being explored using multilevel analysis is: *To what extent do different types of literacy training programmes affect word reading abilities in government primary school pupils in northern Nigeria?*

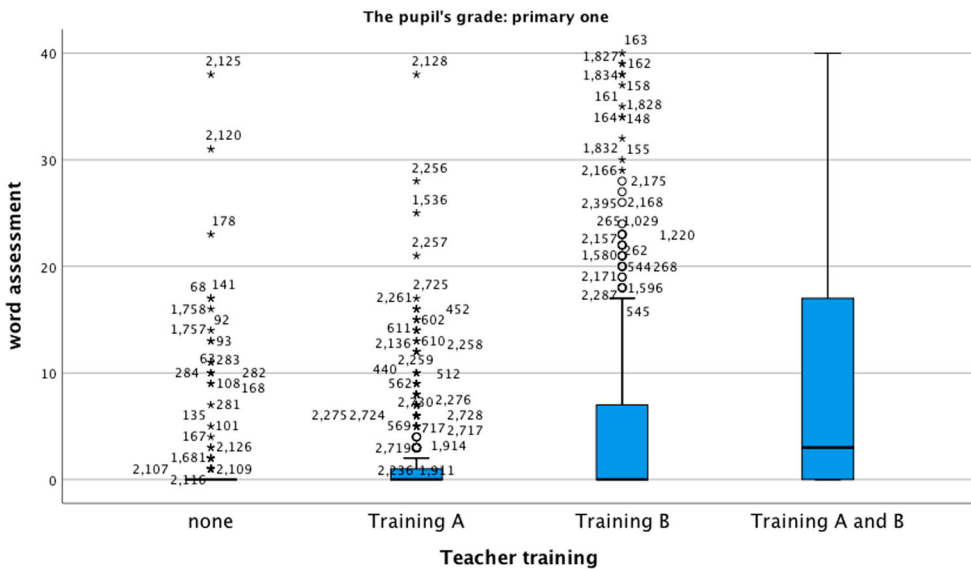


Figure 1. Primary One word assessment score and associated teacher training.

Note: Training A = ESSPIN; Training B = Jolly Phonics only; Training A and B = both Jolly Phonics and ESSPIN.

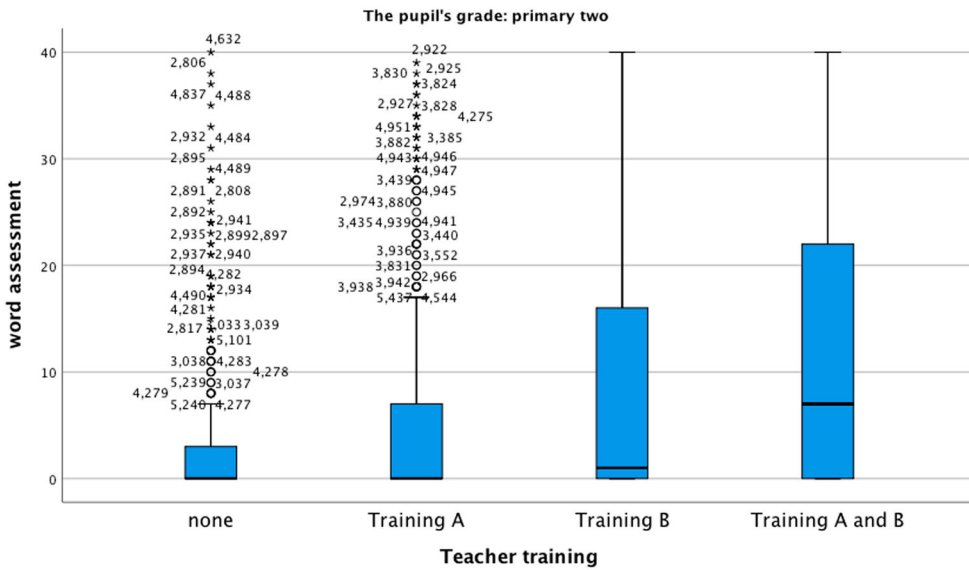


Figure 2. Primary Two word assessment and associated teacher training.
 Note: Training A = ESSPIN; Training B = Jolly Phonics only; Training A and B = both Jolly Phonics and ESSPIN.

Table 5. Primary One and Two homogeneous subsets.

	Word Assessment Primary One			Word Assessment Primary Two		
	No.	Subset for Alpha = 0.05		No.	Subset for Alpha = 0.05	
Teacher Training		1	2	3		
None	206	1.50			273	4.31
ESSPIN only	541	1.52			629	4.90
Jolly Phonics only	525		4.49		540	8.01
Both Jolly Phonics and ESSPIN	1,471			9.01	1,241	11.87
Significance		1.000	1.000	1.000		.877 1.000 1.000

Note: Means for groups in homogeneous subsets are illustrated in the table. Harmonic mean sample size of Year 1 is 430.692 and Year 2 is 505.658. As group sizes are unequal, the harmonic mean is used and Type 1 error levels are not guaranteed.

Multilevel modelling (Goldstein, 2003) is a development of regression analysis, which takes into account data that are grouped into similar clusters at different levels. In these data, there are three levels with individual pupils grouped in a school and those schools grouped within districts. Note that the pupils in each school have all been taught by the same teacher. Multilevel modelling allows us to take account of the hierarchical structure of the data and produce more accurate predictions, as well as estimates of the differences between pupils, between schools, and between districts.

The multilevel model was therefore set up with three levels:

- (1) District (42 in total)
- (2) School (275 in Primary One and 261 in Primary Two)
- (3) Pupil (Pupils in Primary One 2,760 and Primary Two 2,689)

Comparing the base case with the final model shows how much of the variation in the word score achievement across school and district is accounted for. Explanatory

independent variables are introduced into the model to try and explain part of the variability in the word score across schools and districts. The residual variance is much lower in the final model than in the base model. The residual variance is lower because the district and school variances are partly explained by the introduction of these variables.

The introduction of these independent variables to our base model leads to a greater decrease in the school-level variance than in the district and pupil variance. This suggests that school level is rather internally homogeneous with respect to these independent variables and that these variables may play an important role at school level. In Primary Two, the total variance is equal to $43.814 + 39.879 + 12.925 = 96.618$. This gives the variance at district level as 13.3% ($12.925/96.618$), as opposed to the variance at school and pupil level of 41.3% ($39.879/96.618$) and 45.3% ($43.814/96.618$), respectively. This suggests that the main variation in word scores is happening over the different schools and the pupils within those schools.

The Level 2 intra-class correlation is $12.925/(39.879 + 12.925) = 24.4\%$, seen in Table 6 as the school variance as 39.879. This means that the school variance is only partly accounted for through the three independent variables (number in school, building quality, and facilities quality). As far as the multilevel modelling goes, if we take two classes in the same district and calculate the word score in one class, this will be a reasonable predictor of the other classes in the same district around one quarter of the time. In Primary One and Two, being taught by teachers who have been trained in more than one method of phonics training is clearly the most important factor in the pupil obtaining a higher word test score. Speaking English at home also has a statistically significant positive effect on word scores.

Table 6. Multilevel models for Primary One and Primary Two.

Parameter	Primary One		Primary Two	
	Estimate	Standard error	Estimate	Standard error
Base case				
Intercept	6.577***	0.830	8.801**	0.867
Pupil variance	33.969	0.973	49.750	1.432
School variance	44.207	4.592	75.159	7.683
District variance	20.887	6.331	17.802	6.771
Final model				
Pupil variance				
ESSPIN only	28.610	0.837	43.814	1.277
Jolly Phonics only	-2.028	1.490	-2.416	1.693
Both Jolly Phonics and ESSPIN	3.233*	1.414	2.039	1.687
Age of pupil	6.062***	1.314	4.344**	1.497
Gender (male = 0)	0.640***	0.122	0.752***	0.132
Attendance at school	-0.629**	0.211	-0.789**	0.263
Child had early years	0.008	0.008	0.046**	0.012
Speak English at home	-0.162	0.168	0.500*	0.215
	0.759***	0.210	0.605*	0.268
School variance				
Number in School	14.381	7.682	39.879	10.034
Building quality	0.000	0.000	0.000	0.000
Facilities Quality	21.186	12.022	58.956	19.816
	5.060	6.988	6.185	6.730
District variance				
Location	19.700	6.358	12.925	5.699
	7.093	3.318	1.783	2.299

Note: Dependent variable: Word score. Primary One: There are 275 schools in the 42 districts. Primary Two: There are 261 schools in the 42 districts.

*** $p < 0.001$. ** $p < 0.01$. * $p < 0.05$.

Quasi-effect sizes (Schagen, 2004) are used to assess the relative strengths of different factors and illustrate how much difference each makes on the expected pupil word score. Table 7 shows the outcomes that are significant, multiplied by 100 for clarity. These quasi-effect sizes convey the average change in the outcome, expressed as a percentage of the outcome standard deviation, for an average change in the background variable.

These results show the change in the word assessment score expressed as a percentage for an average change in the background variable. Your word assessment score would be 6.062 points higher in Primary One if you were taught by a teacher who had both Jolly Phonics and ESSPIN training (Table 6). Looking at the quasi-effect size (Table 7), you can say this increases your word score by 39.94% of the word score standard deviation. Similarly, we can say that in Primary Two your word score would be 4.344 points higher and increased by 28.62% if you were taught by a teacher who had both Jolly Phonics and ESSPIN training. In Primary One, your word assessment score would be 3.233 points higher if you were taught by a teacher who had trained in Jolly Phonics only compared to the base case (i.e., no training). Looking at the quasi-effect size, this increases your word score by 17.04%. There is no statistically significant difference between the word scores of children that are taught by teachers with no training (base case) and those having received ESSPIN training only. Speaking English at home, as we may have thought, also increases your word score, being 0.759 and 0.605 points higher in Primary One and Two, respectively. Being older in your year group and being a boy also have a significant effect on your word score.

Discussion

Nigeria has very high levels of youth illiteracy (National Population Commission, 2015) and a deep learning crisis in the north of the country in particular, which some argue requires a systematic overhaul of policy and practice (Adeniran et al., 2020). It has been highlighted how explicit reading instruction in the Nigerian early primary curriculum tends to lack considered implementation (Barnes et al., 2019). Despite there being a broad consensus that the teaching of phonics is fundamental, others have identified a significant lack of teacher training in effective literacy teaching strategies, particularly with regards to phonics (Adamu et al., 2020).

Contributing to these discussions, this paper considers the findings from a large study that took place in Kano State, Nigeria. Over 5,000 Primary One and Two children across 42 local government areas took part in this study, in order to assess the effectiveness of multiple training approaches on children's word reading development. The findings show

Table 7. Summary of significant results using quasi-effect sizes.

	Primary One	Primary Two
ESSPIN only		
Jolly Phonics only	17.04	
Both Jolly Phonics and ESSPIN	39.94	28.62
Age of pupil	13.58	15.95
Gender	-8.29	-10.40
Attendance at school		14.17
Child had early years		6.13
Speak English at home	8.40	6.70

that teachers trained in a systematic phonic approach (Jolly Phonics) were able to significantly improve pupils' English word reading abilities. This is consistent with other studies that have demonstrated teachers trained in systematic phonic pedagogies improve children's word reading attainment in challenging learning environments (Dixon et al., 2011; Jamaludin et al., 2016). It also reflects the importance of adopting a rigorous reading strategy to train teachers (Binks-Cantrell et al., 2012). The findings also show that this effect was even greater where teachers had also received training in a second broader curriculum-based English literacy programme (ESSPIN). It has been shown that there is a greater likelihood that children's reading scores will be statistically significantly higher if the teacher has been trained in both ESSPIN and Jolly Phonics programmes. In agreement with Conn (2017), the ESSPIN and JP training programmes that used adaptive instruction sessions and elements of coaching and mentoring were shown to be statistically significantly effective in raising pupil outcomes as defined by test scores. However, where teachers receive no training or training on ESSPIN only, there was no statistically significant difference for the children's word assessment score.

One possibility for the difference between ESSPIN only and Jolly Phonics only could be the pedagogical variation between each training type. Jolly Phonics lessons are restricted in the content that they cover, implemented through a systematic approach that follows a simple repeating lesson plan structure, using dedicated pupil workbooks. ESSPIN lessons cover a much broader curriculum-based content, including English speaking and listening, with the type of activities varying from day to day. Because of this focus, Jolly Phonics lessons provide more time and depth to the teaching of word recognition skills. The findings match Ehri et al. (2001) inferring structured and well-paced systematic approaches are effective in raising reading achievement. More specifically, the relative effectiveness of Jolly Phonics only (focusing on decoding and word acquisition) over ESSPIN only (focusing more on comprehension and whole-word strategies) supports bottom-up process models of reading development (Gibb, 2017). It further suggests that L2 learners benefit greatly from the explicit development of word recognition skills from the start of L2 literacy development (Deanda et al., 2016). However, it would be necessary to assess pupils again at a later date with regards to their reading comprehension abilities in order to discover whether word reading abilities indeed predict future comprehension success (Gibb, 2017).

Moreover, Jolly Phonics teaches the phonics content at a much faster pace than the ESSPIN literacy programme (one sound per day compared to one sound per week). As a result of this pace difference, the Jolly Phonics programme covers considerably more phonics content than ESSPIN in both Primary One and Two. Hence, a possible cause of the differences in word reading abilities of the Jolly Phonics and ESSPIN groups could simply be the result of Jolly Phonics pupils having been taught more in a given time period, further supporting the findings of Ehri et al. (2001).

At a more practical level, the improvement in reading scores could be due to the model and content of teacher training. ESSPIN utilised a step-down approach, with the core technical team training government officials, mostly SSOs, who then trained teachers. The content of the training focused on broad teaching skills rather than specific lesson content (Cameron et al., 2016). All Jolly Phonics training was provided by professional trainers, who had been recruited based on their level of technical expertise and experience of teaching Jolly Phonics in Nigerian classrooms. The training was focused specifically on

teaching the Jolly Phonics literacy content. It is possible that this greater technical focus to the Jolly Phonics training provided teachers with a better understanding of how to deliver the systematic phonics content, again highlighting the importance of adopting a rigorous reading strategy to train teachers (Binks-Cantrell et al., 2012; Ehri & Flugman, 2018).

When teachers had both Jolly Phonics and ESSPIN training, a pupil's word reading score was statistically significantly higher than when teachers had Jolly Phonics training only. More training time overall was experienced by teachers undertaking both ESSPIN and Jolly Phonics programmes. In addition to the literacy lesson content training, under ESSPIN they have been trained in more general teaching principles, such as classroom management, use of instructional materials, differentiation, and other teaching pedagogy. ESSPIN-trained teachers were provided with better facilities, more resources, and more time dedicated to the teaching of literacy. Before these two interventions were brought to Kano State, it was highly likely that the teachers had received no training in the teaching of reading and writing, especially concerning the teaching of phonics, as such training was simply not available (Adamu et al., 2020). From this, we can assume that these factors would make the ESSPIN and Jolly Phonics training combined better placed to bring about improvements in pupils' word reading abilities. Together, the two programmes could be argued to contain both of the components of effective reading programmes, supporting componential models of reading development (Joshi, 2019; Lesaux, 2012). This complementary mixture coming together seems to have provided enhanced teacher training that has resulted in improved pupil outcomes.

Although the above findings from these data are clear and interesting, note should be taken of some caveats about over-interpretation of the results of the analysis. Statistical analysis can only control for factors which have been measured. It also assumes that measurements in different settings are truly equivalent. Furthermore, statistical analysis cannot make clear to us the reasons why the teacher training programmes appear to be having the observed effect, and these reasons may be worth further investigation. Further research is required in relation to teacher training programmes that focus on primary schooling in the global south investigating the possible effects associated with cross-language transfer and reading performance. Using a mixed-method approach and gathering additional qualitative data would help to enhance the understanding of the effectiveness of teacher training programmes in such settings. Studying how one language influences the other and the relative effect on children's reading performance might be an area of future inquiry. Dialectal and regional languages could also be considered in this regard to take into account the impact they have on developing phonological processes used as a proxy for understanding word reading success. Studies might consider developing cross-state/region interventions to mitigate the findings of this study.

This research highlights the importance of teacher training for children's proficiency in English within primary schools in Nigeria. For the first 3 years in school, the language of instruction is either Yoruba, Igbo, or Hausa. However, in Primary Four, English becomes the medium of instruction. Without a foundation of English on which to build, children who are moving into a system where all subjects are taught in English are severely disadvantaged. Not having been provided appropriate skills to read, write, and speak in English will detrimentally affect proficiency in other school subjects and future learning (Oyewole, 2017). At the end of Primary Six, children take the Primary School Leaving Certificate, and at the end of Junior Secondary education (Grades 7–9) the Basic Education Certificate

(BEC). Subjects are taught in English, and students need to achieve passes in six subjects to be awarded the BEC. The research set out here shows how important teacher training is in the first 2 years of primary schooling for children's achievement in English. Providing meaningful and impactful teacher training programmes is the first step on the road to give every child the opportunity to succeed in the Nigerian education system whilst English remains the medium of instruction.

Notes

1. Illiteracy according to the UNESCO definition is a given age group that cannot read and write. Literacy rates consider the proportion of the population that have acquired the ability of using the written word.
2. In this context, L1 would be Yoruba, Igbo, or Hausa and L2 English. L1 is a speaker's first language and L2 their second.
3. This was continued by the Nigeria government under the £34 million "Teacher Development Programme" (TDP) 6090 funded by the Department for International Development (DFID), the then government department of the United Kingdom responsible for administering foreign aid.
4. This is a term used by ESSPIN/UKaid documents, that is, learning is "stepped down" through the system of State School Improvement Teams (SSITs) to School Support Officers (SSO).
5. The test and guidance can be found here: <https://www.gov.uk/government/publications/phonics-screening-check-2018-materials>. Prior to this research, a small pilot study was undertaken by members of the research team in Ghana with 100 primary school children to check the reliability of the "Phonics Screening Check" reading test in a west African setting. Cronbach's alpha at 0.84 demonstrated good internal consistency.

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