Teachers Designing for Context: Using Integrity Principles to Design Early Literacy Support in Aotearoa New Zealand

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Overview

The present study reports the processes and outcomes of a refresh process within the Aotearoa New Zealand implementation of Reading Recovery®. Conceived as Early Literacy Support within a school, design-based research processes were employed to develop and enact contextually appropriate responses to working more closely within schools, including collaborating with classroom teachers, codesigning, coplanning, and coteaching small groups of students within the classroom. To enable contextual variation within the design, a distinction was drawn between intervention fidelity and intervention integrity by theorizing the transferable features of the existing expertise of Reading Recovery teachers.

Background

Aotearoa New Zealand has a long history of implementing Reading Recovery intervention. Reading Recovery was developed as a preventative approach to literacy difficulties by providing additional one-to-one literacy lessons for students who find literacy learning challenging after their first year at school (Clay, 2016). Children commonly start school here at or near their 5th birthday. A year at school is, therefore, near to their 6th birthday. The children might be either Year 1 or Year 2.

Reading Recovery has proven polarizing, with ongoing critiques centering on the cost of individual instruction (e.g., Iversen et al., 2005) and the need for explicit attention to alphabet coding skills (e.g., Chapman & Tunmer, 2019). In 2019, an independent evaluation was produced for the Ministry of Education (Appleton-Dyer et al., 2019). Findings included improved literacy levels for children engaged in the intervention and high regard for the teachers, but limited reach and influence in improving literacy provision in schools. Recommendations therefore were to adjust the approach to reach more children, earlier in their schooling, and to provide a greater contribution to capability and culture within schools (Appleton-Dyer et al., 2019).

Based on those recommendations, Reading Recovery in Aotearoa began a "refresh," using a design-based research methodology to codesign the changes with the profession. Developed across 2 years, new ways of working included incorporating culturally responsive and relational pedagogical principles, collaborating with Year 1 and 2 classroom teachers, and participating as members of school literacy teams in implementing a three-tiered approach. In Aotearoa New Zealand, the policy framework *He Pikorua* guides inclusive practice, underpinned by Te Tūāpapa as a foundation for inclusive learning communities by including universal, group, and individual support for students within an "ecological" model of practice (Bronfenbrenner, 1979; Ministry of Education, 2024). This extended role included working in literacy teams to strengthen everyday practices as well as working with teachers to support targeted groups. In practice, this meant setting aside a 30-minute teaching slot for in-class group support alongside the class teacher. We report here on the processes undertaken, and the outcomes for children taught as part of the small-group classroom teaching context, as an addition to a Reading Recovery teacher's role with children.

Teaching and Learning as Sociocultural, Relational Processes

Sociocultural and relational theorizing highlight the importance of context to the enactment of intentions. From a sociocultural perspective, learning arises as an interaction with the context (Vygotsky, 1978) and so any educational process

needs to embrace the complex network of interdependent, nested, and indeterminate interpersonal relationships that exist among and between students, their families, their texts, their teachers, and their contexts. The tutorial features of Reading Recovery have been interpreted using this socio-cultural lens as the application of key themes in sociocultural research: scaffolding, mediation, and the child's increasing control of joint activity (Clay & Cazden, 1990).

Applying this sociocultural relational lens to schoolwide literacy teaching, what counts as good teaching is based on social, cultural, and historical underpinnings, and successive studies have underscored the importance of time, space and context for literacy learning (Compton-Lilly, 2006; Compton-Lilly et al, 2014). Aotearoa New Zealand has a bicultural policy context, both bilingual and multilingual populations, and a long history of inequities. Recent changes to the Education Act reassert the responsibility to give effect to the founding document, Te Tiriti o Waitangi, to ensure equitable access to education, emphasizing the role of schools to include Māori worldviews, knowledge and practices; including local Māori as community; and ensuring equitable outcomes (Education and Training Act 2020).

Teaching in Aotearoa is acknowledged to be relational (Berryman et al., 2016). From a relational perspective, the contexts for learning are not seen as "things," but as sets of relations in a process (Hoskins & Jones, 2017). Within this view, the connections between people can be considered, nurtured, and protected (Suaalii-Sauni, 2017). Scholars have argued for a strengths-based conception of children (Rogoff et al., 2017), by understanding the conditions within which they thrive (Webber & Macfarlane, 2020). Expressions of culture in the Aotearoa context might include seeing relationality as a visible aspect of life (Hoskins & Jones, 2017; Suaalii-Sauni, 2017); child rearing as communal; and intergenerational relationships, teaching, and stories as central (Rameka et al., 2016). Valued practices might include oral literacies, such as parent–child reminiscing, intergenerational storytelling, and oral narratives (Neha et al., 2020; Schaughency et al., 2017). Thus, whānau (family and extended family) are experts on their children's learning, and oral language(s) and visual languages (e.g., images, carvings, woven imagery, gestures), as well as reading and writing, underpin these sociocultural conceptions of literacy practices and literacy learning.

Iterative process-led interventions

Drawing on understandings of adaptive expertise (Schwartz et al., 2005), process-led interventions investigate the applied issues of practice in education by engaging with practitioners at the intersection of research and practice. Early research (Bond & Dykstra, 1967/1997) found that the effectiveness of interventions was reliant on teachers' implementation, and the way that more effective teachers applied approaches that suited their learners. Design-based research focuses on developing practical theory and tools that support local efforts to solve problems of practice (Reinking & Bradley, 2008); it is an iterative, process-led approach to design and implementation that can inform decisions about design of instruction (McNaughton, 2011) as well as refinements and adjustments (Penuel et al., 2011). Educational science (Snow, 2015) acknowledges the combined strengths and challenges of different schools and communities in the design of instruction. Educational science approaches use codesign to develop and adjust instruction to specific educational challenges in specific contexts (McNaughton, 2011). Using the context as a feature in the theory incorporates the nature of the implementation, in addition to the design (Penuel et al., 2011). Such an investigation incorporates perspectives of stakeholders and collaboration at multiple levels since the interrelationships within and between each level (system, school, community, teacher, students) all affect the outcomes.

The present study was conceived as a collaboration between university-based researchers (Jesson and Liu) and the national network of Reading Recovery educators (represented here by Aitken). Collaborations between researchers and practitioners take several forms, including teacher action research (Cochran-Smith & Lytle, 2009), formative interventions (Engeström, 2011), and professional learning interventions (McNaughton & Lai, 2009). Partnerships that are collaborative include the realities of practice and of teacher learning, and a mutual commitment to ongoing learning. Alongside the

educational science employed to design instructional approaches, ongoing processes are required to make sure that instruction is refined, evaluated, and improved. Improvement science (Bryk et al., 2015) relies on understanding both the educational processes (e.g., time spent, instructional moves, engagement, or collaboration) and outcomes for the particular children served. Cycles of data collection, analysis, and feedback are used by all participants to refine instruction. Arguably, applied processes rely on the knowledge gleaned through experimental methods which develop a standard set of instructional routines, components, and protocols, rigorously tested for effects using experimental designs. In these experimental approaches, instructional routines are developed through well-controlled studies, and tested in the field, where the teaching tests the hypothesis that fidelity to the new teaching approach will be superior to business as usual. Such designs tightly control for possible variables, and implementation is standardized, so that the effect of context can be discounted (Thomas, 2016). Thus, the design-based approach is not about casting all experimental knowledge aside, but rather investigating how the knowledge from experimental studies plays out in a specific context, incorporated into the business as usual work of schools.

The design logic used in the refresh process relied on the expertise gained in Reading Recovery but sought to investigate the effects of varied teaching decisions, in the specific context. Given the complex network of interactions in application, implementation variation was to be expected; indeed, it operated as a design principle. Using this lens, the instruction itself was seen as the local application of a particular set of principles, or a shared theory (Pawson, 2006). The Early Literacy Support work, while context specific, drew explicitly from the expertise developed in Reading Recovery, potentially coalescing with other theories or approaches operating in schools through power-sharing conversations between teachers and whānau, and coteaching.

To think about how the expertise of Reading Recovery might be applied in context, we drew from sociocultural theory to consider the explanatory features of expertise in Reading Recovery that might be applicable in context. Specifically, we drew on Vygotsky's distinction between the "phenotypic" (descriptive), and the genotypic (explanatory) viewpoints, to theorize the features of the intervention that might seek its "causal dynamic basis" (Vygotsky, 1978, p. 62). Using this distinction, it became possible to distinguish between the forms that Reading Recovery takes, and the underlying mechanisms of teacher expertise that might be applied to the in-class group teaching context.

At the teaching level then, a core design principle was designing for the children concerned, using the texts and resources appropriate to the school context based on careful noticing of their areas of cultural, linguistic, and textual expertise. The classroom teacher, the whānau, and a literacy specialist teacher were all considered to be a part of a cooperative endeavor—supporting children's learning—with mutual accountability for the learning of the child, so that the amount of teaching expertise available to each learner was increased. Successful collaboration within school contexts included considering teacher characteristics and school or team contexts and processes so that the potential benefits were realized (Vangrieken et al., 2015).

In summary, the refresh approach taken was designed to enact the foundational notion that teaching and learning are social, cultural, and relational processes, playing out in mutually constitutive ways in different environments and contexts (Vygotsky, 1978). In this conception, literacy learning is the process of becoming increasingly more expert in participating in the literacy practices of the community, developed in contexts, with more expert others (Rogoff et al., 2003, 2017), who are themselves part of various learning contexts. Teaching was viewed as a relational exercise rooted in intersubjectivity, scaffolding learners' increasing participation and control over the task (Wood et al., 1976). Adaptive expertise (Schwartz et al., 2005) in teaching in Reading Recovery was seen as the development of strategies for noticing student learning, and the ability to respond with an appropriate teaching action through deliberately planned tasks, instructional focus, and responsive moment-by-moment adjustments (Clay, 2016; Sirinides & Gray, 2022). Using this conception, the principles of teaching learned in Reading Recovery were adapted to the shared teaching context of working with groups of children in classrooms.

Methodology

The present study employed a design-based research logic conceiving of the Reading Recovery teachers and the classroom teacher as the codesigners of instruction using the advice of whānau, so that both teachers might learn from each other, and the children would benefit from the knowledge of all. The main concern was to achieve a robust design that allowed for defensible decisions to be made for the specific needs of the group of students, while incorporating the pragmatic needs of teachers, classrooms, and the wider school context. After the initial development in Term 1, 2021, multiple iterations (7) over a series of school terms were undertaken, with continuous improvement and review, and refinements to the approach.

Participating Reading Recovery teachers and class teachers collaborated in context appropriate ways to design, plan, teach, and evaluate a series of lessons for a small group of children. The intended age range for the students was after their first 6 months of school. It was intended that intervening earlier, with a less intensive small-group intervention, might serve greater numbers of students and also identify children requiring individual support in Reading Recovery. Teachers worked together to design their shared assessment, planning, and teaching roles, using live Google docs as an aid to visible collaborative planning (see Appendix B). At the end of each term, participating teachers submitted their coplanning documents to the research team for review and analysis. In each subsequent term, webinars were held to present ongoing findings, provoke ongoing discussion, and problem solve difficulties. In each webinar, the quantitative analyses were presented first, followed by coplanner analyses. The presentations were focused on naming what seemed to be going well for teachers, and also where teachers were reporting difficulties, or where researchers noted silences (e.g., the contribution of families or class teachers in the planning was missing). As a result of each analysis, teachers, tutors (facilitators), and researchers discussed implications, possible refinements to the design, and iterative adjustments required based on teaching contexts.

Participants

Participants were a subgroup of teachers involved in the codesign. As part of a Ministry of Education-funded set of school supports, all Reading Recovery teachers and schools were able to participate in the work. Teachers were invited to participate in the research by allowing their data and coplanning to be analyzed for the study. School leaders were asked for permission to use the students' anonymized data to track the effects of the approach. Facilitators (tutors/teacher leaders) supported the work informally, using the commenting features in Google docs, or by including discussions of small-group teaching in group sessions, but were not considered participants in the research. In total, 65 teachers from 57 schools across the country volunteered to participate in the research by contributing their planning and assessment data (see Table 1).

Assessments

Typically, assessments for Reading Recovery include *An Observation Survey of Literacy Achievement* (Observation Survey; Clay, 2019), an early literacy test comprising six tasks (Word Reading, Word Writing, Letter Identification, Text Reading, Concepts About Print, and Dictation). It has been standardized to norms internationally (e.g., Holliman et al., 2010) and in New Zealand (Berg & Lawes, 2018; Clay, 2019). Construct validity, internal consistency, and test–retest reliability have been demonstrated (Holliman et al., 2010). The complete survey measures children's early literacy awareness (D'Agostino et al., 2018); however, for the purposes of codesigning the Early Literacy Support group implementa-

Table 1. Participants in Each Iteration

Term	Students	Schools	Teachers
2021 Term 2	28	7	8
2021 Term 3	53	16	17
2021 Term 4	13	6	6
2022 Term 1	102	27	29
2022 Term 2	154	43	45
2022 Term 3	166	45	47
2022 Term 4	111	32	33
TOTAL	**627**	**57**	**65**

tion, assessing larger numbers of children earlier in their schooling—with both Reading Recovery and classroom teachers using assessments that would be suitable for in-class use—it was not defensible to undertake the whole assessment with every child. Instead, items were selected on two bases: firstly, their importance for children in Year 1 of school, and therefore the ability to identify children not getting underway; and secondly, the ability to identify change. Teachers assessed the children at the beginning and end of the school term (in Week 1 and Week 10). The approach differed from using the assessments as a screening tool for intervention. Instead, the initial assessments were considered formative — helping teachers to design lessons targeted to the specific competencies of the group. Items selected therefore included both constrained (Letter Identification) and less constrained (Word Reading, Word Writing and Text Reading) tasks. Outcomes for the four repeated norm-referenced assessments in each term were shared with teachers to understand the effectiveness of the ongoing design compared with New Zealand norms and typical rates of progress.

Reading level was collected using teachers' assessment of children's Text Reading level (running records: Clay 2019). In Aotearoa New Zealand, text reading levels are available from many publishers, and from the Ministry of Education *Ready to Read* series of early readers.

Word reading was assessed using The Burt Word Reading Test, New Zealand Revision (Gilmore et al., 1981). The assessment consists of 110 words graded in increasing order of difficulty. This test is standardised for use in Aotearoa New Zealand. It is an individually administered test, which provides a measure of word recognition.

Word writing was assessed using the Writing Vocabulary subtest of the Observation Survey. The assessment asks children to write as many individual words as they can within 10 minutes.

Alphabet knowledge was assessed using the Letter Identification task from the Observation Survey. Children are asked whether they know letters (by either name, sound, or word).

Analyses

Two approaches were used to analyze the student achievement data. In the first instance, paired *t* tests were employed to evaluate the improvement in repeated measures (pre–post) over the course of each iteration of the design. Secondly, hierarchical linear modeling (HLM) was used to compare the outcomes across contexts with repeated measures. Two-level hierarchical models were specified. At Level 1, individual student-improvement patterns were modeled using the repeated measures and student demographic and initial levels to understand improvement patterns. At Level 2, the teaching group and the socioeconomic ranking (decile) of schools were introduced into the model, separately, and combined. All the analyses were processed in R software, from the R Foundation for Statistical Computing (http://www.R-project.org/).

Teachers' planners were analyzed each term using an inductive approach, through open, then axial, coding (Strauss & Corbin, 1990) within analysis categories. We theorized that the teachers' decision making would be apparent, at least partly, through the links between the evidence collected about the students from assessments and whānau conversations, the goals identified for the students, the nature of activities described, and the evaluative review of the coteaching. The analysis frame therefore consisted of six overarching analysis categories:

- The input from whānau about their children
- The goals identified for reading, writing, and oral language
- The nature of the texts selected
- The types of activities children were engaged in
- The nature of the evaluation and review
- The evidence of coplanning and coteaching

Within each of these codes, recurrent themes were sought within each iteration. These themes emerged as ongoing and iterative findings, which were presented and discussed each term with teachers, as a process of iterative codesign.

Iteration 1: The Initial Design

In the first instance, a Hui Whakaruruhau (sector advisory meeting) with educational academics and officials from across the country sought their impressions of Reading Recovery and their advice

for change. Based on that advice, the initial design was developed in consultation with the Reading Recovery facilitators (tutors/teacher leaders). A set of instructional principles was developed to support trained Reading Recovery teachers to transfer their expertise, to begin working within classrooms with small groups of children in their first year of school—intervening earlier before any need for Reading Recovery—and shifting to a more ecological approach by working closely with class teachers and whānau. Initially, using one of the 30-minute slots traditionally dedicated to an individual, small groups of children would be taught for 30 minutes each day, inside the classroom, collaborating with teachers. Literacy lessons would include oral language (talking, thinking), reading, and writing. The initial week of the term was set aside for assessment and getting to know the children and seeking advice from whānau. A midpoint review opportunity was advocated to seek feedback from whānau, and the final week of a term was designated for review, reflection, and evaluation, including from whānau. Materials developed included a planning format (a coplanner, see Appendix B) to support Reading Recovery teachers and classroom teachers to collaborate by providing an impetus for conversation and a place to record, and an assessment collection spreadsheet. The initial design was based on the hypothesis that trained Reading Recovery teachers' expertise would successfully transfer to working in classrooms with teachers, supporting the teaching of a small group based on relationships that sought and heeded whānau advice.

The processes of analysis, review, and refinement over successive iterations became the processes for the refresh, with more schools and teachers joining as the design process unfolded. Each term, student achievement data and teacher planning data formed the basis for a "sense-making" or feedback session (online), with successes highlighted and focus areas identified (see Table 2). Over successive iterations of Early Literacy Support group teaching, areas of focus included group size; using instructional strategies designed for groups; coplanning and coteaching (cooperative teaching, negotiation, conflict, power sharing); effective teaching practices; responsive teaching; text selections and adjustments; whānau involvement; feedback; and ongoing communication. Using the online sessions as impetus, teachers and tutors were asked to engage in problem-solving and solution-seeking conversations together to find ways that worked for teachers, while simultaneously being uncompromising about the need for student progress.

Qualitative Findings

The first round of analysis revealed that several key understandings did indeed transfer from Reading Recovery practice. In particular, the multicomponential aspect of Reading Recovery was retained, with teachers' lessons including time for repeated reading of familiar texts, reading of texts, composing and encoding of stories, as well as word- and sub-word-level teaching foci linking reading and writing within the 30-minute lessons. However, there were also challenges for teachers. Table 2 provides a summary of the iterative findings of the analyses of coplanners each term, and the focus of the feedback sessions to teachers and their tutors. That summary identifies the focus from the point of view of the researchers. In practice, tutors' and teachers' experiences were much less linear, with some teachers having early successes in different areas and finding different aspects difficult, depending on context.

In early iterations, the most pressing challenges to engage with from a design perspective were instructional: to understand which teaching procedures from Reading Recovery could or should be productively employed with groups of approximately three children. It quickly became clear that some of the procedures designed for working one-on-one with children were difficult to implement as group procedures. Moreover, some of the individual procedures were identified as posing a risk to progress, particularly if the rest of the group was spending time waiting or watching while teachers focused on one child at a time. Thus, initial conversations centered on manageable group size and the use of teaching approaches that kept all students gainfully engaged for as much of the teaching time as possible, rather than waiting for turns with teachers.

While instructional challenges seemed to be pressing, but relatively solvable, multiple more persistent challenges for teachers were implementational or relational — including time for collaboration, organizational coordination, coherence between teachers, and variation in child progress. In each iteration, more thought was required about the processes for inducting

Table 2. Iterative Qualitative Findings and Subsequent Refinements Over Time

Iteration	Successful Transfer (What Went Well?)	Challenges Identified (What Did Teachers Find Difficult)?	Revision to Design for the Next Iteration (What We Decided to Work On)
1. Webinar and discussions Term 3, 2021	Multicomponent teaching approach (fluency, reading, writing, word, and letter work.) Shared principles: Responsive to children, responsive to context.	Individual teaching procedures meant that children were spending time waiting. Working in the classroom or modern learning environment alongside the class teacher—time, organization, management, noise.	1. Explicit advice to use group teaching approaches rather than teaching procedures designed for individuals. 2. Inclusion of "set-up" organizational conversation between teachers, team leaders, and tutors.
2. Webinar and discussions Term 4, 2021	Incorporation of range of instructional approaches. Meeting with whānau, and recording children's interests and strengths, getting to know children.	Feedback that the design was not clear. New teachers: Teachers unsure of how to start and "what to do."	3. Development of training resources—underpinning principles and explicitly naming aspects of expertise expected to "transfer." 4. Explicit advice to "add" Reading Recovery teacher to an existing relationship with classroom teacher (rather than try to begin a new relationship.)
3. Webinar and discussions Term 1, 2022	Acknowledgment of students' interests and strengths in planning. Inclusion of talking, thinking, reading, and writing in all lessons.	Teachers reporting families not responding to email, teachers too busy to coplan. Planning for talking/thinking.	5. Exploring nontraditional ways to maintaining close communications with whānau. 6. Exploring multimodal and oral literacies.
4. Webinar and discussions Term 2, 2022	Inclusion of multiple series of texts in planning. Links to classroom programmes.	Ongoing organizational challenges for coplanning, coteaching, and coevaluation.	7. Focus on engaging team and school leaders in planning conversations and on shared problem solving to codesign solutions to creating space and bringing teachers closer for benefit of students.
5. Webinar and discussions Term 3, 2022	Flexibility and relationships, working together in schools.	Systematic provision for tiers of support (identification, monitoring, tracking, follow up).	8. Inclusion of a framework for levels of coteaching: (codesign, coplanning, coteaching). 9. Developing literacy leadership conversation frameworks.
6. Webinar and discussions Term 4, 2022	Development of ongoing solutions for collaboration.	Ongoing coherence in schoolwide planning.	10. Inclusion of literacy leadership conversations in role of tutor in schools—class programmes, provision of support, coordination of staffing.

new teachers and developing "set-up" conversations that would promote productive collaboration and a shared focus on the children. After the second iteration, tutors began to advise schools to engage in explicit conversations about setting up Early Literacy Support groups for success and prethinking organizational solutions that would work in the context (time, absenteeism, interruptions, noise, roving to support the rest of the class). In particular, the coteaching aspect of the approach required further consideration, and preplanning meetings between school teams were developed to negotiate protocols and organizational routines that meant teachers were able to benefit from each other's expertise. In later iterations, conversations moved toward embedding the approach as a purposeful part of schoolwide planning for comprehensive student support in early literacy (see Table 2).

The shift to thinking more ecologically about the child required an explicit and ongoing series of messages about seeking, valuing, and honoring whānau knowledge of their children and home literacy practices; acknowledging family literacies, including oral literacies; and planning to reflect that whānau input. In some contexts, it became apparent that letters or emails had been the predominant way of contacting families, and that these traditional unidirectional communication methods did not support ecological thinking and relational ways of teaching children as members of their whānau. More successfully, teachers reported face-to-face meetings, advice seeking, and informal, ongoing messages or interactions before and after school (at pick-up and drop-off times), through texts or online platforms. With each iteration, conversations were developed about how a Reading Recovery teacher might join the classroom teacher's existing relationships with whānau, how to maintain their ongoing communication, and how the two teachers would incorporate the advice from whānau, so that from the whānau point of view, participation in the planning conversations would be worth the effort.

Quantitative Results

The raw score pre–post outcomes for each of the repeated seven iterations of the co-design process are presented in Table 3. The outcomes show medium-to-large pre–post effect sizes for all measures, which varied somewhat by term, with progress slightly less marked in the final term of the calendar years, but relatively stable over time.

In Aotearoa New Zealand, 2021 and 2022 were COVID-affected schooling years. In 2021, portions of the country were affected by lockdowns; in addition, during 2022, the country opened its borders and large numbers of people were affected by illness. Our analysis of effects was therefore compromised by larger than optimal numbers of missing data. To check that our analysis was not biased by underreporting of students with incomplete data, we identified all the children with incomplete data to test for a systematic difference between them and the tracked children. Table 4 (on page 66) shows the pre–post outcomes, taking the worst case scenario of no gain in the measures for students with incomplete data.

Based on initial regression results (comparing the difference between the gains with the start score), for all measurements, the improvement was significant. Also, for all measurements, the improvement had a significant relationship with start score. However, the sign of slope of start score depended on measurement. For alphabet knowledge, the relationship was negative, indicating that students with higher starting levels made less improvement. This stands to reason, given that many children reached ceiling or near ceiling levels on this constrained assessment. For the less constrained assessments, Word Reading and Writing Vocabulary, the association was positive, indicating that students with higher starting levels made greater gains. The initial regression results indicated an effect of number of lessons received. Most students received between 7 and 9 weeks of lessons a term, depending on the length of the school term. Within that window, teachers recorded the number of lessons students received. Fewer lessons received might indicate an absent child, absent teacher, or teaching time being diverted to other school or teaching tasks (interruptions, events, teacher relief). The number of lessons students received had a positive significant relationship with gains on all measures (p value < 0.000 for all five measurements, see Appendix A).

Initial regression results also indicated interactions between gains and demographic variables, with some significant positive associations between some measures and gender or ethnicity. For reading level outcomes, students of Other ethnicities (African, Latin American,

Middle Eastern, South African, Russian) and NZ European children made more improvement than Asian, Pacific, and Māori children if other factors were kept the same. To investigate these interactions, we reviewed the distribution of these variables. Demographic variables were not distributed evenly across our participating teachers and schools. Contextually, Māori and Pacific children were overrepresented in schools serving areas of economic hardship, and therefore not distributed evenly within teaching groups.

We conducted two hierarchical linear models to understand the variability associated with school economic status (decile), teaching groups (teacher), and between individual children. Based on the decile analysis, approximately 7% of the overall variance (ICC = 7.2) of improvement in Text Reading level could be attributed to differences between school economic status; and 11.6% could be explained by a combination of starting score, number of lessons, age, and ethnicity. When we added teacher as a variable, 17% of the variance (ICC = 17.3%) in reading level outcomes could be explained at the teacher (or teaching-group) level. The

Table 3. Paired *t* Test for Pre–Post Measures of Early Literacy Support Across Seven Iterations

Measurement	Term	*N*	Start of Term	End of Term	Mean Gain	*SD* Gain	*t* Statistics	*p* Value	*d*	sig
Reading Level (> = 1)	2021 T2	32	3.19	6.50	3.31	1.51	12.39	1.52E-13	2.19	***
	2021 T3	57	3.28	7.23	3.95	2.01	14.80	5.20E-21	1.96	***
	2020 T4	20	4.85	8.10	3.25	1.92	7.59	3.66E-07	1.70	***
	2022 T1	107	2.85	6.38	3.53	1.82	20.09	6.22E-38	1.94	***
	2022 T2	150	2.90	7.31	4.41	2.57	20.98	2.53E-46	1.71	***
	2022 T3	164	3.51	7.43	3.92	2.40	20.91	5.20E-48	1.63	***
	2022 T4	114	3.28	6.63	3.35	4.30	8.32	2.32E-13	0.78	***
Letter Identification (0–54)	2021 T2	35	32.40	47.11	14.71	10.25	8.49	6.43E-10	1.44	***
	2021 T3	64	37.39	47.52	10.13	7.33	11.05	2.18E-16	1.38	***
	2020 T4	20	45.20	50.30	5.10	5.85	3.90	9.63E-04	0.87	***
	2022 T1	112	37.34	47.30	9.95	10.24	10.29	7.51E-18	0.97	***
	2022 T2	158	35.51	47.37	11.86	10.65	14.00	2.09E-29	1.11	***
	2022 T3	172	39.08	48.63	9.56	8.56	14.64	5.49E-32	1.12	***
	2022 T4	113	40.55	48.11	7.56	7.46	10.76	5.57E-19	1.01	***
Burt Word Reading (0–110)	2021 T2	35	4.57	13.40	8.83	4.65	11.24	5.45E-13	1.90	***
	2021 T3	64	5.34	13.50	8.16	5.17	12.73	6.35E-19	1.58	***
	2020 T4	19	7.74	14.84	7.11	5.50	5.64	2.40E-05	1.29	***
	2022 T1	113	5.88	13.74	7.86	5.04	16.59	6.01E-32	1.56	***
	2022 T2	158	5.95	14.73	8.79	5.34	20.68	1.14E-46	1.65	***
	2022 T3	171	7.09	15.30	8.21	5.06	21.19	1.42E-49	1.62	***
	2022 T4	113	7.43	13.65	6.22	8.21	8.06	9.36E-13	0.76	***
Writing Vocabulary (> = 0)	2021 T2	35	7.54	22.69	15.14	7.42	12.07	7.62E-14	2.04	***
	2021 T3	60	10.90	27.45	16.55	10.15	12.63	1.99E-18	1.63	***
	2020 T4	19	15.58	29.26	13.68	9.59	6.22	7.18E-06	1.43	***
	2022 T1	113	8.98	27.61	18.63	9.40	21.06	9.53E-41	1.98	***
	2022 T2	159	11.49	28.75	17.26	10.97	19.84	9.35E-45	1.57	***
	2022 T3	172	13.41	29.84	16.43	10.82	19.91	2.07E-46	1.52	***
	2022 T4	111	12.76	25.53	12.78	9.65	13.94	4.62E-26	1.32	***

Table 4. Estimated Outcomes Assuming No Gain for Students With Incomplete Data

Measurement	Term	*N*	Start of Term	End of Term	Mean Gain	SD Gain	*t* Statistics	*p* Value	*d*	sig
Reading Level (> = 1)	2021 T2	37	3.68	6.54	2.87	1.81	9.61	1.77E-11	1.58	***
	2021 T3	80	3.23	6.04	2.81	2.47	10.18	4.97E-16	1.14	***
	2020 T4	20	4.85	8.10	3.25	1.92	7.59	3.66E-07	1.70	***
	2022 T1	136	2.90	5.68	2.78	2.17	14.94	2.12E-30	1.28	***
	2022 T2	177	2.73	6.46	3.73	2.85	17.43	3.65E-40	1.31	***
	2022 T3	177	3.44	7.07	3.63	2.53	19.12	8.10E-13	1.44	***
	2022 T4	126	3.22	6.25	3.03	4.21	8.09	4.51E-13	0.72	***
Letter Identification (0–54)	2021 T2	40	33.35	46.23	12.88	10.77	7.56	3.65E-09	1.20	***
	2021 T3	84	36.39	44.11	7.71	7.72	9.16	3.14E-14	1.00	***
	2020 T4	20	45.20	50.30	5.10	5.85	3.90	9.63E-04	0.87	***
	2022 T1	139	36.08	44.11	8.03	10.00	9.46	1.10E-16	0.80	***
	2022 T2	183	35.16	45.40	10.24	10.70	12.94	1.40E-27	0.96	***
	2022 T3	181	38.86	47.95	9.08	8.60	14.21	3.30E-31	1.06	***
	2022 T4	129	40.30	46.92	6.62	7.42	10.14	4.30E-18	0.89	***
Burt Word Reading (0–110)	2021 T2	40	5.30	13.03	7.73	5.25	9.30	1.91E-11	1.47	***
	2021 T3	84	5.66	11.87	6.21	5.70	10.00	6.67E-16	1.09	***
	2020 T4	20	8.95	15.70	6.75	5.58	5.41	3.22E-05	1.21	***
	2022 T1	143	5.50	11.71	6.21	5.51	13.49	3.26E-27	1.13	***
	2022 T2	183	5.48	13.07	7.59	5.81	17.66	2.60E-41	1.31	***
	2022 T3	181	6.95	14.70	7.75	5.27	19.80	4.72E-47	1.47	***
	2022 T4	129	7.49	12.94	5.45	7.95	7.79	2.05E-12	0.69	***
Writing Vocabulary (> = 0)	2021 T2	36	7.53	22.25	24.72	7.74	11.42	2.37E-13	1.90	***
	2021 T3	84	10.27	22.10	11.82	11.39	9.51	6.21E-15	1.04	***
	2020 T4	20	17.05	30.05	13.00	9.82	5.92	1.06E-05	1.32	***
	2022 T1	143	8.27	22.99	14.72	11.30	15.58	1.55E-32	1.30	***
	2022 T2	182	10.91	25.98	15.08	11.75	17.31	3.04E-40	1.28	***
	2022 T3	180	13.16	28.86	15.70	11.11	18.96	1.11E-44	1.41	***
	2022 T4	129	13.76	24.75	10.99	9.99	12.50	6.48E-24	1.10	***

percentage explained by teachers within deciles was 17.4%, indicating substantial variability between teachers, even within the same school social-index band. In these analyses, only the Other students' progress was significantly different among ethnicities (see Appendix A). The 33 children in our database listed as Other included 20 children new to English (becoming bilingual speakers of English).

For Writing Vocabulary, analyses indicated that girls made more improvement than boys if other factors were kept the same. This difference in gender remained significant after teacher as a random effect, and after decile. For writing, about 8% of the overall variance of improvement could be attributed to differences between deciles (ICC = 7.6); 28% could be attributed to differences between teachers (ICC = 28.1%). Numbers of lessons, age, and gender, combined, accounted for 13.9% of the variance.

To ascertain the effects of the group work compared with the previous trajectory, we compared baseline achievement using both mean initial scores and the initial regression line, with gains made by children of each age group over the course of the series of lessons. This analysis

assumes that given no intervention, the baseline condition would have prevailed. In Figures 1 and 2 students' pre–post achievement scores over the term are presented as visual comparisons with initial baseline levels and the baseline regression line. In both Text Reading Level and Word Reading, marked changes are observable between the baseline trajectory and the end-of-term outcomes across the age ranges (counted in months, e.g., 72 months = 6 years old).

Discussion

As part of a process of refresh in the Reading Recovery teacher's role, the present study sought to understand the ways that the teacher expertise developed in Reading Recovery might be purposefully employed to support more students in classrooms, promoting greater reach of the service to children, and greater coherence within schools (Appleton-Dyer, et al., 2019). Our data indicate that transferring teaching expertise to different contexts can realize the potential of having Reading Recovery-trained teachers, and that gains for children were achievable early in the series of iterations, with relatively little additional instructional advice to teachers, and these remained relatively consistent over time. Teacher expertise in Reading Recovery has been conceived as instructional strength, a combination of deliberateness, dexterity, and disposition (Sirinides & Gray, 2022). In that conceptualization of instructional strength, *deliberateness* is understood as the commitment to planned and reflective practice

Figure 1. Students' Text Reading Level Gains Compared With Baseline Mean and Regression Line

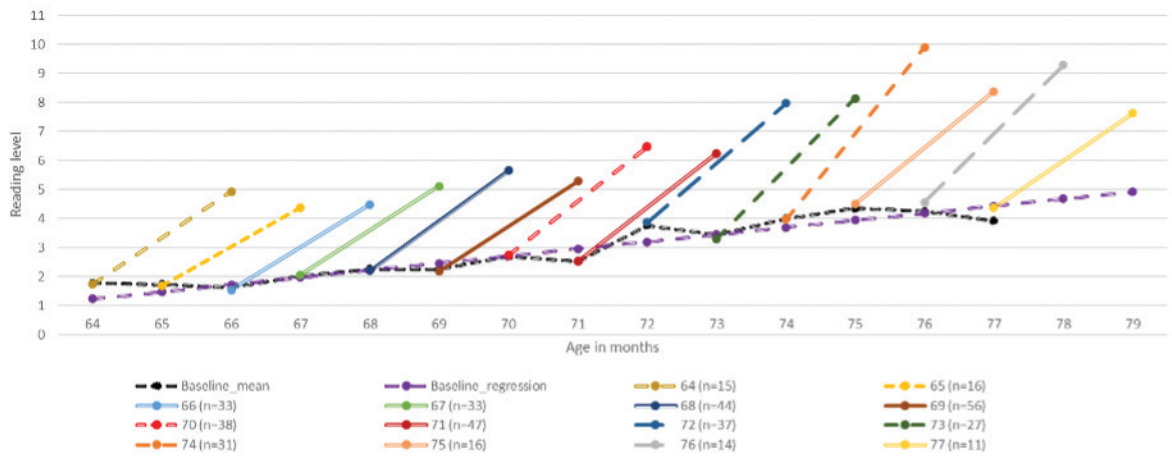
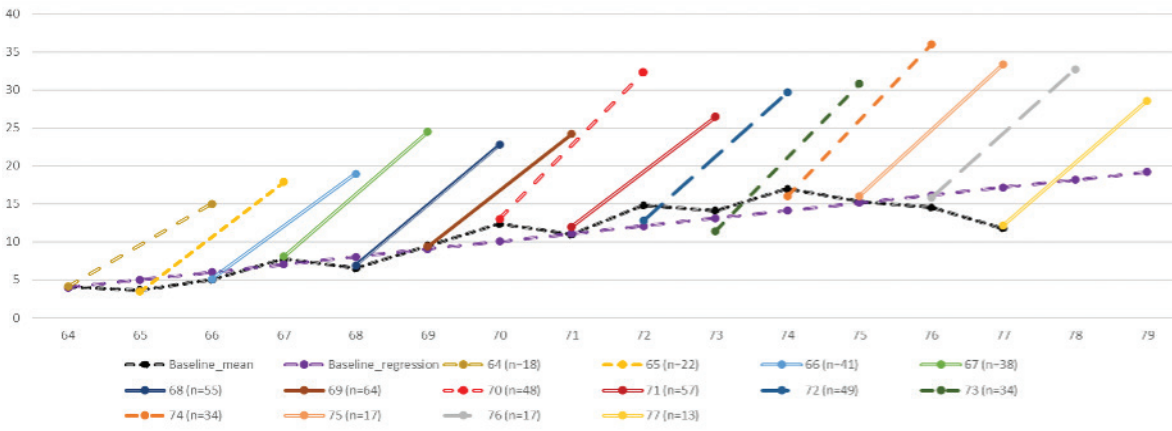


Figure 2. Students' Word Writing Gains Compared With Baseline Mean and Regression Line



before and after lessons; instructional *dexterity* is conceived as flexible responsive practice within a lesson, and *disposition* is conceived as a set of inclinations that include high expectations for student learning, a talent for teaching, a belief in the ability of all students, a sense of urgency, and a strong work ethic (Sirinides & Gray, 2022); all of which seem to describe genotypical features likely to transfer across contexts to the teaching of groups of children. The findings of our analyses of outcomes suggest that extending the role of the teacher to designing instruction for groups might be a viable approach to extending the instructional strength developed by trained Reading Recovery teachers in their work with individuals. Potentially also, some of the observed effects might come not from the knowledge of Reading Recovery, but knowledge contributed by class teachers, schoolwide approaches or whānau conversation. However, in implementing the design-based approach, ongoing conversations after the early iterations quickly turned to implementation rather than instructional issues.

Contribution to schools

The second potential explored was for greater coherence within a school, which emerged as requiring more intentional advice and contextual problem solving. Successful implementation of Reading Recovery at the school level depends on integration into the school community and endorsement by leaders (May et al., 2016). Through ongoing conversations and teaching for peers, Reading Recovery teachers participate in a community of practice by sharing their teaching and seeking and responding to feedback around issues of practice. In the present study, the notion of expertise based on a repertoire of skills was extended to include working directly alongside classroom teachers, in classrooms.

Qualitative findings suggested a role for ongoing, deliberate, and explicit conversations to enact this process of collaborative teaching so that business as usual within a school draws from the interventions within that context. Through the process, it was apparent that enabling shared planning and teaching with classroom teachers and whānau was the hardest aspect of the design to achieve well, requiring intentional and additional support, in ways that the instructional aspects of the design did not. Arguably, however, it is worth the effort, since contribution to system strength for children would benefit the relationships between all the systems within which children learn (Bronfenbrenner, 1979), and would enable shared and close attention to all teaching that supports them via conversations about planning, responding, areas of focus, and high expectations for them (Sirinides & Gray, 2022).

Teacher/teaching group variability

In the outcomes for children, a large proportion of the variability could be explained at the teacher level, which in our study operated at the interactions between the group of students, the two teachers' collaboration, and the whānau advice. Design-based research and development approaches to school change have been described as facing the conundrum of how to deal with variability: "…in instructional design, in learning, and in achievement outcomes. We have a love/hate relationship with variability" (McNaughton, 2021, p 1). Variability operates at multiple levels in any intervention. Given the variability in children and context, as expressed in our outcome data, variability in instructional design is expected. The question is how to make sure that the instructional response to variability is positive for children's learning outcomes, such that teachers continue to make more effective decisions based on close attention to students' progress and high expectations of pace and success.

Variability in student outcome is a known feature of the Aotearoa New Zealand education system (Ministry of Education, 2019). There is also evidence that teacher expectations based on students' achievement levels can affect the instruction that students receive (Rubie-Davies et al., 2020). Differences in instruction based on students' starting achievement are understandable. Potentially, however, a negative cycle of constrained opportunities to learn, which are based on low expectations, which are in turn based on starting point and stereotypes, also impact students' expectations of themselves (Rubie-Davies et al., 2020). The cycle has been identified and described as "rational but troubling" (Berliner, 2011, p. 289). In line with this theorizing, the present study identified no differences between groups in their outcomes in the constrained skills, or in Word Reading, but some differences between groups in less constrained measures of Text Reading levels and Word Writing. We identified skewed distributions of ethnicity in teaching

groups, and variability in outcomes based on the school economic-index level and at the level of the teacher. This analysis suggested that boys' progress in word writing was, on average, slightly lower, but that progress on reading levels did not systematically vary as a function of children's demographic variables; instead, they could be explained at the teaching-group level (by either or both school decile and teacher).

Thus, teaching variability remains an implementation issue, given the dual policy desires of careful explicit attention to foundational skills while maintaining progress at pace. In the present study, the process of codesign allowed explicit and reflective conversations about how teachers were enacting or expressing integrity to the design principles, based on instructional strength. During design conversations, facilitation and feedback about underpinning principles were ongoing features. Average effects were high, but using this approach, teacher decision making becomes crucial for effectiveness, and variability in outcomes becomes both a boon (when teaching results in rapid progress) and a risk (when progress slows).

The findings have implications for the work of Reading Recovery facilitators (tutors/teacher leaders). Firstly, it seems likely that ongoing reflection, critique, and self-improvement (Bryk et al., 2015) are needed in the embedded design of Early Literacy Support group teaching, in similar ways to the processes for trained Reading Recovery teachers (International Reading Recovery Trainers Organization, 2006), such that what is "tight" and what might be more "loose" (Trask & Cowie, 2022) is explored explicitly, to make visible the processes that underpin acceleration, and also the processes that might constrain opportunities to learn. Secondly, it was not enough, in our study, to give advice to teachers to codesign, coplan, and coteach. Instead, explicit set-up conversations with school teams and school leaders were necessary, so that teachers were able to work productively together to achieve supportive and collaborative working relationships. Again, ongoing sharing of successful practices, systems, and routines needed to be context specific and designed collaboratively so that the Reading Recovery teacher's role was seen as part of the early learning ecology within a school, rather than a parallel or separate intervention.

Limitations and Future Directions

Given the size of this study, there are several limitations that should be considered to help guide future research. Because the refresh approach was designed in response to policy advice (Appleton-Dyer et al, 2019), all schools offering Reading Recovery were entitled to participate in the refresh if they chose, and therefore we were not able to employ a waiting-group design. Instead, we employed a quasiexperimental analysis for this study, comparing effects against the baseline condition, rather than a control group. HLM analyses were conducted to understand the variables that may have contributed to the results, however further variables need to be understood within this design. Ideally, to understand the role of teacher variability, given school-level socioeconomic differences, greater analysis power is needed to tease out the variability at the teacher level within a school. Integrity measures would therefore be required at two levels. At the level of instruction, it would be necessary to understand whether and how the design principles are expressed. At the level of implementation, it would be necessary to understand the additional contribution of engaging with whānau and of working together as a coherent school team.

Conclusion

The findings suggest that, overall, extending teacher expertise beyond the Reading Recovery intervention to working with groups of children, with their teachers, in their classrooms, with close relationships with whānau might be a viable way to achieve two related outcomes: (a) deliberately reaching more students, earlier, and (b) cohering more closely with business-as-usual decision making, planning, and support inside school systems.

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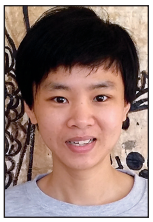
About the Authors

Dr. Rebecca Jesson is associate professor at the University of Auckland. Her research involves leading design based research processes that result in literacy improvement for schools seeking to address disparity of outcomes in literacy. Rebecca's focus is on partnership between research and practice. Her studies use evidence to support school groups to develop strategic direction for professional learning and school change.

Judy Aitken holds the position of professional lead for Reading Recovery and Early Literacy Support at Tui Tuia | Learning Circle which is affiliated with the University of Auckland. Judy has considerable experience in early literacy intervention, having trained as a facilitator (tutor/teacher-leader) in 1991 and as a trainer in 2014. Her past research focused on understanding how instructional decision making by classroom teachers influences early processing effectively.



Dr. Yu is an experienced data analyst with a solid background in statistics, math, and financial engineering. She worked at Woolf Fisher Research Centre at the University of Auckland for almost 5 years, having contributed to an educational research study aiming to improve student achievement outcomes for over 100 schools in areas with low socioeconomic status. Apart from education, she also has data analysis experience across industries, including banking, retailing, and financial investment.

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Appendix A: Regression and Heirarchical Linear Model (HLM) Outcomes Tables

Table A1. Regression Outcomes for Alphabet Knowledge

Alphabet Knowledge	Estimate	Std Error	*t* Value	*p* Value	sig
(Intercept)	38.98	2.607	11.884	0.000	***
Start Score	-0.522	0.015	-33.70	0.000	***
Number Lessons	0.162	0.025	6.476	0.000	***
Age	-0.085	0.037	-2.306	0.021	**

Table A2. Regression Outcomes for Word Reading

Burt (NZCER)	Estimate	Std Error	*t* Value	*p* Value	sig
(Intercept)	1.892	0.883	2.144	0.032	**
Start Score	0.102	0.033	3.062	0.002	***
Number Lessons	0.183	0.027	6.721	0.000	***

Table A3. Regression Outcomes for Writing Vocabulary

Burt (NZCER)	Estimate	Std Error	*t* Value	*p* Value	sig
(Intercept)	-11.832	5.44	-2.18	0.030	**
Start Score	0.13	0.04	3.412	0.001	***
Number Lessons	0.35	0.05	7.382	0.000	***
Age	0.24	0.08	3.170	0.002	***
Gender Male	-1.73	0.80	-2.165	0.031	**

Table A4. Heirarchical Linear Model Outcomes for Reading Level Variation by Deciles

Baseline (Māori)	Estimate	Std Error	*DF*	*t* Value	*p* Value	sig
(Intercept)	-2.68	1.51	559.14	-1.77	0.08	
Start Score	0.16	0.04	576.98	3.84	0.00	***
Number Lessons	0.06	0.01	567.77	4.39	0.00	***
Age	0.05	0.02	576.98	2.58	0.01	**
Ethnicity Pasifika	0.32	0.42	575.81	0.75	0.45	
Ethnicity Asian	0.12	0.45	574.74	0.27	0.78	
Ethnicity Other	1.34	0.51	576.93	2.63	0.01	***
Ethnicity NZ European	0.45	0.27	564.81	1.66	0.10	

Table A5. Heirarchical Linear Model Outcomes for Reading Level Variation by Teacher/Teaching Group

Baseline (Māori)	Estimate	Std Error	*DF*	*t* Value	*p* Value	sig
(Intercept)	-2.65	1.65	424.01	-1.61	0.11	
Start Score	0.15	0.05	470.31	3.32	0.00	***
Number Lessons	0.05	0.01	561.81	3.96	0.00	***
Age	0.06	0.02	441.51	2.51	0.01	**
Ethnicity Pasifika	0.18	0.44	535.54	0.42	0.68	
Ethnicity Asian	0.17	0.45	576.60	0.38	0.71	
Ethnicity Other	1.40	0.51	576.05	2.73	0.01	***
Ethnicity NZ European	0.35	0.27	557.75	1.31	0.19	

Appendix B: Sample Coplanner

Class teacher:	Date:

WEEK ONE: IDENTIFICATION AND INITIAL ASSESSMENT

Consultation with whānau
In this box record whānau comments and advice about their children

Summary of the students
In this box write a summary of the students' strengths on text, with words and with letters, for reading AND writing

WEEK ONE: INITIAL CO-PLANNING MEETING

Progress goals: By the end of the series of lessons, the students will need to know how to:

	Group Reading Goals	Group Writing Goals
Stories and language		
Words		
Letters and sounds		

Notes about selection of topics and texts
In this box please record discussions about the sorts of tets you are going to select for these students and why.

Supported by in-class practice through (links to other parts of wider literacy programme — e.g., buddy reading)

Communication with whānau:

WEEKLY PLANNING (repeated each week)

	Talking and thinking	Reading	Writing
Week 2			
	Co-review notes:		

WEEK 5 MID-TERM CO-REVIEW

Date: Talking and thinking Reading Writing Feedback from whānau

WEEKLY PLANNING (repeated each week)

	Talking and thinking	Reading	Writing
Week 6			
	Co-review notes:		
	WEEK 10: Co-review notes and evaluation for the end of term (expand the box as required)		

THANK YOU for your insights about these children and your contribution to their emerging literate identities.

Ngā mihi nui ki a kōrua/ koutou.