

Literacy intervention provision in Victorian primary education: An analysis of online data

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Literacy intervention programs are a common approach to improve children's literacy achievement. A previous study (Rohl, Milton & Brady, 2000; Rohl & Milton, 2002) identified a range of literacy intervention programs offered across Australia, including Victoria. Contemporary Victorian education policies have shifted towards greater school choice in literacy intervention provision, suggesting that up to date research about schools' use of these programs is timely. This article outlines and discusses an online data collection protocol for gathering information about literacy intervention use in Victorian primary education settings in 2014. Data on 150 schools' intervention provision, together with their demographic and average reading achievement information, were gathered from schools' websites, annual reports, and the *My School* website (ACARA, n.d., a). Descriptive statistics and Pearson's chi-square tests were used to explore differences in reported literacy intervention offerings between schools from different sectors; and of differing enrolment sizes, and levels of socio-educational advantage and reading achievement. The results showed that literacy interventions were commonly offered across schools, with a range of programs identified. School sector showed a highly significant association, and enrolment size showed a moderate association; with whether or not schools offered one or more literacy interventions; but no significant associations were identified for either schools' socio-educational status or mean reading achievement. Implications of these findings are discussed with reference to sector policies and research literature. The potential and challenges in utilising online data in educational research are also explored. This paper contributes recent empirical data on literacy intervention provision in Victoria and explores the utility of online data methodologies to answer questions about schools' programs.

Literature review

Substantial research has established that print literacy acquisition — learning to read and write — is difficult for a significant proportion of people. Approximately 20% of people in developed countries experience difficulties in learning to read and write (Lyon & Moats, 1997; Pressley & Allington, 2014; Thomson et al., 2017), some of whom continue to experience difficulties throughout their lives (Bynner & Parsons, 2001; Klenk & Kibby, 2000; Lesnick et al., 2010; OECD, 2017). A literacy intervention is an educational response to these difficulties, providing additional literacy instruction for individuals or small groups, or professional development or coaching to improve teacher instruction in classrooms and schools. Interventions are most often offered in the early years of school, before literacy difficulties become compounded and entrenched (Brooks, 2007; Francis, Shaywitz, Stuebing, Shaywitz & Fletcher, 1996; Lesnick et al., 2010). A plethora of programs have been developed over the years, with most researchers agreeing that students with literacy difficulties require more intensive and explicit high-quality literacy instruction, and more opportunities to develop their literacy skills and strategies, than their

'normally developing' peers (e.g. Allington & McGill-Franzen, 2000; Al Otaiba, Rouse & Baker, 2018; Snow et al., 1998; Torgesen, 2004).

In Australia, most literacy intervention research has focussed on the efficacy of a particular program or approach (e.g. Bradford & Wan, 2015; Buckingham, Beaman-Wheldall & Wheldall, 2014; Graham, Bellert, Thomas & Pegg, 2007; Kamler & Comber, 2005; Wheldall, Wheldall, Madelaine, Reynolds & Arakelian, 2017); or reviewed existing research to make recommendations to governments and schools (Ellis, 2005; Meiers, Reid, McKenzie & Mellor, 2013; Purdie & Ellis, 2005; Serry & Oberklaid, 2015). Few studies have explored which programs schools actually provide for primary aged students with literacy difficulties, or examined the characteristics of schools offering particular programs. One exception is *Mapping the Territory* (Louden et al., 2000), a large-scale study that investigated literacy and other learning difficulties in primary education settings across Australia's states and territories. The survey of schools component of this study (Rohl, Milton & Brady, 2000; Rohl & Milton, 2002) gathered data on schools' proportions of students with learning difficulties, the nature and extent of these difficulties, and the assessments used to diagnose difficulties. It also identified schools' interventions for students with learning, including literacy, difficulties. This survey demonstrated that literacy interventions were widely offered across Australia, and identified frequently used programs, including the whole class approach *First Steps* (Department of Education WA, n.d.), and the individual early intervention *Reading Recovery* (Clay, 1993, 2005, 2016).

Mapping the Territory (Louden et al., 2000; Rohl et al., 2000; Rohl & Milton, 2002) publications did not consistently report on disaggregated data sets by state, sector, school size, or programs offered; but did offer a few specific literacy intervention examples, including the statement that *Reading Recovery* was offered by 78% of Victorian schools. The popularity of *Reading Recovery* at this time is likely due to it being: a) the Victorian Department of Education and Training [DET]'s recommended early literacy intervention, as part of its broader *Early Years Literacy Program [EYLP]* (Hill & Crevola 1999); and b) the Catholic Education Commission of Victoria's mandatory early intervention for schools participating in its broad *Children's Literacy Success Strategy [CLaSS]* (Hill & Crevola, 2005). However, the *EYLP* ceased to be a recommended approach over a decade ago, and choices about literacy pedagogy and intervention have since been devolved to individual government schools and their governing boards. These changes in recommended intervention pedagogy suggest that up to date research about literacy intervention use in schools is needed, particularly as there are a plethora of other intervention programs available, and little is known about schools' use of these.

Another justification for an updated study on literacy intervention provision is to explore whether an alternative method of gathering data from online sources may provide a means of learning about schools' programs. The *Mapping the Territory* study used a mailed questionnaire which elicited a response rate of 37.7% (Rohl & Milton, 2000). Low questionnaire response rates are common (Fowler, 2014) and therefore findings from studies reporting on the data are difficult to generalise to the broader population, as non-responders might have different characteristics to responders (Fowler, 2014). A potential

benefit in gathering data from online sources is that data can be collected from an entire sample instead of self-selected participants within a sample.

Data collection using online information is relatively new in Australian educational research. Quantitative studies examining student achievement in relation to demographic variables were common before school data was publicly available online, and contemporary researchers such as Li and Dockery (2014) have utilised the mandatory demographic and achievement data reported on the *My School* website to continue such work. However, studies using the information schools choose to provide in publicly available online forums are less common. One exception is Carter, Stephenson and Wheldall's (2007) study into Australian schools' self-reported use of perceptual motor programs [PMPs]. These authors *Googled* PMPs, read the first 300 of the resulting Australian websites, and used as their sample the 117 of these that were school websites. In addition to gathering data on the prevalence of PMP use, the authors also examined schools' reported reasons for offering these programs. Carter et al. noted that schools commonly provided information about offering PMPs, with some also providing a rationale for their use, on their websites.

This article aims to build on the work of Rohl et al. (2000, 2002) and Carter et al. (2007) in exploring the potential of online data collection methods to answer questions about Victorian schools' literacy intervention provision. It seeks to provide more recent data on schools' programs for students with literacy difficulties but does not recommend particular programs or intervention practices.

Method

As part of a larger study on literacy interventions in Victorian primary education, a school literacy intervention provision questionnaire was distributed to principals across Victoria to gather data on their schools' literacy intervention programs in July 2014. A poor response rate to this questionnaire (22%) led to the development of the data collection protocol discussed in this article, which utilises publicly available information from a range of online sources. An initial scan of local schools' websites suggested that schools typically provided information about the additional programs they offered. Further online investigation revealed that schools' demographic and NAPLAN¹ (ACARA, n.d., b) achievement information were available from the *My School* website, and that some schools' annual reports, available from the Victorian State register, provided additional information about their literacy intervention programs.

A small convenience sample of schools' online data sources was used to model an online data collection protocol. This process helped to define the demographic variables of interest, together with popular literacy interventions offered in schools, and useful

¹ The National Assessment Program – Literacy and Numeracy [NAPLAN] is Australia's annual national assessment for school students. The program assesses students in years three, five, seven, and nine in reading, writing, language conventions, and numeracy. NAPLAN data are reported to schools and parents, and schools' achievement summaries are publicised on the *My School* website.

keywords for searching within school websites to locate information about literacy intervention programs.

The online data scan was designed to answer three main research questions:

What is the prevalence of literacy intervention provision in Victorian primary education?

What programs are offered?

Are there associations between schools' demographic and achievement characteristics and their likelihood of offering literacy intervention/s?

Sample

A randomised sample of 150 (8%) Victorian primary and primary/secondary composite schools was drawn from the 1782 Government, Catholic, and Independent schools that offered general primary education in 2014, using an online randomising tool (Urbaniak & Plous, 2013). Four schools in the sample either had no website or the school website was down for construction or repair for more than a week, and the next four on the randomised list were added to the sample to give a total of 150 schools. The following formula was used to calculate the sample size:

$$\text{Sample size} = \frac{z^2 \times p(1-p)}{e^2} \div \left(1 + \left(\frac{z^2 \times p(1-p)}{e^2 N} \right) \right)$$

A confidence interval of 80% and a margin of error of 5% were used as the purpose of the study was to gain a broad overview of literacy intervention use in Victoria. The population proportion 0.5 was used, which gave an *a priori* estimate of a school offering a literacy intervention as equal probability, due to there being no established body of evidence providing alternate proportions of Victorian schools offering literacy interventions. The input figures for the above formula were therefore:

$N = 1782$ (number of schools)

$e = 0.05$ (margin of error)

$z = 1.28$ (standard deviation, calculated from the confidence interval)

$p = 0.5$ (population proportion)

$$150.0446 = \frac{\frac{1.28^2 \times 0.5(1-0.5)}{0.05^2}}{1 + \left(\frac{1.28^2 \times 0.5(1-0.5)}{0.05^2 1782} \right)}$$

A check on school sector proportions for the 1782 schools in Victoria, and for the sample schools, demonstrated comparable weightings, with differences of up to 5% (Table 1).

Table 1: Percentages of schools from each sector in Victoria and in the sample

Sector	Victoria	Sample
Government	68%	63%
Catholic	22%	24%
Independent	10%	13%

Data collection

For each of the 150 schools, two sources — school websites and school annual reports — were read for mention of literacy interventions offered. Data were collected from school websites in 2014, and from school annual reports in 2015, as this is when schools' 2014 reports were made publicly available. Schools were coded as offering a literacy intervention: if they reported offering a program known to be specifically for students with literacy difficulties, for example, *Reading Recovery*; if they stated offering extra support programs for students with literacy difficulties but did not name a product or program; or if they stated using a volunteer program or reported using a broader literacy program specifically with individuals or groups of students with literacy difficulties, for example, a reading mentor or a phonological awareness program. Two interventions were named using the funding tagged to them: Catholic schools' *Literacy Numeracy Special Needs* funding (CECV, n.d.); and Government schools' *Early Years Koorie Literacy and Numeracy* program funding (DET, n.d., a), as they were described in the relevant schools' websites and/or annual reports as being used to target students with literacy difficulties. General references to support for students with special needs or with learning difficulties were not counted, nor were references to whole class literacy approaches, oral language and speech programs, or general parental or volunteer reading programs.

Data were also collected on schools' demographic and achievement variables: sector type (Government, Catholic, or Independent); enrolment size; and *Index of Community Socio-Educational Advantage* (ICSEA)² value; and schools' mean NAPLAN reading score in years three and five. The NAPLAN variables were included to provide a proxy for reading achievement in the sample schools. NAPLAN reading was selected rather than the other NAPLAN literacy domains assessed due to the strong focus on reading difficulties and intervention in primary education. The demographic and achievement data were collected from the *My School* website in 2015, as this is when schools' 2014 data were published.

The literacy intervention data gathered in this online scan was what schools themselves had provided on their websites and in their annual reports. This reliance on schools' self-report of providing literacy interventions had the potential to impact on the validity of the information provided; for example, it was possible that school websites were not up to

² ICSEA is a national scale of school communities' socio-educational and socioeconomic advantage. ICSEA values are calculated using data on parental education and occupation, school location, and community socioeconomic makeup. Schools' ICSEA values are primarily used for interpreting their NAPLAN data in relation to schools with similar levels of advantage or disadvantage.

date and may therefore have referenced programs no longer offered. However, checks conducted during data collection showed that most school websites had been recently updated, and as schools' annual reports are legal documents, it was highly likely that these would contain accurate information. Unfortunately for this study, providing information about additional support programs, such as literacy interventions, is not mandatory on school websites or in annual reports. It is possible that some schools may choose not to disclose the intervention programs they offer. For example, they may have other priorities for the information included on their website and in their annual reports.

This study used ICSEA and NAPLAN as proxy measures of schools' socio-educational advantage and average reading achievement. It is acknowledged that many aspects of socio-educational disadvantage and advantage, and of student achievement, are not evident in the standardised data these measures generate. Despite this, using these online sources enabled data collection from all schools in the sample, and allowed broad comparisons to be made between more and less socio-educationally advantaged schools, and schools with higher and lower mean NAPLAN reading achievement.

Data analysis

A spreadsheet in *SPSS* (IBM, 2013) was constructed to record the 150 schools' online data, comprising: school identification number; sector type; number of students enrolled; ICSEA value; year three and five NAPLAN reading means; and literacy interventions offered. Descriptive statistics were used to summarise the nominal variables: sector type; report of offering a literacy intervention; and names of interventions offered. The data sets for each of the continuous variables — enrolment, ICSEA value, and NAPLAN means — were divided using quartiles in order for comparisons to be made between the resulting quarters: low (first quarter); low-average (second quarter); high-average (third quarter); and high (fourth quarter). Outliers were checked, found to be correct, and retained in the sample.

Crosstabs and the Pearson's chi-square test for goodness of fit were used to test the hypothesis that there would be no relationship between each of the demographic variables, and schools' report of offering literacy interventions. This null hypothesis was used as the baseline, due to there being no established body of research demonstrating different proportions of literacy intervention use across demographic or achievement variables in Victorian or Australian schools. The crosstabs enabled comparison between the expected even distribution of schools offering literacy interventions across the categories for each demographic variable, with the actual distributions in the data. Pearson's chi-square tests for goodness of fit tested whether the differences identified in the crosstabs were statistically significant ($p < 0.05$) — suggesting a relationship between the demographic variable and the likelihood of a school reporting offering a literacy intervention program; or likely to be due to chance — supporting the null hypothesis that there is no relationship between the variable and report of offering a literacy intervention.

The names of the literacy interventions schools reported offering were entered into the spreadsheet and coded as to their instructional emphasis if this could be identified. This

list of interventions was sorted into three major types for further analysis, and the crosstab and chi-square procedures described above were run to test the null hypothesis that there would be no relationship between each of the demographic variables, and schools' report of offering or not offering each of these types of interventions.

It is noted that p values from Pearson's chi-square tests require careful interpretation, as they test a hypothesis of no relationship rather than suggesting causation. However, this approach was appropriate for the specific variables of interest and hypotheses tested; and did not violate assumptions as other potential tests would have done. For example, logistic regressions were not run due to multicollinearity — high inter-correlations between the two NAPLAN means, and between both NAPLAN means and schools' ICSEA values; whilst Pearson's chi-square test for independence was not used as the same 150 schools were represented in each of the five demographic and achievement variables.

Results

School demographics and achievement information

There were 95 Government schools, 36 Catholic schools, and 19 Independent schools in the sample. The schools ranged from very small — with 12 students, to very large — with 2819 students. The median school enrolment was 311 students. Schools' ICSEA values ranged from 881 to 1243, with a median of 1019. Year three NAPLAN³ mean reading scores ranged from 318 to 582, with a median of 428, and year five NAPLAN mean reading scores ranged from 444 to 577 with a median of 507.

Report of offering literacy intervention

One hundred and fourteen (76%) of the 150 schools reported offering one or more literacy interventions for students with literacy difficulties either on their website, in their annual report, or in both locations. Many schools reported offering multiple interventions, and the mean and median number of literacy interventions offered by the 114 schools was two.

Table 2 shows the number and percentage of schools from each sector that reported offering literacy interventions in 2014. These are shown in relation to the expected percentage of 76%, as taken from the overall sample.

Catholic schools unanimously reported offering literacy intervention/s, whilst nearly three quarters (73%) of Government schools and just under half (43%) of Independent schools reported doing so. Pearson's chi-square test for goodness-of-fit demonstrated a highly significant relationship between school sector type and report of offering a literacy intervention ($p < 0.001$), suggesting a very strong association between these variables.

³ NAPLAN data are not reported for schools with very small numbers of students sitting tests at particular levels, meaning that year three NAPLAN data were available for 141 schools, and year five NAPLAN data for 135 schools.

Table 2: Descriptive statistics and results of chi-square test for schools offering literacy interventions by sector (N=150)

Lit. int. offered?	School sector			Variable totals
	Govt. n=95	Catholic n=36	Independ. n=19	
Actual yes*	69 (73%)	36 (100%)	9 (47%)	114 (76%)
Expected yes	(76%)	(76%)	(76%)	114 (76%)

Notes. Numbers in parentheses indicate cell percentages. All percentages rounded to nearest whole number.

$\chi^2 = 20.499$, $df = 2$; * $p < 0.001$

The same process was used to explore the relationship between each of the four continuous variables (school enrolment, ICSEA value, NAPLAN year 3 reading mean, and NAPLAN year 5 reading mean) and report of offering a literacy intervention.

Table 3: Descriptive statistics and results of chi-square tests for schools offering literacy interventions by enrolment size, ICSEA value, and years three and five NAPLAN reading means

Variables	Lit. interven. offering?	Quarters for each variable				Variable total
		Low	Low-av.	High-av.	High	
Enrol. * N=150	Actual yes	22 (59%)	31 (82%)	33 (87%)	28 (76%)	114 (76%)
	Expected yes	(76%)	(76%)	(76%)	(76%)	114 (76%)
ICSEA N=150	Actual yes	32 (82%)	26 (68%)	26 (72%)	30 (81%)	114 (76%)
	Expected yes	(76%)	(76%)	(76%)	(76%)	114 (76%)
NAPLAN 3 N=141	Actual yes	26 (72%)	30 (86%)	27 (77%)	27 (77%)	110 (78%)
	Expected yes	(78%)	(78%)	(78%)	(78%)	110 (78%)
NAPLAN 5 N=135	Actual yes	29 (83%)	27 (82%)	26 (72%)	25 (81%)	107 (79%)
	Expected yes	(79%)	(79%)	(79%)	(79%)	107 (79%)

Notes. Numbers in parentheses indicate cell percentages. All percentages rounded to nearest whole number. Uneven quarters due to multiple data values at the 25th, 50th, and 75th percentiles.

Enrolment $\chi^2 = 8.469$, $df = 3$. * $p < 0.05$

ICSEA $\chi^2 = 2.758$, $df = 3$. *ns.*

NAPLAN 3 $\chi^2 = 1.945$, $df = 3$. *ns.*

NAPLAN 5 $\chi^2 = 1.528$, $df = 3$. *ns.*

Table 3 reports the number and percentage of schools in each quarter of the four continuous variables that reported offering one or more literacy interventions. This table shows that well over half of the schools in each quarter of each variable reported offering interventions, with some differences between the percentages for each quarter. Chi-square tests showed a significant relationship ($p < 0.05$) between school size and report of offering an intervention, but no significance between schools' ICSEA values, or NAPLAN year three or year five mean scores; and their likelihood of offering a literacy intervention. The null hypothesis was upheld for ICSEA and NAPLAN, suggesting that the small differences shown between the quarters for each of these variables are likely to be due to chance.

Types of literacy intervention offered

The 114 schools in the online scan reported offering thirty-five literacy intervention programs, and/or non-program specific literacy intervention for students with literacy difficulties in their schools.

Table 4: Literacy interventions offered at 150 Victorian schools

Program name	No. schools	Instructional focus
Reading Recovery	78	Literacy
Non-program specific literacy intervention	65	Literacy
Levelled Literacy Intervention	9	Literacy
Bridges	8	Literacy
Early Reading Intervention Knowledge - ERIK	8	Literacy
MULTILIT	7	Reading
Rainbow Reading	5	Reading
Literacy Numeracy Special Needs Funding	4	Literacy
Toe by Toe	4	Reading
Phonological Early Reading Instruction - PERI	3	Phonological
LEXIA	3	Reading
Quicksmart	3	Reading
FastforWord – LearnSmart	2	Cognitive
Early Years Koorie Literacy Intervention	2	Literacy
Cued articulation	2	Phonological
Unbranded phonemic/phonological intervention	2	Phonological
Corrective reading	2	Reading
MINILIT	2	Reading
Arrowsmith	1	Cognitive
Yachad Accelerated Learning Project	1	Literacy
Literacy Support	1	Literacy
Catch a Falling Star	1	Literacy
PRELIT	1	Phonological
Rapid Reading	1	Reading
I Can Read	1	Reading
Catch Up Literacy	1	Reading
Reading for Life	1	Reading
Arrow	1	Reading
Successmaker	1	Reading
Legends	1	Reading
Strideahead: An aid to comprehension	1	Reading
Stareway to spelling	1	Spelling
Spelling Mastery	1	Spelling
Dyslexia Coach	1	Unknown
Assistive technology	1	Unknown
Express Write	1	Writing

Table 4 lists the literacy intervention programs schools reported offering in the online data scan. It identifies the number of schools offering each program, and when possible, the

instructional focus of the program. The most common instructional focus was reading (15 interventions), followed by overall literacy (reading, writing, and in some cases, oral language — 10 interventions). Other programs focused on a particular literacy sub-skill such as phonological awareness (four interventions), spelling (two interventions), or writing (one intervention). Two programs focused on cognitive brain training. Two other methods of intervention — a dyslexia coach, and assistive technology — were reported, but it was not possible to determine the instructional foci of these.

The interventions in the above list were categorised as one of three major program types for further analysis: *Reading Recovery*, which 78 (52%) schools reporting offering; non-program-specific literacy intervention, which 65 (43%) schools reporting offering; and a combined variable of one or more of the 34 other programs, which fifty schools (33%) reported offering. Schools frequently reported offering more than one intervention, with 52 schools offering one of *Reading Recovery*, non-program specific literacy intervention or one or more other programs; 45 schools offered interventions from two, and 17 schools offered interventions from all three of these groupings.

Pearson's chi-square tests for goodness of fit were performed to explore relationships between each of the five variables and report of offering each of: *Reading Recovery*; non-program specific literacy intervention; and one or more other programs.

Table 5: Descriptive statistics and results of chi-square test for schools offering *Reading Recovery* (RR), Non-program specific literacy intervention/s (NPSLI), and one or more other programs (OP) by sector ($N=150$)

Program	School sector			Variable totals
	Govt. n=95	Catholic n=36	Independ. n=19	
Offered RR (1)*	40 (42%)	34 (94%)	4 (21%)	78 (52%)
Expected RR	(52%)	(52%)	(52%)	(52%)
Offered NPSLI (2)*	45 (47%)	17 (47%)	3 (16%)	65 (43%)
Expected NPSLI	(43%)	(43%)	(43%)	(43%)
Offered OP (3)*	26 (27%)	20 (56%)	4 (21%)	50 (33%)
Expected OP	(33%)	(33%)	(33%)	(33%)

Note (1). *Reading Recovery* $\chi^2 = 37$, $df = 2$. * $p < 0.001$

Note (2). Non-program specific literacy intervention $\chi^2 = 6.722$, $df = 2$. * $p < 0.05$

Note (3). One or more other programs $\chi^2 = 10.811$, $df = 2$. * $p < 0.01$

Table 5 shows that *Reading Recovery* was offered in just over half of the schools (52%) in the sample, and that differences between the proportions of Government, Catholic, and Independent schools offering this intervention were highly significant ($p < 0.001$). Non-program specific literacy intervention/s were offered in equal proportions by Catholic and Government schools (47%), but much less frequently by Independent schools (16%), a difference that was just significant ($p < 0.05$). Fifty six percent of Catholic schools offered one or more other programs, whilst Government (27%) and Independent (21%) schools were less likely to do so, differences that were moderately significant ($p < 0.01$).

Table 6: Descriptive statistics and results of chi-square tests for schools offering *Reading Recovery* (RR), Non-program specific literacy intervention/s (NPSLI), and one or more other programs (OP) by enrolment size ($N=150$)

Program	Enrolment size (quarters)				Variable totals
	Low	Low-aver.	High-aver.	High	
Offered RR (1)*	13 (35%)	25 (66%)	22 (58%)	18 (49%)	78 (52%)
Expected RR	(52%)	(52%)	(52%)	(52%)	(52%)
Offered NPSLI (2)*	12 (32%)	18 (47%)	24 (63%)	11 (30%)	65 (43%)
Exp. NPSLI	(43%)	(43%)	(43%)	(43%)	(43%)
Offered OP (3)*	4 (10%)	17 (45%)	16 (42%)	13 (35%)	50 (33%)
Expected OP	(33%)	(33%)	(33%)	(33%)	(33%)

Note (1) *Reading Recovery* $\chi^2 = 10.913$, $df = 3$; * $p < 0.02$

Note (2) Non-program specific literacy intervention $\chi^2 = 10.913$, $df = 3$. * $p < 0.02$

Note (3) One or more other programs $\chi^2 = 12.039$, $df = 3$. * $p < 0.01$

Table 6 shows that small schools were less likely to offer interventions from each of the three groupings than schools with low-average, high-average, or high enrolments. Chi-square tests showed that quarter differences between schools of different sizes were moderately significant for each of the three intervention groupings.

As with report of offering literacy intervention overall, the two variables showing a significant relationship with whether or not schools reported offering each of the three literacy intervention categories were school sector and enrolment. Chi-square tests showed no significant associations between schools' ICSEA values or mean NAPLAN reading achievement and their likelihood of offering a literacy intervention (see Appendices for data tables).

Discussion

This discussion comprises two sections. The first is an analysis of the data presented in the results section, discussing literacy intervention provision in Victorian schools in relation to research literature and contemporary educational policies. The second is a discussion of the potential for online data sources to answer educational research questions.

Prevalence and types of literacy interventions in use in Victorian primary education in 2014

The online scan data suggest that literacy interventions are common in Victorian primary education, as seventy six percent (114 schools) of a random sample of 150 schools reported offering one or more literacy intervention programs on their website and/or in their annual report. Given the possibility of a reporting bias in which schools may prefer to not advertise their interventions on public documents, it is possible that the actual proportion of schools offering literacy intervention programs is higher. These findings contribute more recent data to complement those of existing studies which established

that interventions for students with learning difficulties, including literacy difficulties, were common in Australia (Louden et al., 2000; Rohl et al., 2000; Rohl & Milton, 2002).

The findings build on prior research by showing that Victorian schools offered a range of programs to support and improve the literacy of students with literacy difficulties. Some of these were identified in earlier studies of learning interventions in Australia (Louden et al. 2000; Meiers et al. 2013; Rohl et al., 2000; Rohl & Milton, 2002), though many were not. A comparison with the findings of Rohl et al., and Rohl and Milton suggest that shifts may have occurred in intervention provision. For example, whilst *Reading Recovery* was offered by 52% of schools in the online data scan, this is a reduction from the 78% reported by Rohl et al. in 2000. Conflicting research — with some studies critiquing the long-term efficacy of this program (e.g. Chapman & Tunmer, 2011; Reynolds & Wheldall, 2007), and others providing evidence of its effectiveness over time (Schwartz, Hobsbaum, Briggs & Scull, 2009) — may have contributed to this decline. School sector policies may have also influenced *Reading Recovery* provision, and this possibility is explored later in this discussion.

Non-program specific literacy interventions were offered by 43% of schools in the online data scan. It is not known whether these schools chose not to name the program they offered, or whether they offered their own literacy intervention program. It is possible that schools may be devising their own literacy interventions in order to cater to their specific contexts, as some schools in the *Mapping the Territory* (Louden et al., 2000) study did, but without additional information on each school's program, it is difficult to evaluate this finding.

Schools reported offering thirty-four other literacy intervention programs in the online data scan, which focus on various aspects of literacy, and reflect a range of understandings about literacy difficulties, acquisition, and remediation. For example, *Levelled Literacy Intervention* (Fountas & Pinnell n.d.) (9 schools) is a direct instruction program for small groups of students, based on the principles of *Reading Recovery*. *MULTILIT* (2007) (seven schools), *Toe by Toe* (Cowling & Cowling, 1993) (four schools), and *Corrective Reading* (Science Research Associates, n.d.) (two schools), are also direct instruction programs, though these focus on the development of early reading skills — including letter-sound relationships, decoding skills, and irregular sight words — in a developmental sequence. The *Mapping the Territory* survey publications reported only on more commonly used programs, so it is not possible to determine whether there has been an increase in the use of direct instruction programs to support primary students with literacy difficulties in Victoria. It is possible that schools' use of these types of programs may be in response to research studies and meta-analyses that emphasised the importance of explicit skill instruction in early reading development (e.g. *Report of the National Reading Panel*, 2000; *National Inquiry into the Teaching of Literacy*, 2005), and reiterated the need for additional targeted and explicit instruction for students with literacy difficulties (Ellis, 2005; Pressley & Allington, 2014; Rose, 2009; Snow et al., 1998).

A few programs named in the online data scan are grounded in less common and more contentious understandings of literacy difficulties. For example, *Arrowsmith* ("Arrowsmith

program: About us”, n.d.) was offered by one school and *FastforWord* (LearnFast, n.d.) by two schools. These interventions focus on brain change and are premised on the understanding that brain use can be altered through exercises and computer programs. Functional magnetic resonance imaging research on the brains of people with and without dyslexia has identified causal links between brain development and literacy difficulties (e.g. Shaywitz, Lyon & Shaywitz, 2006). However, the claims of the developers of *Arrowsmith*, *FastforWord* and other brain-based programs have been criticised for relying on incorrect interpretations of these causal links, and for claiming that brain exercises, rather than print-based instruction, enable literacy learning (Alferink & Farmer-Dougan, 2010; Castles, 2013; Dawson & D’Souza, 2015). Whilst schools that reported offering brain exercise programs comprised a very small proportion of the sample, their inclusion is of note as it suggests that some schools may subscribe to contentious understandings of literacy difficulties, or alternatively, may not be aware of research critiquing these programs. One challenge with the data collection protocol used in this research was that schools rarely provided their rationales for offering particular interventions on their website or in their annual report.

Variables associated with schools’ intervention provision

This section explores differences between schools’ demographic and achievement variable data, and their report of offering one or more literacy interventions. Of the five variables examined, school sector showed the strongest differences in both report of offering literacy interventions, and in the types of interventions offered. Catholic schools, operating under reasonably directive policies (e.g. CEOM, n.d.⁴; Hill & Crévola, 2005) from the Catholic Education Offices were the most likely to offer interventions. Government schools, free to develop literacy policies to suit the needs of their schools, were also likely to do so, and Independent schools, largely de-regulated, the least likely to do so. It appears that these differences could be partly attributed to the different policies and expectations each school sector operates under.

Government primary schools in Victoria had previously delivered literacy programs based on the *EYLP* (Hill & Crévola, 1999), which directed classroom literacy instruction and recommended *Reading Recovery* as the second wave intervention for students with early literacy difficulties. Subsequent to the *EYLP*, and alongside the introduction of the Australian Curriculum (ACARA, 2012) which defines content to be taught rather than pedagogical approaches, the DET devolved decisions about literacy pedagogy and interventions to schools. It is likely that these changes are reflected in the overall drop in *Reading Recovery* use identified in this study. Literacy pedagogy, the provision of intervention, and the types of interventions offered, were more directed in the Catholic school system, which in Victoria is managed through four Catholic Education Offices (CEOs). At the time of data collection for this study, there was an expectation that

⁴ The cited online policies were current at the time of data collection and analysis. Subsequently, some information provided in these online forums changed to reflect the policy shifts discussed later in this article. Two cited sources relating to CEOM literacy policies and recommendations no longer had functional web links at the time this article was published, as noted in the reference list.

Catholic schools would offer *Reading Recovery* as a second wave intervention, as laid out in the *Children's Literacy Success Strategy (CLaSS)* (Hill & Crévola, 1999, 2005) and more recent Catholic Education Office policies (e.g. CEOM, n.d.; 2011). These CEO policy directives are reflected in the high proportion (94%) of Catholic schools that reported offering *Reading Recovery* in 2014 in the online data scan.

Whilst sector policies appear to have influenced the provision of *Reading Recovery*, other findings from the online data scan were not explained by sector policies or recommendations. For example, Catholic schools also reported offering non-program specific literacy interventions (47%), and one or more other programs (56%), suggesting that providing literacy interventions is a common practice in Catholic schools extending beyond mandated or recommended programs. Independent schools were the least likely to report offering literacy interventions on their school websites and/or in their school annual reports, with just under half of the Independent schools in the online data scan doing so. Several of the Independent schools in the sample were composite settings encompassing early childhood, primary and secondary education. Their school websites and annual reports contained information covering students of all age ranges, and it is possible that information on specialist programs for a limited number of students was not a priority for inclusion.

Enrolment size, community socio-educational status, and mean reading achievement were also hypothesised as potential variables influencing schools' likelihood of offering literacy intervention programs. The online data scan analysis showed that school enrolment was the only variable within which there were statistically significant differences, with small schools the least likely to offer intervention programs. Having said this, 59% of the schools in the low enrolment quarter of the online scan (12-158 students) reported offering literacy interventions. It may be possible that some very small schools have few students with literacy difficulties, and that the low student-teacher ratio is considered sufficient to cater for any students with literacy difficulties.

Differences in schools' community socio-educational status — as measured through their ICSEA values, and average reading achievement — as measured through their year three and five mean NAPLAN reading scores, were not statistically significant predictors of whether or not schools reported offering literacy interventions. This suggests there is no clear or straightforward relationship between whether a school offers literacy intervention/s, and either its average scores on reading achievement tests or its community's socio-educational status. These findings constitute new knowledge in the field, as research exploring these relationships was not found in the literature. These findings were unexpected, as several associations were hypothesised, for example: that schools with high mean NAPLAN reading scores might have achieved these through providing interventions to raise the achievement of their lower readers; or that schools serving lower socio-educational status communities might have used their additional funding to provide intervention programs. It is logical, given the statistical correlation between ICSEA and NAPLAN (Miller & Voon, 2012) that neither of these variables were found to relate to schools' report of offering literacy interventions. However, there is also a strong correlation between ICSEA and school sector, with non-government schools

(Catholic and Independent) typically having higher ICSEA values than Government schools (Bonner & Shepherd, 2016), yet, in this study, only school sector was found to have a strong relationship with whether schools offered literacy intervention programs.

Usefulness of online data collection for this study

The online data protocol utilised in this study drew on schools' websites and annual reports to provide descriptive data on their literacy intervention provision; and linked this to the schools' demographic and achievement information from the *My School* website. This method enabled data to be collected on a complete sample of schools, rather than relying on self-selected responses to a questionnaire. Collection of data from a full sample circumvented the possibility of response bias, but reporting bias may have influenced the findings, in that some schools might choose not to openly publicise the programs or interventions they offer. In addition, smaller schools or those with less staff expertise in website management might reasonably be expected to convey less information in online media.

The use of publicly available demographic, achievement, and reported literacy intervention/s data revealed interesting patterns in schools' intervention provisions, some of which have not been previously discussed in the research literature. The online data set provided information on the prevalence and range of intervention use but did not address why schools did or did not provide literacy intervention/s. The online data findings informed a larger research project, in which qualitative case studies were used to explore: how and why particular programs were used in one Catholic and one Government school; how these impacted on specific students' learning over time; and how sector and funding policies impacted on each school's intervention provision. These findings will be reported in later publications.

Transferability of methodology to other contexts

The online data scan used for this study, and Carter et al.'s (2007) online methodology, suggest that schools commonly provide information about their additional programs in online forums. In both studies, the respective data sets were utilised to discuss the prevalence of particular kinds of programs provided in Australian schools. As Australian schools typically have a reasonable amount of freedom in their curriculum implementation, an understanding of the pedagogical programs and approaches offered provides valuable insights into schools' practices. There is potential for online data collection protocols to answer other questions about schools' programs, for example: languages taught; open plan classrooms; learning styles pedagogies; and gifted and talented programs.

In the broader research context, others have demonstrated the potential in drawing descriptive data from online sources. For example, Mewburn, Suominen and Grant (2017) utilised the descriptive data from job advertisements to answer questions about employer demand for PhD-related skills. Their study used a machine learning program to harvest information from the job website seek.com.au, enabling the collection of a much larger

data set than was possible with the manual website reading used for the online data scan reported in this article. It is possible, given expertise and funding, that machine learning algorithms could be designed to collect self-reported information from school websites. Such studies might provide not only a snapshot of programs in use, but also information about changing patterns in schools' pedagogical choices over time.

Conclusion

This article provides data on literacy intervention use in Victorian primary education in 2014, and uncovers patterns in the types of schools offering interventions. It highlights the range of programs offered, and identifies the potential for school sector policies to influence intervention provision. This article also contributes methodologically to the field of educational research by demonstrating the research potential of utilising publicly available online data.

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Appendices

Table 7: Descriptive statistics and results of chi-square tests for schools offering *Reading Recovery* (RR), Non-program specific literacy intervention/s (NPSLI), and one or more other programs (OP) by ICSEA value ($N=150$)

Program	ICSEA values (quarters)				Variable totals
	Low	Low-aver.	High-aver.	High	
Offered RR (1)	20 (51%)	19 (50%)	15 (42%)	24 (65%)	78 (52%)
Expected RR	(52%)	(52%)	(52%)	(52%)	78 (52%)
Offered NPSLI (2)	20 (51%)	16 (42%)	15 (42%)	14 (38%)	65 (43%)
Exp. NPSLI	(43%)	(43%)	(43%)	(43%)	(43%)
Offered OP (3)	9 (23%)	15 (39%)	12 (33%)	14 (38%)	50 (33%)
Expected OP	(33%)	(33%)	(33%)	(33%)	50 (33%)

Note (1) *Reading Recovery* $\chi^2 = 4.062$, $df = 3$. *ns*.

Note (2) Non-program specific literacy intervention $\chi^2 = 1.523$, $df = 3$. *ns*.

Note (3) One or more other programs $\chi^2 = 2.829$, $df = 3$. *ns*.

Table 8: Descriptive statistics and results of chi-square tests for schools offering *Reading Recovery* (RR), Non-program specific literacy intervention/s (NPSLI), and one or more other programs (OP) by Year 3 NAPLAN reading means (N=141)

Program	School NAPLAN means (quarters)				Variable totals
	Low	Low-aver.	High-aver.	High	
Offered RR (1)	17 (47%)	19 (54%)	23 (66%)	18 (51%)	77 (55%)
Expected RR	(55%)	(55%)	(55%)	(55%)	77 (55%)
Offered NPSLI (2)	17 (45%)	15 (43%)	15 (43%)	15 (43%)	62 (44%)
Exp. NPSLI	(44%)	(44%)	(44%)	(44%)	(44%)
Offered OP (3)	8 (22%)	18 (51%)	13 (37%)	11 (31%)	50 (35%)
Expected OP	(35%)	(35%)	(35%)	(35%)	50 (35%)

Note (1) *Reading Recovery* $\chi^2 = 2.678$, df = 3. *ns.*

Note (2) Non-program specific literacy intervention $\chi^2 = 0.207$, df = 3. *ns.*

Note (3) One or more other programs $\chi^2 = 6.948$, df = 3. *ns.*

Table 9: Descriptive statistics and results of chi-square tests for schools offering *Reading Recovery* (RR), Non-program specific literacy intervention/s (NPSLI), and one or more other programs (OP) by Year 5 NAPLAN reading means (N=135)

Program	Enrolment size (quarters)				Variable totals
	Low	Low-aver.	High-aver.	High	
Offered RR (1)	19 (54%)	17 (52%)	21 (58%)	19 (61%)	76 (56%)
Expected RR	(56%)	(56%)	(56%)	(56%)	76 (56%)
Offered NPSLI (2)	20 (57%)	15 (45%)	12 (33%)	14 (45%)	61 (45%)
Exp. NPSLI	(45%)	(45%)	(45%)	(45%)	(45%)
Offered OP (3)	13 (37%)	14 (42%)	11 (31%)	11 (35%)	49 (36%)
Expected OP	(36%)	(36%)	(36%)	(36%)	(36%)

Note (1) *Reading Recovery* $\chi^2 = 0.739$, df = 3. *ns.*

Note (2) Non-program specific literacy intervention $\chi^2 = 4.043$, df = 3. *ns.*

Note (3) One or more other programs $\chi^2 = 1.069$, df = 3. *ns.*

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