



Teaching phonics in context—stories of teachers' practice and students' outcomes

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Abstract

This article presents the outcomes of a study conducted in Victoria, Australia, that recognised teachers' knowledge and understanding of phonics teaching, and early literacy acquisition processes more generally. In total, 45 teachers and 220 students from the 18 focus schools who engaged in the reform initiative agreed to participate in this study. The questions posed considered understandings associated with the professional learning programme and processes that support the implementation of the phonics teaching and the impact this had on students' literacy learning. We share the data used to map teachers' stories of change and practice and some of the key factors, including structures, practices and attitudes, that influenced the implementation. The impact on students' reading and writing outcomes throughout the reform process are also reported. Combined, the findings indicate that the teaching of phonic knowledge, integrated into rich contexts for learning, contributed to improvements in teaching and students' early literacy skills. Furthermore, this study fills an important and common missing gap in professional learning as it explores implementation processes and practice in the classroom. The results inform continuing reform efforts and targeted research necessary to refine phonics teaching practice and further advance students' literacy outcomes.

Keywords Early literacy · Reading · Writing · Phonics · Professional learning

1 Introduction

There is widespread agreement about the importance of phonic knowledge and code-based literacy practices in early years classrooms (Castles et al., 2018). As such, it is essential that teachers have a sophisticated knowledge of sound–letter relationships, and of the ways young students learn to use sound–letter knowledge when reading and writing. Teachers, as informed professionals, use this knowledge to ascertain what knowledge of phonics students have already learned and determine what next would assist them in their learning (Black & Wiliam, 2003). However, the ways that teachers integrate skills such as alphabet

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knowledge, word lists and phonic knowledge into rich literacy programmes are often contested. This article reports the outcomes of a study that recognised and built on teachers' understanding of phonics teaching and early literacy acquisition processes, and the teachers' subsequent engagement in professional learning opportunities as they supported students' literacy learning. It is important to note from the outset that the intention was not to measure students' phonics knowledge in isolation, but rather how the students used their developing understandings of grapho-phoneme representations to support their advancement in reading and writing.

2 Learning to read

Within the research literature, there are models of reading that support the belief that reading comprises knowledge of the various elements, or components of text and of learned relations among them (Adams, 1990). Accordingly, when learning to read, the student must work with the matrix of information in text and integrated processes for reading. These elements are most often defined as phonological awareness, phonics, vocabulary, reading fluency and comprehension (Department of Education, Science and Training (DEST), 2005; National Reading Panel, 2000), with Konza (2016) adding oral language to this list. While the importance of phonological awareness, phonemic awareness and phonics as key aspects of comprehensive early literacy programmes are well recognised, debate continues about the way these skills are taught (Castles et al., 2018). The teaching of phonics often dominates this discussion as approaches to reading instruction are contested (Wyse & Bradbury, 2022).

Proponents of the Simple View of Reading (SVR) posit that skilled reading involves two component parts more recently described by Hoover and Tunmer (2020) as word recognition and language comprehension. Fundamental to this view is that children who cannot phonologically decode do not become good readers, hence the argument for discrete phonics instruction (Adams, 1990; Ehri, 1991, 2020; Stanovich, 2000). As the young reader's competency in the decoding of print develops, attention is subsequently directed to focus on the meaning of the text (Adams, 1990; Jenkins et al., 2003). Ehri's (2020) four-phase theory of reading development is consistent with this approach, as the young reader moves from the pre-alphabetic phase to the partial alphabetic phase using letter names or sounds when reading and writing but without decoding, to the full alphabetic phase where they have acquired decoding skills, to the consolidated alphabetic phase with many words within the reader's lexical memory alongside a consolidated knowledge of spelling patterns. Dual reading models add nonlexical components and processing connections that increase the knowledge available and efficiency of the operations within each component (Jackson & Coltheart, 2001), therefore 'proposing that all elements of the mature reading system exist in at least rudimentary form among partial-alphabetic readers' (p. 101).

Further examination of a range of perspectives pertaining to reading acquisition highlight the complexities of word recognition and language comprehension. Integrated approaches to reading acknowledge that the reader draws flexibly across the range of information sources available as they interpret and negotiate the meaning of texts. Critical to this discussion is Rumelhart's (2004) interactive theory of reading that researchers claim challenges linear models of reading (Compton-Lilly et al., 2020). Rumelhart's model proposed that readers make use of sensory, syntactic, semantic and pragmatic information and described these various sources of information as interacting in complex ways that 'blur

the bridges' between cognitive and perceptual distinctions that are traditionally referenced to describe the process of reading (Rumelhart, 2004, p. 1149). Hence, as young children learn to search the detail of print, and develop increased receptiveness to visual information, they also learn to access a range knowledge sources, such as oral language skills, to read the messages in texts (Doyle, 2013). Similarly, Harrison (2004) hypothesised that as beginning readers are accumulating knowledge about the structure of language, world knowledge and letter-word information, they gradually come to know how and when each kind of information can help with purposeful decisions when reading, assisted by interactions with the teacher. Stanovich (2000), in his conceptualisation of an interactive theory of reading, considers information from various text processors as not only interactive, but also compensatory, hence his Interactive Compensatory Model of Reading. To the notion of the simultaneous amalgamation of information from various knowledge sources, Stanovich (2000) added what he termed the 'compensatory assumption' (p. 49). If information from one source was deficient, greater use of information from other levels would compensate for this. However, in further articulating reading processing within this model, Stanovich outlines that the model is informed by the idea of cognitive resource allocation. He states that 'capacity must be freed for the all-important comprehension and integration processes' (p. 50).

3 Teaching phonic knowledge

The centrality of phonic knowledge to early reading is clearly understood, yet key points of difference lie in approaches to teaching phonics. Debate in this area can be explicated with reference to constrained and unconstrained skills. Stahl (2011) defines 'constrained skills as consisting of a limited number of items and thus can be mastered within a relatively short time frame while unconstrained abilities are learned across a lifetime, broad in scope, variable among people, and may influence many cognitive and academic skills' (pp. 52–53). Paris (2005) identifies text orthography and phonic knowledge as constrained skills, those narrow in scope 'that are learned quickly so the trajectory of mastery is steep, and the duration of acquisition is brief' (p. 188). Correspondingly, teaching should be clear, focused and systematic, and informed by assessment (Black & Wiliam, 2003). With consideration given to what students know and subsequently what they need to learn, teachers should attend to the visible features of print, and the links between form and sound, as young readers need rapid access to this information as they process print. And while we can teach children letters and letter clusters that can be heard as distinct patterns of sounds alongside common spelling pattern and words in isolation, they soon need to use this knowledge to engage effectively with text meanings (Clay, 2001). The essential overlap between word recognition and comprehension is not inconsequential (Duke & Cartwright, 2021).

Coincidentally, teachers need to frame instructional practices to meet the learning skill profiles of students, so they might integrate the various processes and inherent elements in text necessary for successful reading (Doyle, 2013; Duke & Cartwright, 2021). Where to look, what to look for and the matching of speech with print occur as children are guided by teachers to experience and learn from the reading of continuous text (Doyle, 2013). Similar skillsets are advanced through writing, with children's early writing rich in opportunities for the contextualised teaching of phonics. When constructing their own messages, children attend closely to segmenting and synthesising sounds in words and to the features of letters as they compose and record messages, learning to coordinate this complex range

of skills (Mackenzie et al., 2015). Although reading and writing are not identical processes, they do draw across the same knowledge systems such that children's performance in reading or writing is undoubtedly influenced by their prior experiences in one or both of these areas of learning (Graham, 2020).

4 Phonics in context

In response to these challenges, the Phonics in Context (PIC) curriculum reform programme was initiated as a sector-wide professional learning programme. This was in the tradition of code-related literacy professional learning such as the 'Principals as Literacy Leaders Project' that broadened principals' and teachers' knowledge of the reading process and assisted schools to collect data and align teaching (Konza, 2016). Similar to research conducted by Mantei et al., (2022), the PIC professional learning programme acknowledged the expertise of teachers as they shared examples of explicit phonics instruction 'integrated into literacy-rich environments informed by quality pedagogies that respond to individual learning needs' (2022, p. 757). Overall, the aim of the PIC initiative was to strengthen teacher capacity to teach phonics within rich social learning environments that support successful readers and writers, within one Catholic diocese over the course of a school year. Throughout the programme, teachers were invited to explore both reading and writing as contexts for teaching phonics and to ensure students learn how to attend to all the sound units of our language (words, syllables, rhymes and phonemes) and to visually recognise letters and letter patterns used to represent those sounds. Teachers of students in the first three years of schooling were invited to attend a range of offsite and onsite activities, including three days of phonics-focused facilitated professional learning, designed to build teachers' pedagogical content knowledge of the teaching of phonics (Lyons & Scull, 2023). This work continued as teaching teams nominated to work in one of two streams for school-based learning. They could continue to attend the sector-arranged programme to support the development teaching routines and professional collaboration or design their own shared processes to advance phonics teaching and learning.

5 Study aims and methods

A cornerstone of the project was to better understand how Phonics in Context was being implemented within schools participating in the sector-wide phonics teaching initiative. The questions posed considered understandings associated with the professional learning programme and also interrogated the two streams of ongoing professional support—sector-supported design (SSD) and the school-based designs (SBD)—and importantly, the effect on students' reading and writing outcomes. Using a mixed methodology framework, teacher experiences, understandings and practices were captured and analysed to map the impact of the professional learning designs and the influence of PIC teaching on students' literacy learning. Narrative inquiry as methodology and method was used to assist with the data collection and the analysis of stories to give insight into teachers' learning and classroom practice (Lyons & Scull, 2023).

The study was performed with approval from the university's Human Research Ethics Committee as well as permission from the participating educational institution and

schools, alongside teacher consent. Parental consent was also obtained before the participation of the students.

5.1 Participants and data collection

From the project schools located in a large metropolitan city in Victoria Australia, 45 teachers who engaged in the reform initiative agreed to participate in this supplementary study. This included teachers from the ten schools who opted to participate in the SSD professional learning programme of support alongside teachers from the eight schools involved in SBD professional learning processes. In addition, we collected data from 220 students in their first three years of school (with 193 matched student datasets), with the data then grouped by the schools' selected professional learning stream. Dosage data was available for SSD participants, so students from this stream were further disaggregated into two groups—participants who had engaged in less than three phonics-focused sessions ($SDS < 3$) and participants who had engaged in three or more phonics focused sessions ($SDS > 3$), as detailed in Table 1.

Dataset 1 *Narratives of teacher practice*: Over the course of the school year, teachers were invited to reflect on their practice by responding (in writing) to three prompts, which were emailed to participants. Prompt 1 focused on prior knowledge and practice; Prompt 2 focused on professional learning; and Prompt 3 focused on current practice, which was informed by professional learning.

We drew on narrative inquiry to both design and analyse the prompts. Specifically, we drew on Clandinin and Connelly's (2000) three-dimensional framework, which considered interactions, continuities and situations:

Inquiries are personal and social (interaction); past, present and future (continuity); combined with the notion of place (situation). This set of terms creates a metaphorical three-dimensional narrative inquiry space, with temporality along one dimension, the personal and social along a second dimension and place along a third (Clandinin & Connelly, 2000, p. 50).

This framework afforded us an insider's perspective around how teachers in this study were thinking about the teaching of phonics, and how they were practising the teaching of phonics over time and within a variety of contexts.

Table 1 Student participant numbers across year level and groups and dosage

Year level	SSD	SSD < 3	SSD > 3	SBD
Prep*	52	36	16	35
Year 1	53	37	16	21
Year 2	51	44	7	8
Total	156	117	39	64

SSD sector-supported design, SBD school-based designs.

*The first year of school in Victoria, Australia, is called Prep, which is short for 'preparatory year'.

Dataset 2 Student data: For reading, the systemic data collection of students' Records of Reading Behaviour were accessed, with students' reading assessed using the AlphaAssess test kit (Eleanor Curtain Publishing, 2004). The kit contains benchmark books and evaluation forms that are used to measure students' reading level, strategy use and comprehension in order to establish independent levels of text reading for instruction. The AlphaAssess texts are graded for levels of difficulty with increasing complexity in sentence type and length, high-frequency words and spelling patterns. For example, Level 1 and 2 texts include repeated single clause sentences and a small bank of high-frequency word such as 'I', 'like' and 'me' and attention to the initial letters of words to support phonic knowledge decoding. The Level 9 text comprises simple and compound sentences with independent clauses connected using conjunctions 'and' and 'but', a range of high-frequency words, including, but not limited to, 'was', 'said' and 'with', and a shift beyond regular consonant, vowel, consonant (CVC) decoding to increasingly more complex phonic patterns consisting of blends and consonant and vowel digraphs, for example 'swim', 'wings', 'kicked' and 'beach'. At Level 15, there are a range of sentence types, including complex sentences with dependent clauses and adverbial phrases of place and time, an increasing range of high-frequency words, for example 'ask', 'more' and 'could', and more complex phonic patterns such as 'burst', 'huge' and 'young'.

End-of-year school data were used for Time 1 (T1; year preceding implementation) and end-of-year data from the study year were used for Time 2 (T2). In Prep, a default text reading level score of zero was assigned to T1.

Students' writing samples from Term 1 (T1) and Term 4 (T2) were collected. Writing samples at each time point were analysed using the Writing Analysis Tool (Mackenzie et al., 2015; Scull et al., 2020).

A copy of this tool has been included as an appendix (see Appendix 1) with the web address below providing access to the tool with hyperlinks to samples of students' writing, illustrative of the dimensions of writing and the levels of attainment used in the analysis (<https://doms.csu.edu.au/csu/file/832c364a-855c-4e39-aac5-1dc9a96fa8cf/1/Writing%20Analysis%20Tool.zip/Writing%20Analysis%20Tool/index.html>).

At each data collection point, students' writing samples were coded by the researchers with scores from 0 to 6 recorded for Text structure, Sentence structure, Vocabulary, Spelling, Punctuation and Handwriting. Scores were awarded based on the levels of complexity evident in the writing samples and understandings of expected progressions in learning alongside a clear recognition of what young writers are capable of achieving in each dimension (Australian Curriculum, Assessment and Reporting Authority (ACARA), 2012). Each dimension was scored independently, and it is not expected that a total numeric would be assigned to any one text (Scull et al., 2020). Reliability for coding was achieved as 10% of the students' text were assessed by two researchers independently and then compared to check for intercoder reliability (Vaismoradi et al., 2013). Any points of ambiguity were discussed until consensus was reached (Pyett, 2003).

6 Results—teacher learning

The teachers' narrative responses are reported with reference to the two streams of professional learning (SSD and SBD) at each of the data collection points. Clandinin and Connelly's (2000) three-dimensional framework identified three broad themes associated within teacher learning within this study, including a shift in teacher practice, a shift in pedagogical language and a nuanced shift in reflective practice.

6.1 A shift in teaching practice

Within Prompt 1, teachers spoke of the teaching of phonics often located within a whole class focus. By the time we arrive at Prompt 3, there was much stronger focus on the students' learning, rather than the teacher teaching; for example:

I am trying to make the text relevant and creating learning intentions and activities that are guided from the text. I am also highlighting phonics and I try to bring [that learning] into context of that child's life, i.e. for a child who is struggling with letters, learning the letters that his family members names start with. (SBD teacher—Prompt 3)

Teachers appeared to be more open to learning and allowing learning to inform their practice. Positioning teachers as 'experts' of learning and teaching, and valuing this expertise, appeared to encourage a more critically informed practice of not only the teaching of phonics, but the architectural connection of this learning to broader literacy practice informed by student data and evidence; for example:

We have been finding evidence of students' prior knowledge and research strategies to inform teaching. (SSD teacher—Prompt 3)

I think I have created shorter and sharper teaching on a particular focus area and given it more time for me to teach and children to learn. (SSD teacher—Prompt 3)

These excerpts of storied experience give some insight into not only teaching practice changing, but how teaching practice was thought about by teachers in this study. Teachers' narratives demonstrated the impact of professional learning on *what* and *how* they were teaching phonics, and the impact this can have on literacy achievement.

6.2 A shift in pedagogical language

The impact of co-constructed discourses of language on the pedagogical enactment of phonics in context was a significant theme to emerge out of the narrative inquiry data. The 'language of learning' was more overt in teachers' responses; for example:

We developed a joint vocabulary that we used to identify the students' needs and we were focused on practising and monitoring the success of the students in this area. (SSD teacher—Prompt 2)

Evident in the narrative data was a crafting of professional learning that empowered teachers to critically engage with not only what they were teaching, but how they were teaching, and why they were crafting the learning in particular ways. This appeared to increase the complexity of the evidence-based pedagogies; for example:

As the Literacy Leader, I am finding the regular meeting times where I can engage in professional dialogue with the teachers around a focused teaching and learning very helpful and productive. The talk is focused around a selected group of students and work samples are used to plan for further teaching. There is opportunity to discuss the most effective teaching strategies and this has helped me to focus my work when modelling and co-teaching in classrooms with the teachers. (SSD teacher/leader—Prompt 2)

The shift in pedagogical language was demonstrated to be beyond localised phonics discourses. Teachers in this study appeared to be making connections to evidence-based learning theory and using evidence to inform critical pedagogical choices about how to teach phonics.

6.3 A nuanced shift whereby data and reflective practice was informing the pedagogical decision making

The narratives of teacher practice in this study suggested the importance of reflective and critically informed practice when considering data and what do to with that data. We offer three examples to demonstrate this point:

The impact of this work has led to increased teacher knowledge of curriculum content and effective pedagogy. It has also assisted to develop more consistent practices between classrooms. Teachers are becoming more comfortable in using evidence to inform teaching decisions. (SSD teacher/leader—Prompt 3)

We have been very thorough in using this data to plan our teaching and ..., we became better at targeting specific children, not the whole cohort of Grade 1's. (SSD teacher—Prompt 3)

We have become more explicit in the teaching of phonics in the sense that we are now being more targeted in what we are teaching and when and following more of a continuum rather than choosing from week to week at random what phonics knowledge is being introduced based on the texts teachers are selecting. This has enabled us to really target student's learning and any gaps in their phonological knowledge. (SBD—combined teacher response—Prompt 3)

While the way to 'best' to teach phonic knowledge may remain contested, what the narratives of teacher practice in this study afford us is a different starting point. That is, when teachers are given the time, resources and training to critically engage with evidence, and able to craft the findings from that evidence into their learning contexts, the learning appears to be richer, more targeted and more valuing of the broader place of phonics teaching. Being empowered to use evidence does appear to be linked to being comfortable to critically engage with pedagogical practices and philosophies, and this criticality appears to be most valued when it is woven within professional learning and enacted in classrooms with a reflective disposition.

7 Results—student learning

Concurrent with the shift in teachers' practice, we were also interested in the impact of teaching on students' literacy learning. Students' pre- and post-results for reading, writing and spelling are detailed in the sections that follow.

7.1 Reading

Students' independent text reading levels were provided to the researchers for analysis from the year preceding the programme (T1) and then again at the end of year of implementation (T2). As there was no T1 data available for Prep students, a text-reading level score of zero was assigned. Average gains in reading levels for SSD (all), SSD < 3, SSD > 3 and SBD participants are reported in Table 2. All Prep students' reading levels improved, with average gains for SBD students higher than the total average gains for the SSD cohort. For Year 1, while starting from a lower base, the SSD students made on average gains of 12.8 reading levels compared to 10.14 for SBD students. A similar result is evident for Year 2 students, with gains of 6.28 for SSD students and 2.58 for SBD students.

Disaggregating the results for the SSD students to consider PIC teaching dosage, for Year 1 students in both groups, those receiving fewer than three sessions as well as those receiving more than three sessions increased by an average 12 text levels over the study period. The additional teaching for the lower performing students allowed them to not fall further behind but to accelerate at the same rate as their higher performing peers. Targeting the lower performing students in Year 2, this small group of seven students, receiving more than three PIC sessions, also showed an increase of above 12 text levels, surpassing the average end-of-year achievement levels of their SSD peers.

7.2 Writing

To investigate student attainment over time for writing, students' writing samples were analysed by members of the research at T1 and T2 using the Writing Analysis Tool (MacKenzie et al., 2015), with scores for Text structure, Sentence structure, Vocabulary, Spelling, Punctuation and Handwriting recorded. The mean scores for each aspect of writing measured across year level, group (SSD, SSD < 3, SSD > 3 and SBD) and time are presented in Table 3. This table shows that all students made gains over the study period. Similar to T1 and T2 reading data, all SBD students started and finished with higher scores with the exception of Year 2 T1 data for Text structure and Sentence structure.

Table 2 Reading text levels

Year level	Time	SSD			SSD < 3			SSD > 3			SBD		
		<i>N</i>	Mean	<i>SD</i>	<i>n</i>	Mean	<i>SD</i>	<i>n</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>
* Prep	T1	52	0.00	0.00	36	0.00	0.00	16	0.00	0.00	35	0.00	0.00
	T2	52	9.92	7.32	36	10.97	8.10	16	7.56	4.50	35	10.80	10.30
Year 1	T1	53	8.84	7.29	37	10.82	7.54	16	4.33	4.08	21	15.81	8.87
	T2	49	21.62	5.75	34	23.73	4.83	15	16.75	4.71	21	25.95	2.97
Year 2	T1	51	19.00	8.65	44	19.80	9.07	7	14.00	0.58	8	25.38	10.98
	T2	50	25.28	4.84	43	25.05	5.16	7	26.71	1.38	8	27.88	0.35

SSD < 3 denotes dosage of fewer than three Phonics in Context (PIC) sessions; SSD > 3 denotes greater than 3 PIC sessions.

SSD sector-supported design, SBD school-based designs.

*Prep reading scores at T1 were estimated at zero.

Table 3 Writing sample analysis

Year	Data points	Dimensions of writing	SSD	SSD < 3	SSD > 3	SBD
Prep	T1	Text structure	0.87	1.00	0.56	1.00
		Sentence structure	0.85	0.97	0.56	0.94
		Vocabulary	0.67	0.78	0.44	0.91
		Spelling	0.98	1.17	0.56	1.17
		Punctuation	0.85	0.97	0.56	1.14
		Handwriting	1.21	1.47	0.63	1.46
	T2	Text structure	3.04	3.30	2.47	3.41
		Sentence structure	2.69	2.79	2.47	2.83
		Vocabulary	2.88	2.94	2.73	3.14
		Spelling	2.65	2.73	2.47	2.86
		Punctuation	2.15	2.15	2.13	2.17
		Handwriting	2.30	2.30	2.29	2.52
Year 1	T1	Text structure	3.00	3.30	2.31	3.38
		Sentence structure	2.85	3.05	2.38	3.24
		Vocabulary	2.70	2.95	2.13	3.05
		Spelling	3.00	3.32	2.25	2.81
		Punctuation	2.11	2.16	2.00	2.48
		Handwriting	2.66	2.86	2.19	2.95
	T2	Text structure	4.00	4.19	3.50	4.75
		Sentence structure	3.50	3.50	3.50	4.05
		Vocabulary	3.60	3.58	3.64	3.80
		Spelling	3.48	3.50	3.43	3.80
		Punctuation	2.52	2.58	2.36	2.80
		Handwriting	3.22	3.31	3.00	3.65
Year 2	T1	Text structure	4.06	4.25	2.86	3.88
		Sentence structure	3.43	3.50	3.00	3.38
		Vocabulary	3.33	3.39	3.00	3.38
		Spelling	3.45	3.55	2.86	3.63
		Punctuation	2.59	2.59	2.57	3.13
		Handwriting	3.27	3.34	2.86	4.38
	T2	Text structure	4.55	4.62	4.14	4.71
		Sentence structure	3.86	3.84	4.00	4.29
		Vocabulary	3.82	3.78	4.00	4.14
		Spelling	3.93	3.97	3.71	4.29
		Punctuation	3.07	3.14	2.71	3.86
		Handwriting	3.86	3.92	3.57	4.86

SSD sector-supported design, SBD school-based designs, T1 Time 1, T2 Time 2.

Prep students' start- and end-of-programme data showed an increase in scores on all six dimensions of writing measured by the Writing Analysis Tool. The SBD students commenced and ended the year with higher overall average scores. Similarly, the SSD group receiving fewer than three Phonics in Context sessions started and finished with scores higher than those students receiving more than three sessions, yet the students reported

as receiving more than the three sessions made the greatest gains in all dimensions except Text structure, signalling the impact of dosage on improvements in learning outcomes.

Year 1 students in the SBD group also started the year with higher scores in all areas of writing except for Spelling, as for this dimension of writing at T1 on average the SSD group scored 3.00 and SBD scores 2.81. When gains are considered, the students receiving more than three sessions showed the greatest gain in four of the six dimensions. The SBD group made the greatest gain in Text structure and the SSD group reported as receiving fewer than three teaching sessions making the greatest gains in Punctuation.

Year 2 writing results follow a similar pattern, with the SBD students recording the highest end-of-programme scores on all dimensions of writing measured. When gains are considered, those students reported as receiving more than three phonics teaching sessions made the greatest gains in all dimensions with the exception of Punctuation. This result is similar to that of a larger study of children's writing, where punctuation changed little over time, with students most often using capital letters and full stops throughout the second year of school (Mackenzie et al., 2015). The analysis of samples found that as student's texts consisted largely of simple or compound sentence, capital letters and full stops were often all that was needed. Children's experimentation with a wider variety of sentence forms often resulted punctuation use that was incomplete or applied with inaccuracies.

7.3 Spelling

Starting from the analysis of the students' text, the dimensions captured in the Writing Analysis Tool illustrate the components of early writing with accuracy and confidence (Scull et al., 2020). However, spelling as a single dimension of writing provides the clearest evidence of children's phonic knowledge. Taking this dimension aside for analysis, we have graphed the gains for students across the two school cohorts, with the dosage for the SSD groups also presented. With achievement data reported in Table 3, the figures below make clearer the students' gains in this area of writing (Fig. 1). Most pronounced is the growth in Prep student learning across all groups, with this somewhat expected given this is the first year of schooling where students are introduced to formal writing processes, followed by students in Year 1 in SBD professional learning stream, with average scores shifting from 2.25 to 3.43. Moreover, the focused teaching associated with the PIC programme appears to level out the average scores for all cohorts, reducing the achievement gap for all participating student cohorts.

7.4 Effect sizes

Given the distribution of students across year levels and cohorts, the greatest effect sizes were for the aggregated year levels and group scores, with 193 matched student datasets used for this analysis. The impact of teaching PIC was clearly evident in students' learning from T1 to T2, with effect sizes approximately at or above 0.4 on all measures; see Table 4. Hattie (2008) claims that effect sizes are the best way of measuring the influence on student learning and states that an effect size of 0.2 is considered to have a small effect, 0.5 a moderate effect and 0.8 a large effect. According to Hattie (2008), achievement gains over a year that are greater than 0.4 are considered above average for educational research. The above-average effect sizes of 0.62 for Reading levels and 0.52 for Spelling over the study period can be attributed to the contribution of the PIC teacher professional learning programme on students' outcomes.

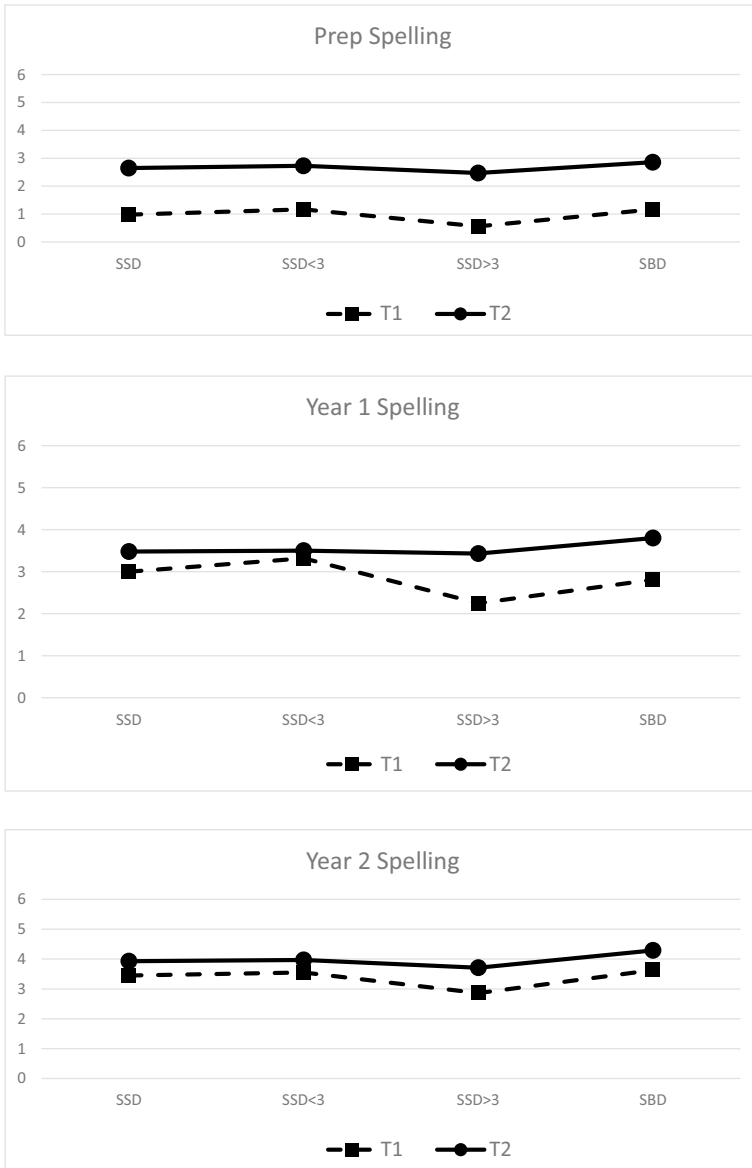


Fig. 1 Spelling graphs, Prep, Year 1 and Year 2

Table 4 Effect sizes for phonics in context and literacy outcomes

All year levels	Time 1 (<i>N</i> =193)		Time 2 (<i>N</i> =193)		Time effect		
	Mean	SD	Mean	SD	<i>F</i>	Significance	η^2
Reading level	9.27	10.42	18.87	9.63	309.28	0.001**	0.62
Text structure	2.48	1.62	3.91	1.07	236.62	0.001**	0.57
Sentence structure	2.31	1.46	3.38	0.88	178.37	0.001**	0.48
Vocabulary	2.16	1.43	3.44	0.77	235.94	0.001**	0.55
Spelling	2.28	1.37	3.35	0.90	210.00	0.001**	0.52
Punctuation	1.83	1.06	2.59	0.83	125.07	0.001**	0.39
Handwriting	2.36	1.39	3.15	1.13	117.79	0.001**	0.38

* $p < 0.05$; ** $p < 0.01$

8 Discussion

Findings from this study support the teaching of phonics as integrated in reading and writing contexts. As Lo Bianco and Freebody (2001) in *Australian Literacies* state: ‘optimally, skills development for all children should be an explicit and priority objective but one that is delivered richly embedded within meaningful pedagogies’ (p. 56). More recently, Wyse and Bradbury (2022) contest the ‘undue separation of the teaching of the alphabetic code from the context of whole texts as part of teaching in primary/elementary schools is unlikely to be as effective as contextualised teaching of reading’ (p. 48). The results of this study show improvements in literacy outcomes for students as teachers were encouraged to provide meaningful opportunities for learners to both develop phonic knowledge and for this to be used strategically in assisting word identification (in reading) and spelling (in writing). Identifying and distinguishing between skill and strategies may prove useful in this context. As Afflerbach et al., (2008) argue, while it may be sufficient to help many children practise basic skills such as phonemic awareness, beginning readers may need to learn specific strategies to decode words and comprehend text. These researchers state, ‘teaching these kinds of reading strategies explicitly helps children understand what they are doing and why it is important—two crucial features of learning that may escape children who are given daily worksheets to practice the skills without the cognitive explanations (Afflerbach et al., 2008, p. 370). The PIC initiative required teachers to develop within students a level of automaticity, with close attention to phonics knowledge and skills alongside the intentional and effortful application of strategies when reading and writing. Clearly strategy use requires a written language context (Duke & Cartwright, 2021), as students learn to apply strategies to decode and ascertain the meaning of unknown words when reading texts and when writing as they encode a range of novel and varied words to communicate messages to self and others.

Successful learning outcomes were also connected to the grouping of students for instruction and the subsequent frequency of teaching. A central tenet of the reform initiative was small group teaching, with this grounded in the desire to accommodate individual student’s learning needs (Reutzel, 2003). Throughout the project, teachers were encouraged to employ flexible skill-focused groups, purposefully constructed based on students’ learning needs to support teaching efficiencies (Jones & Henriksen,

2013). Similar to the analysis of teachers' practice and student performance conducted by Castle et al. (2005), teachers attributed improvements in students' literacy outcomes to flexible groupings that made targeted instruction possible. When considering the impact of the teaching, the frequency of instruction should also be taken into account. Often considered with respect to the evaluation of literacy interventions (May et al., 2016), other areas of education are beginning to examine how dosage (i.e. the level of exposure) is important and to explore the levels of participation necessary to make a difference (Page et al., 2019). The results from this study indicate that frequency contributed to students' literacy gains, ensuring lower achieving students were able to keep pace with their higher achieving peers. The targeting of lower performing students in Year 2 enabled these students to reach above-average attainment levels in reading by the end the school year. Increased exposure to focused teaching was also seen as impacting students' end-of-year writing scores, with the students receiving more than three small group sessions making greater gains, in more dimensions of writing, than their peers. Knowing how to group students, and for what purpose, requires teachers have a deep understanding of the relationship between phonics and ways in which children learn to read and write, knowledge of achievement patterns, and an awareness of the evidence that signals competence.

Central to the PIC initiative was collaborative professional learning (PL) as a vehicle to transform teachers' knowledge of phonics and teaching to understandings that informed teaching programmes evident in classroom practice. The PIC project highlights several PL themes that are supported by the literature, which encourages meaningful and long-term pedagogical change. Specifically, the teacher narrative data highlighted the importance of context, PL pedagogy, time and opportunity for critical reflection as significant pillars that encourage pedagogical change and innovation within the teaching of phonics (Darling-Hammond et al., 2017).

The writings of Gladwell (2000) suggest that the world is changing at a rate and pace new to human history, and understanding the context is important if change is to be embraced successfully. Participants in this study engaged, through professional learning opportunities, with global literacy issues and debates before they considered a more specific aspect of literacy, in this case the effective teaching of phonics. This appeared to have a significant impact, as participants in this study were making evidence-based pedagogical decisions within their teaching that were informed and reasoned. Equally, the construction of the professional learning within this project positioned participants as leaders of learning, and indeed as lifelong learners of pedagogical practices (Swaffield & Macbeath, 2009). There was strong evidence within the reflective data that participants viewed, as part of their everyday practice, collaborative professional learning conversations and pedagogical knowledge and understanding as critical to their work (Lefstein et al., 2020). Participants, in differing ways, mentioned their commitment to, and support of, improved pedagogical understanding for themselves and their teams.

This project uncovers an obvious, yet important point: in order for teachers to be able to *facilitate* learning, they need to *understand* learning. Better still, they need to understand pedagogy and locate pedagogy within a contextual framework. Stoll et al. (2003) highlight that teachers often have to make a decision whereby the results of the

decision may not be evident for years. What this suggests is that teachers (and school leaders) need to have the capacity and opportunity for critical reflection of context, pedagogy and practice decisions, and their professional knowledge needs to be woven into the day-to-day pedagogical decision making. Participants in this study embraced the opportunity to critically engage with multiple points of data and draw on their professional knowledge to ask questions of the data to promote learning for their students. In a political climate where teachers report their agency and autonomy are being eroded at a rapid rate and replaced with one-stop programmes with claims of magic-bullet fixes, this project offers insight into how lasting results can be achieved in a professional rigorous and empowering manner for teachers, students and communities.

9 Limitations

The data collected for analysis and the subsequent discussion presented in this article describes teacher professional learning as self-reported narratives of practice and students' attainment patterns from selective classroom reading tests and writing tasks across the early years of schooling. As the scope of the data and the multiple forms of analysis provides a level of confidence in the findings, additional data collection and analysis will also be required to examine the impact of phonics teaching and to report students' reading and writing competence from diverse perspectives, beyond the year of the PIC implementation and across a wider range of year levels. Furthermore, now that we have moved closer to describing aspects of effective professional learning, student attainment patterns and potential for within-class groupings for teaching phonics, we propose to continue investigating how practitioners engage in phonics teaching. This additional work, prompted by the question 'What constitutes a science reading instruction?', will support the identification of effective pedagogical processes, leading to higher probabilities of success (Shanahan, 2020). This sets the agenda for the next stage of our inquiry.

10 Conclusion

As Pressley et al., (2001, p. 49) state, exceptional early years teaching 'requires well-informed teachers who routinely identify children's instructional needs and offer targeted lessons that foster development'. This is especially pertinent for the teaching of phonic knowledge as a key skill for early reading and writing acquisition processes. While debate continues over ideal instructional routines and processes, we remain open to considering the value of students' diverse paths to literacy success and appreciate the the range of evidence informed approaches that accommodate students' learning needs and advance literacy outcomes. We see the research presented in this article as contributing to the evidence base that supports the teaching of PIC, as one of many ways of progressing effective early literacy teaching.

Appendix 1

See Table 5

Table 5 Writing Analysis Tool

Rating	Text Structure	Sentence structure & Grammatical features	Vocabulary	Spelling	Punctuation	Handwriting/Legibility
1	No clear message	Shows an awareness of correct sentence parts including noun/verb agreement. Meaning may be unclear	Uses familiar, common words (e.g. like, went) and one, two and three letter high frequency words (e.g. I, my, to, the, a, see, me)	Semi-phonetic, consonant framework, alongside representation of dominant vowel sounds. Correct spelling of some two and three letter high frequency words (e.g. the, my, to, can)	Some use of capital letters and/or full stops	Mix of upper and lower case letters and / or some reversals / distortions (e.g. hnr / ad / bp / vy / i l)
2	One or more ideas (not related)	Shows an awareness of correct sentence parts including noun/verb agreement. Meaning may be unclear	Uses familiar, common words (e.g. like, went) and one, two and three letter high frequency words (e.g. I, my, to, the, a, see, me)	Semi-phonetic, consonant framework, alongside representation of dominant vowel sounds. Correct spelling of some two and three letter high frequency words (e.g. the, my, to, can)	Some use of capital letters and/or full stops	Mix of upper and lower case letters and / or some reversals / distortions (e.g. hnr / ad / bp / vy / i l)
3	Two or three related ideas. May also include other unrelated ideas	Uses simple clauses, with nouns, verbs, adverbs, which may be linked by "and". Meaning clear	Everyday vocabulary, for example Oxford first 307 word list plus proper nouns (particular to the child's cultural context e.g. Fruit Fly Circus, Sydney Opera House)	Phonetic spelling – plausible attempts with most sounds in words represented. Correct spelling of three and four letter high frequency words (e.g. the, like, come, have, went)	Correct use of capital letters and full stops at the start and end of sentences	Mostly correct letter formations yet may contain poor spacing, positioning, or messy corrections

Table 5 (continued)

Rating	Text Structure	Sentence structure & Grammatical features	Vocabulary	Spelling	Punctuation	Handwriting/Legibility
4	Four or more sequenced ideas. Clearly connected	Uses simple and compound sentence/s with appropriate conjunctions (e.g. and, but, then). Use of adverbial phrases to indicate when, where, how or with whom	Uses a range of vocabulary, including topic specific words (e.g. A story about going to the zoo might include animal names and behaviours)	Use of orthographic patterns or common English letter sequences. If incorrect they are plausible alternatives (e.g. er for ir or ur; cort for caught). Use of some digraphs (ck, ay). Correct use of inflections (ed, ing). Correct spelling of common words (e.g. was, here, they, this)	Some use, either correct or incorrect, of any of the following: • Proper noun capitalisation, • Speech marks, • Question mark, • Exclamation mark, • Commas for lists, • Apostrophe for possession	Letters correctly formed, mostly well spaced and positioned
5	Evidence of structure and features of genre (text type). eg. recount, narrative, report letter	Uses a variety of sentence structures: simple, compound and complex. Pronoun reference is correct to track a character or object over sentences	Demonstrate a variety of vocabulary choices. Includes descriptive or emotive language	Use of some irregular spelling patterns (e.g. light, cough) Application of spelling rules (e.g. hope/hoping, skip/skipping). Correct spelling of more complex common words (e.g. there, their, where, were, why, who)	Uses a range of punctuation correctly	Regularity of letter size, shape, placement, orientation and spacing

Table 5 (continued)

Rating	Text Structure	Sentence structure & Grammatical features	Vocabulary	Spelling	Punctuation	Handwriting/Legibility
6	Complex text which shows strong evidence of the features of text type, purpose and audience	Demonstrates variety in sentence structures, sentence length, and uses a range of sentence beginnings. Sentences flow with logical sequence throughout the text and show a consistent use of tense	Correct use of unique field or technical specific vocabulary. Use of figurative language such as metaphor and/or simile	Correct spelling of most words including multisyllabic and phonetically irregular words. Making plausible attempts at unusual words	Demonstrates control over a variety of punctuation to enhance text meaning	Correct, consistent, legible, appearing to be fluent

Writing Tool, Mackenzie, Scull & Munsie, 2013 © All Rights Reserved

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Declarations

Ethics approval The methodology for this study was approved by the Human Research Ethics committee of Monash University, Project Number: 12244 and the Catholic Education Melbourne, Research application, 0721 approved March 2018.

Conflict of interest The authors declare no competing interests.

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