A pilot study exploring the effectiveness of a whole-school intervention targeting receptive vocabulary in the early years: Findings from a mixed method study involving students as part of a practice-based research placement.

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Abstract

Studies that have examined whole-school interventions that target conceptual knowledge, reveal characteristics that are important in the delivery of a deep processing approach to word learning. These consist of explicit instruction, play, and multi-sensory experiences that are situated within and repeated across varied contexts (Marulis & Neuman, 2010; Steele, 2011). Word Aware (WA) is an example of a vocabulary intervention that incorporates such features (Parsons & Branagan, 2016). This study examined the effectiveness of the Early Years version of the WA programme in supporting the development of vocabulary knowledge in a sample of 92 children comparing them to a control group of 31 children who received usual teaching. Student speech and language therapists supported the testing and delivery of a 10-week intervention as part of their clinical placement and were interviewed along with the teachers on their perceptions of the intervention and their experiences collaborating with staff to support the whole school delivery of the programme. Informal and standardised assessment scores of receptive vocabulary showed no significant difference in the overall improvement between both groups despite finding significant improvement within each group on words targeted for intervention. Qualitative thematic analysis revealed positive observations of child engagement with aspects of the programme that aimed to promote a deep processing of word meaning. Students reported an increased sense of confidence in their ability to collaborate with teaching staff and in their willingness to engage in research as part of their clinical practice. The ceiling effects reported in the outcome measures of both the intervention and control group, suggests that the WA programme may be better suited to a sample of younger-aged children. The study provides original insight into the student experience of working in a whole-class environment whilst conducting practice-based research as part of clinical placement. The methodological limitations of this study are discussed along with suggestions for future research.

During the early years of a child's life and accounting for individual variance, typically developing children are expected to demonstrate significant growth in word knowledge. This, in turn, supports the development of language and literacy throughout the school years (Roulstone et al., 2011). Effective vocabulary intervention is, therefore, an important component of education in the early years, and research has highlighted the benefits that specific components of vocabulary intervention can have on oral language. These components include a whole class approach to vocabulary learning that consists of a combination of explicit and implicit instruction (Marulis and Neuman, 2010). The Word Aware intervention program is an example of such an approach that is yet to be explored in comparison to a control group of children receiving typical teaching instruction.

Vocabulary breadth (number of words known) and depth (how much children know about these words) are considered valuable developmental tools for academic progress (Hadley et al., 2018), with evidence highlighting vocabulary as an important predictor of language and reading comprehension (e.g., see Cain et al., 2001). Yet not all children enter formal schooling with sufficient language and vocabulary abilities (Roulstone et al., 2011). For example, children from lower socio-economic backgrounds have been reported as displaying vocabulary that is considered to be significantly less diverse in comparison to their peers and this has been attributable partly to parental language input (Hart and Risley, 1992; Hoff, 2003).

Vocabulary depth provides scope for development in literacy due to the wealth of rich contextual information about words that are stored in semantic memory and which aid the processes of word retention and retrieval (Anderson and Freebody, 1985; Bowne et al., 2016). This contextual information can include the perceptual and functional properties of referents that are shared amongst those situated within the same conceptual neighbourhood, and this information can aid the learning of novel words through a process of spreading activation (Booth, 2009; Hadley et al., 2018; Neuman et al., 2011). Spreading activation is a term used to describe the activation and inhibition of nodes that connect related concepts that are stored within semantic memory. These connecting nodes are activated in response to the exposure of perceptual features of referents that match the semantic information stored in memory, which in turn, enables successful word retrieval (Booth, 2009; Hadley et al., 2018; Neuman et al., 2011). To facilitate a deeper processing of vocabulary, children should ideally be exposed to words and their conceptual components repeatedly (Beck and McKeown, 2007). This is to ensure that the semantic features of the word are slowly mapped onto any accompanied phonological and morphological aspects of the word over time (Hadley et al., 2018; Perfetti, 2007). The process of slow mapping provides an elaborative and meaningful exposure to words that strengthens the semantic information of such concepts and any connecting nodes within the semantic network. This process involves repeated exposure accompanied by explicit instruction that is embedded across multiple contexts to facilitate word retrieval (Hadley et al., 2018; Neuman et al., 2011; Steele and Mills, 2011).

Teaching strategies that incorporate explicit instruction can include defining words to learners in an accessible manner, asking challenging open-ended questions, encouraging learners to provide definitions of words, and embedding words in examples and experiences that are familiar to the learner (Hong and Diamond, 2012; Steele and Mills, 2011). There are many examples of explicit instruction incorporated into vocabulary interventions that promote shared reading within the classroom (Kelley et al., 2015; Neuman et al., 2011; Noble et al., 2020; Pollard-Durodala et al., 2011).

Explicit instruction results in a significantly greater improvement in vocabulary compared to implicit instruction; with the latter consisting of independent playful exploration that aligns itself to a Piagetian constructivist approach to learning (Hong and Diamond, 2012; Marulis and Neuman, 2010). Although, the detection of improvement is dependent on the sensitivity of the outcome measures used, as informal measures of target vocabulary are more likely to result in word learning compared to the use of formal distal measures (Haley et al., 2017; Peters-Sanders, 2020; Pollard-Durodala et al., 2011). Where explicit instruction occurs within the contexts of physically active play, children show significantly more growth in vocabulary compared to conditions that offer explicit instruction without this added component (Han et al., 2010). This study acknowledges the importance of play in providing a spontaneous and fun context for vocabulary exploration that can enhance vocabulary and can increase engagement in literacy practice.

The advocated use of expert-led, guided instruction that contains opportunities for regular feedback is a good example of a scaffolding approach to education that aligns itself to Vygotskian social constructivist theory. A central feature of such an approach is that instructed tasks are tailored to the needs of the individual learner, specifically targeting their zone of proximal development (ZPD), (Vygotsky, 1978). Applying this pedagogical approach to vocabulary intervention would imply that particular attention is made to the choice of

words targeted for intervention. Beck et al., (2002) distinguish between word types that differ in the extent to which they suit explicit instruction. For example, tier two words are considered to be concepts that children are less likely to encounter in conversation, but which do frequently occur in written language and across a range of academic contexts. Such words are therefore important for vocabulary expansion and the development of language and literacy and are often targeted through direct intervention (Beck et al., 2002). Tier two words are at times referred to as Goldilocks words (Stahl and Stahl, 2004: 133) since such words are likely to fall within a child's ZPD and align to similar concepts already known to the child (Beck et al., 2002).

Word Aware 2 (WA) is a structured whole-school language intervention that targets the understanding of vocabulary and concepts during the early years, and it aims to help close the gap in language attainment that exists between children from low and high socio-economic backgrounds (Parsons and Branagan, 2016). It incorporates suggested activities for teachers to implement in their class that align with the components of explicit instruction. Lists of words that children may be expected to learn during this developmental phase are included and referred to as Goldilocks words following guidance provided by Beck et al (2002) and Stahl and Stahl (2004). The programme encourages teachers to consider the individual child's ZPD and emphasises the importance of selecting words that share conceptual themes. The programme follows a STAR approach to word learning (Blachowitz and Fisher, 2015). This consists of the *Selection* of appropriate words followed by the *Teaching* of these words through structured instruction that involves defining words in a child-friendly manner as well as providing examples and stories that children can relate to. These words are then *Activated* across meaningful and multiple contexts. Words are then *Reviewed* through further exposure to solidify meanings in long-term semantic memory. Word Aware provides teachers with plenty of guidance and examples that support the creation of a word-rich environment by incorporating active play and a multi-sensory exposure of words through pictures, word walls, objects, videos, and songs. Teachers are also encouraged to ask open questions and to provide children with the opportunity to create their own stories involving words selected for intervention. Collectively, all these teaching strategies support the deep semantic and phonological processing of words. The effectiveness of the WA approach has only been explored recently using a pre-post-test intervention design (Moran and Moir, 2018). Without the inclusion of a control group, it is impossible to ascertain whether improvement on vocabulary measures is due to the intervention and not due to other potential confounds, such as natural progression effects (Haley et al., 2017). This study, therefore, aimed to explore the effectiveness of the WA 2 programme in improving the conceptual knowledge of vocabulary in pre-school children, comparing them to a group of children receiving usual teaching practice.

A qualitative strand to the design was incorporated to provide teachers and students with the opportunity to express their perceptions of and experiences using the WA 2 programme. This is important to obtain as whole-school interventions must be utilised with ease and confidence by teaching staff, and it should be perceived as being a useful addition to knowledge and practice (Diamond and Powell, 2011; St John and Vance, 2014). Moreover, whilst the indirect consultative model of speech and language therapy (SLT) support is becoming a prominent method of delivery in schools (Law et al., 2000), this collaborative approach has been perceived as challenging by both teachers and student SLTs alike (Hartas,

2004). Student and graduate SLTs have also expressed the need for more experience collaborating with educational professionals during their practical placement as a way of preparing them for the challenges of working in a multi-disciplinary environment (O'Leary and Cantillon, 2020). An additional aim of this study was to therefore explore the experience that both teachers and student SLTs had collaborating with one another during the implementation of the WA programme.

The need to bridge the gap between evidence and clinical practice within the speech and language therapy professions has been documented (Roddam and Skeat, 2010). However, to our knowledge, no studies have explored the experience that student SLTs have participating in research alongside clinical placement. Findings from the nursing profession report that students negatively perceive research theory but that this perception changes when students experience the application of research methods to placement. After having had this experience, students reported an increase in confidence in applying research methods theory to practice and demonstrated a clearer appreciation of the benefits that research can have for clinical practice (Whitehouse, 2017). The lack of confidence in understanding evidence-based theory is something that student SLTs have also reported (Spek et al., 2013). In supporting the delivery of the WA programme as part of their practice placement, the student SLTs in this study were experiencing a research practice placement. It was thus considered important to explore this experience and the impact that it may have had on students' perception of research theory.

The study, therefore, addressed the following research questions:

1. How effective is the Word Aware 2 programme in supporting the comprehension of early word concepts for children aged 4-5years over a 10-week intervention period compared to an age-matched waiting control group?
2. What perceptions do teachers have of the Word Aware 2 programme and its application to the curriculum?
3. How do teachers and students collaborate with one another as part of the implementation of the Word Aware 2 programme and how satisfied are both parties with this approach?
4. How do students experience being involved in research as part of their clinical placement, and to what extent does this impact their perception of research methods?

Method

Design

This mixed-methods study incorporated a quasi-experimental design for the quantitative element. This consisted of one pre-school that received the Word Aware 2 (WA) programme and a separate pre-school, matched on socio-economic status, acting as a waiting control group that had no prior experience with the WA programme.

The qualitative part of the study utilised semi-structured interviews to examine teachers' and students' experiences of implementing the WA 2 programme.

Participants

One hundred and twenty-three children aged between 4 to 5 years were recruited from reception classes in two pre-schools in the West Midlands area, identified as being situated in areas of low socio-economic status. Socio-economic status of the schools was calculated using a combination of distal measures that included educational metrics from the index of deprivation (Noble et al, 2019) and data on free school meals and special educational needs and disabilities. After obtaining this data for the intervention school, control schools in the local area that matched this data were identified and approached for recruitment. This resulted in both schools presenting with an overall decile of deprivation (according to the National Indices of Deprivation, 2019) that fell below the national average and this was also the case for the decile specific to education. Both schools also consisted of an above-average number of cases of Education Health and Care (EHC) plans and an above-average percentage of free school meal eligibility.

Of the 123 children recruited, 92 children were recruited from school A (the intervention group), and 31 were recruited from school B (the control group). Prior to recruitment, it was estimated that a total sample of approximately 100 children would provide enough statistical power to detect a group effect based on previous research that has recruited similar numbers and has demonstrated medium effect sizes (Haley et al., 2017). It was estimated that an equal number of children would be recruited from both schools, but this was made slightly more difficult by the fact that the control group's school was smaller in size. Unfortunately, extending the limited recruitment phase was not possible due to having to complete data collection prior to the commencement of the student placements.

All participating children in both schools completed pre-testing (See Table 1 for demographic information of the total sample of children). Eighty-eight children from the intervention group and 29 children from the control group completed post-testing.

Table 1. Demographic information of the sample split by intervention group.

	Intervention group (N=92)	Control group (N=31)
Identified speech, language and communication need	14	4
Education and health care plan	2	4
English as an additional language	5	2

Three class teachers, one teaching assistant, and two student SLTs who were completing their final year placement at the schools participated in follow-up interviews about their experiences of administering the WA 2 programme.

Assessment materials

Each child completed the informal and standardised assessment of conceptual understanding that measured receptive vocabulary. Both assessments required the child to listen to a sentence that was read out by the assessor and which contained a reference to a concept (e.g., The one who is *under* the chair). Whilst the sentence was read aloud, the child was shown a selection of three images and was then asked to point to the image that matched the concept that was referred to in the description. The task was explained to each child prior to testing and each child was given some trial examples to ensure that the child understood the task. The informal assessment was the same one used for the selection of words (see the section below) and consisted of word concepts developed by the authors of WA 2. Similar to Beck et al (2002) tiered approach to word selection, these words were split into three levels. To avoid unnecessary testing time, all children started at Level 2 but were assessed on the Level 1 words if they incorrectly labelled five or more words at Level 2. Any child that correctly identified at least 26 of the 33 Level 2 words also completed the Level 3 set. The maximum score possible on this assessment was 87. The generalisation of word learning attributed to the intervention to words that were not subjected to intervention was examined by assessing word knowledge in all words that formed the informal screening. The basic word concept subtest from the Pre-School Clinical Evaluation of Language Fundamentals (CELF-2) was included as a standardised measure of receptive early word concepts for the same reason but also due to the test's strong validity and internal consistency (Wiig et al., 2004).

Word selection

Ten target words for the intervention (Seven Level 3 words and three Level 2 words; See Appendix 1A) were selected from the informal assessment of receptive vocabulary developed by the WA 2 authors. It was important to select words that the children did not already know, and so performance on the pre-test vocabulary measure of all the children involved in the study was analysed to select words that were appropriate for targeted intervention. Target words were those that the largest number of children in both groups did not know at the pre-test. Those selected were also words where performance at the pre-test was well-matched across the schools (groups) to minimise the impact of any existing group differences at the pre-test (See Appendix 1B).

Interviews

Four one-to-one semi-structured interviews were conducted with teaching staff and two student SLTs who were involved in delivering the WA 2 intervention were also interviewed separately. The interview schedule (See Appendix 1C) consisted of twenty questions relating to the experience of delivering the intervention and included questions on training, collaboration, and parent engagement. Student SLTs were also asked to comment on

their experience of conducting practice-based research in clinical practice (See Appendix 1D for the list of themes).

Intervention

Ethical approval for the study was received by the health and education faculty of Birmingham City University and permission to access the pre-schools was granted by the headteachers of both schools. The intervention commenced in the month of January and lasted 10 weeks to align with the duration and timing of the final year undergraduate student placement. Each week, one WA 2 target word (See Appendix 1A) was incorporated into training adhering to the STAR approach. At the beginning of each week, one of the selected target words was taught through explicit whole-class instruction lasting approximately 20 minutes, and this incorporated objects that resembled or demonstrated the concept, a playful narrative involving appropriate books and stories that revolved around a central character termed 'concept cat'. The meaning of the target words was also taught via song and throughout the week, children were encouraged to watch the concept cat videos, re-enact the stories and develop their own stories, incorporating the target word. These activities were also initiated and supported by the teaching staff and SLTs to enable the constant activation of the target words through explicit reference to them during unstructured play. The words were also displayed in the classroom alongside accompanying images that represented the word's meaning. The student SLTs supported the teaching staff in the delivery of all aspects of the WA STAR approach. The target words learnt were reviewed again explicitly by the teaching staff at the end of the week for the same amount of time and using similar methods to those used at the introduction stage, including the use of pictures, objects stories, and songs.

Procedure

Training was provided to all students and the teaching staff at the intervention school on how to implement the WA 2 approach. To ensure that all the content of the programme and its philosophy were delivered accurately and reliably, the training was delivered by the authors of the WA programme. This involved a twilight session incorporating a presentation that highlighted the aims of the programme along with an overview of the relevant theory underpinning word learning. The same training session was then offered to the control school on completion of the research project, to minimise the risk of confounding routine teaching practice. The training then outlined the STAR approach with practical examples of how to implement this in the classroom. The students were provided with an additional briefing session at the university that lasted two hours and was delivered by the research team. This session outlined the procedure of data collection and management and included instructions for accurate test administration.

Pre-test assessments using the informal early word concept measure and the CELF-2 took place in one period lasting approximately 15 minutes and were administered in a quiet space at the schools. The order of assessments was counterbalanced to control for possible order effects. Assessments were conducted by the student SLTs at pre-test and the research team at post-test, all of whom were blind to the group status of the schools. The intervention

proceeded immediately after completion of pre-testing and lasted for 10 weeks, followed by post-test assessments on the same measures as at the pre-test.

Monitoring the fidelity of the STAR approach was difficult with limited resources but the SLT students met with the teaching staff every week in which they would review and discuss progress, identifying any challenges that could be resolved. As a result of these meetings, students provided additional modelled support on strategies that staff could implement in the activation stage of the WA programme. The students themselves would regularly support the delivery of the WA programme for two days every week and their involvement was closely monitored by their placement supervisors who would review the student's progress and provide guidance on how they could improve on their role in supporting the delivery of the intervention. The research team also held an afternoon debrief session midway through the intervention with the students to review progress and to offer solutions to any challenges faced by the students. Students would often report experiencing difficulties in knowing how best to support teachers in incorporating the activation elements of the intervention in a manner that was accessible to them.

All four teachers (one teacher per class) consented to be interviewed at the school and the interviews were audio-recorded using a digital encrypted device. Interviews were transcribed verbatim, and data were analysed using inductive thematic analysis (Braun and Clarke, 2006; Thomas, 2006). To increase the rigour of the analytic process (Morse, 2015), the internal reliability of the framework of codes produced by the primary analyst was checked by an additional member of the research team. This additional member who was trained and experienced in qualitative thematic analysis read through all of the interview transcripts and verified the codes produced by the primary analyst. This process ensured that the descriptive codes accurately captured the accounts reported by the participants. On the few occasions when the original codes and/or themes were deemed to be unclear or the semantic description of the code/theme was challenged by the reviewer, the reviewer met with the analyst to discuss further. They compared thoughts and reviewed these codes/themes until mutual agreement was reached for the final framework of codes and sub-theme/themes. An additional reliability check of this final list of sub-themes and themes (See Appendix D) was then carried out by sharing the list (and the original transcripts) with two additional members of the research team. They both independently agreed on the names of the themes, their relationship with one another and agreed that the themes provided an accurate account of the descriptions offered by the participants.

Results

Mean scores on all words that formed the informal word concept measure (maximum score of 87) and mean scores on only the 10 words of this measure that were targeted for intervention, were compared between groups, at both the pre- and post-testing phase (See Table 2 & 3). A sub-group of children in both the control and intervention groups did not complete the Level 3 words at pre-test but did at the post-test (due to having an improved score in their respective Level 2 words at post-test, n=17). Excluding this subgroup's Level 3-word scores resulted in slightly lower target word mean scores but as this did not alter the final trend nor the inferential results of the study, all data that was obtained on target word

knowledge at both pre- and post-testing was included for the inferential analyses as reported below.

Table 2. Descriptive statistics for the correct identification of the 10 target words.

	Pre-Test (n = 123).		Post-Test (n = 88).	
	Mean	Standard Deviation	Mean	Standard Deviation
Intervention Group	4.6	2.1	5.6	1.7
Control Group	4.0	2.3	5.9	2.3

Table 3. Descriptive statistics for all words correctly identified on the informal assessment out of a maximum score of 87.

	Pre-Test (n = 123).		Post-Test (n = 88).	
	Mean	Standard Deviation	Mean	Standard Deviation
Intervention Group	71	16.5	77	6.2
Control Group	66	16.5	76	12.4

To examine whether any significant difference between both groups was found in improvement on target word knowledge (pre v post-test), a two-way repeated-measures analysis of variance (ANOVA) was conducted. The data met the assumptions of a normal distribution and was assumed to have met sphericity due to having only two levels for each variable (Dancey and Reidy, 2004).

The ANOVA revealed a non-significant main effect of group $F(1, 116) = .15$, $p = 0.70$ and a significant main effect of time, $F(1, 116) = 42.5$, $p < .001$, in which post-test scores were significantly greater than pre-test scores for both the intervention and control group, although the effect of this difference was small (partial $\eta 2 = 0.30$). No significant interaction between the group variables was found and no significant differences in performance of Level 2 and Level 3 words were found when these were analysed separately ($p > 0.05$).

An independent t-test revealed no significant differences in performance between pre- and post-testing scores on the CELF-2 for either group ($p > 0.05$) with both groups scoring a mean of 17 out of 18 at both testing phases.

Qualitative findings

In adherence to the stages of thematic analysis (Braun and Clarke, 2006), the analysts familiarised themselves with each interview transcript and inductively produced meaningful semantic (descriptive) codes for each interview. These descriptive codes were then reviewed and grouped into sub-themes and overarching final themes through a recursive process of

reviewing/redefining themes in light of the original data. This resulted in a list of three final themes that accurately described the data (See Appendix D). These three themes of *sharing and transferring knowledge, depth of processing and embedding meaning, and the developing student practitioner* will now be reported in more detail with support from quotes obtained directly from the original transcripts.

The sharing and transfer of knowledge

All teaching staff and students perceived the resources that accompanied the Word Aware (WA) 2 programme as *informative* and *easy to follow* and all teachers commented on how the information increased their awareness of the prevalence of vocabulary difficulties in the early years: *I didn't understand how many children don't understand basic language (Participant 3).* Throughout the programme, all teaching staff were introduced to intervention strategies that challenged their preconceptions of what they considered to be 'effective' practice. *Teaching opposites, you can see why it is confusing (Participant 1).* This included a focus on the deeper processing of words, delivered at a pace suitable for the needs of the children: *The activate and apply stage is crucial and the children can learn those different words, but they've got to have that understanding behind them, they've got to apply them; It's brilliant to support the children by doing one word a week to focus on (Participant 4).*

The informal assessment was also mentioned by two of the teachers as a tool that challenged their assumptions of children's language ability. For example, it came as a surprise to them that children were not able to show understanding of certain concepts:

That's a word you assume they'll know and until you start delivering this, you realise that they don't (Participant 2); You think it's an easy concept and actually, a lot of them are really thrown by it (Participant 3).

Both students supported teaching staff by incorporating a scaffolding approach to the delivery of WA: *It does work well with an SLT just going in now and then to support, to observe and talk about what they're doing really well and giving them support on areas that they are finding a bit more difficult (Student 1); We met and reminded them (teaching staff) on what they were doing and spent time in there doing it so they could see what we were doing so they could do it too. We were working together, and it felt like a team effort (Student 2).*

This was achieved through modelling behaviours and interactions with the children of which one teacher would have liked to see more of: *I would have liked more contact time for them to model how they're doing it. I mean they could have possibly been working with the TA's a lot on this (Participant 3).* All the teachers commented on the usefulness of this approach, especially as they found the activation and review parts of the programme more difficult to implement. *Erm, we had a lot of back and forth... uh but how do we do this and what do we say, how do we say this concept and different things like that but once we got into the role of it, into the swing, they kind of just left us to it and were just topping us up with the resources that we needed (Participant 2); We were struggling with the activate part of the programme, so I suggested the training to them to the teaching assistants and they were willing to do that training (Participant 4); I think had we not had that collaboration we would have felt a bit lost (Participant 2).*

This was partly due to time and capacity restrictions preventing them all from engaging in aspects of the programme as much as they would have liked:

It is quite time-consuming with the planning of it, but we do fit it in within the curriculum. Participant, 1); The review is perhaps the one that gets missed a bit because of time (Participant, 1). Two of the teachers valued the support that the students provided for the signing of words and the recommendations for the order in which the words should be introduced to the children was acknowledged by another: *There's been a couple of concepts that we've done and we can't find the signing anywhere so just having that person we can go to straight away has made a massive difference (Participant 2); When we weren't sure about signs and symbols, they went back, and they emailed us which was really useful. So, it has been useful to have them there (Participant 4); Even just knowing the order to teach the concepts, well you know, they were constantly there to help us with that (Participant 3).*

Sharing knowledge of concept development with parents was something that WA 2 also aimed to achieve. This, as recognised by each teacher, was comprised of an indirect approach to dissemination, in which letters detailing information about the programme were sent to parents. This approach also compiled homework tasks and word of the week slips to complete for an online learning journal: *We send the word home as well, so parents are aware of it, you know, so they are doing at home as well (Participant 1); They send photos in of their learning journey, or they stick the little slip we give them in their learning journey books (Participant 3).* However, all teachers acknowledged that parent engagement was not as strong as it could have been and attributed this partly to a lack of awareness and anxiety or uncertainty towards how best to support their children using the WA approach: *A lot of parents at school aren't engaging as we would like them to be and I think if they had more information, they might potentially kind of use it a bit more (Participant 1); Showing them the meaning behind it which would be useful because I think sometimes parents think 'oh, it's another piece of homework or something (Participant 4); Parents don't know because they have either a bad experience themselves or they just don't know. They're just not aware of child development (Participant 3).*

Suggestions for offering additional workshops for parents on the WA approach were offered by two teachers, as well as suggestions for sharing more resources that provided parents with examples of activities that they could implement easily at home with their children:

I think really to get them in and to get them involved, you just need to sit down with them... with the teacher and the child and deliver it like a little group (Participant 3); Some parents who came in were shown concept cat, the song and the videos, so when they saw it and then they thought 'oh, we can do this, this is easy!'. It's just giving them that confidence and scaffolding it for them (Participant 3, line); We could you know, have them in at the end of the term or something you know, show them some of the videos, show them the meaning behind it which would be useful, you know... to show them why we're doing it (Participant 4).

Depth of processing and embedding meaning

WA 2, and in particular concept cat, was described by all teaching staff and students as being very engaging for the children due to the fun nature of the activities that supported the children's processing of the concepts. The concept cat stories were praised for providing

engaging, simple narratives for the children to follow: *They love it, and they take concept cat around looking for, you know, looking for the concept (Participant 1). They use the cat in their play, so they'll be like pretending 'I'm gonna tell you a story' (Participant 3). They are engaged in it and you know as an early year practitioner, if you see them acting like this, it's because they've absorbed it (Participant 3). It was all very child-centred and the children loved it (Student 1). The children loved the story side to it and the character (Student 2).*

Despite being faced with time restrictions, all teachers were committed to making the programme effective. This was evident in the additional efforts put into producing videos, believing that use of familiar technology would increase the children's access to and engagement with the programme: *We film videos and that kind of thing, so that is quite time-consuming and within the curriculum, we do fit it in… so it does work but that's because we all want it to work (Participant 1); We do the word rap, which they just love and erm because they can access that on YouTube, they go home and watch the word rap (Participant 3).*

Within the classroom, concepts were embedded in activities that enabled a multi-sensory experience of words, including visual displays, such as word trees and physical objects that were used to demonstrate concepts to children: *Trying to think of ways we can get objects and how we can have different activities for them without having that reading element so they can just look at the object (Participant 2). We worked closely with the students to make the word aware tree (Participant 4); There were different ways of getting children engaged in the words including songs and physically practising the word, so it was very multi-sensory (Student 1).* All teachers were encouraged to explicitly activate and review the words introduced to the children by incorporating them within playful interactions and environments that children naturally found themselves in: *It's kind of embedded throughout all child-initiated activity (Participant 4); and it's the language coming out of asking the children to show examples (Participant 4); You do hear them using it in their play and they'll come and say oh look, I found something that's* ***thick*** *or* ***thin*** *(Participant 1); Bringing natural play into it and not just drumming the word in was something that teachers found useful (Student 1).*

Parents were also encouraged to embed the word of the day in their interactions with objects at home, as guided by the WA programme, and all teachers had witnessed some examples of this being done successfully: *They'll take a picture with their child with something. So, I had a child who had a very* ***tall*** *cactus in their house, and she put that on there (Participant 3); You can see the parents that have engaged positively, and you can see that each week, they're putting onto the online learning journey 'what's short and what's not short' (Participant 2).*

The developing student practitioner

Both students experienced a journey of increased problem solving, confidence, and independence that resulted in a positive working relationship with teaching staff. Initially, students were overwhelmed with this perceived responsibility, not helped by the belief that their purpose was to deliver the intervention *onto* the teachers rather than *with* them.

It was challenging as we felt like we had a lot of responsibility (Student 1); I was a bit apprehensive like it's going to be this huge thing (Student 2); Was it our intervention or their intervention because it was like a school intervention but because we were there so much it

kind of felt like it was ours and they were just part of it rather than it being theirs? (Student 1). In this, we predetermined the list of concepts for the research, but it would have been easier for them if they had developed it on their own to target specific words (Student 2).

In realising that aspects of the programme were not being successfully delivered, the students began their enquiry into the teachers' experience and expectations surrounding the intervention. *We had a meeting with the teachers to see what was going on because we were a bit concerned that there wasn't much of the activation stage happening and she said that that was the bit that they really struggled with just because they were so busy. So, then we had a meeting with the TAs to talk about child-led play and how to bring in the word naturally and being around to model activities (Student 1); I've got to take some responsibility for that like being a student it was challenging for me to get the confidence to like can you do this now please but towards the end, it was absolutely fine, and we talked about it and it wasn't an issue (Student 2).*

This resulted in a more proactive approach in supporting teachers' development using constructive scaffolding strategies that transferred the responsibility and ownership onto the teaching staff, empowering them to take ownership over the delivery of the intervention. This, in turn, provided students with more trust in the teachers' ability to maintain the delivery of the intervention: *The activation felt like that was our responsibility. It was like crossing over that responsibility to them so they could run with it and empowering them to do it in the future (Student 1); I think it was more part of it developing myself as an SLT and growing confidence to sit down with teachers and be like ok what's going on? (Student 1); The experience we had collaborating made it easier to speak to teaching staff, so this improved for me (Student 2).*

Students also recognised the value of engaging with teachers on the WA 2 programme in developing their understanding and scientific reasoning: *Especially the collaborative learning and working with other professionals and like theory to practice because we were having to explain to TAs the theoretical underpinning of why this was important (Student 1); It was a good experience building relationships up to transfer knowledge of other aspects through a team approach, as they (teachers) are much better at teaching the vocab and we had the knowledge of speech and language, that's why it worked so well combining those two aspects (Student 2).*

Both students felt more confident in participating in research and reported welcoming further opportunities for this within their clinical practice. They felt that their involvement in the WA 2 programme provided them with insight into the important application of practice-based research, in addition to experiencing life in a busy collaborative school environment, with a new appreciation of the challenges experienced by teaching staff:

It's given me a very good impression of what whole school working can be like, which is why I want to do that in the future now (Student 1); Immersing yourself in a school environment, what it looks like, how it really works and then asking yourself, can you do this? (Student 2); It changed my perception of research as now I can see it's quite easy to do in practice and children are benefiting as well. I was a bit apprehensive at first but it's easier than people think (Student 2); It feels good to be part of something that's the bigger picture of SLT and you're doing something for your profession bridging the gap in the evidence base to prove what we're doing is worthwhile (Student 1).

Discussion

We aimed to examine the effectiveness of a whole school early years vocabulary intervention by comparing pre-and post-test performance on measures of conceptual knowledge to a control school that provided classroom instruction as usual. The quantitative analysis showed no difference in the conceptual knowledge of children receiving the Word Aware (WA) 2 programme compared to those children receiving typical classroom instruction. In fact, children in both groups showed a significant improvement in vocabulary scores between the pre-and post-test. This was despite finding slight ceiling effects at the pre-test of all words, which were significantly higher in the intervention group than the control group (See Table 3). This indicates that the children in both groups had sufficient existing knowledge in their understanding of basic concepts but suggests that the small improvement observed in the intervention group may be attributable to ceiling effects. Despite the fact that the concepts utilised in the early years version of the WA programme are grounded in theory on vocabulary development, the ceiling effects reported in our study suggest that the WA programme may be better suited to younger-aged children. It would therefore be beneficial, for research that examines the early year's WA programme to monitor its impact on vocabulary development in a sample of children aged between 3-4 years. In addition, whilst vocabulary interventions that contain shorter treatment amounts have been reported as being beneficial for vocabulary learning in young children, the result is still complex and dependent on many factors with studies reporting a varied amount of treatment dosage (Marulis and Neuman, 2010). The benefit of increased word exposure on word learning has been reported in children with language impairment (Steele and Mills, 2011) and as a significant number of children in our intervention group had identified speech and language communication needs, they may have benefited from an increased (and more closely monitored) frequency of word exposure in the delivery of the WA programme.

The control group also made a significant improvement between the pre-and post-test. The improvement observed in the intervention group may therefore also be attributable to maturation effects. This study highlights the importance of including a control group when designing intervention research within an education setting as research without this comparison has demonstrated improvements in vocabulary on receipt of the Word Aware programme (Moran and Moir, 2018). It is important to note that this study utilised a control group that consisted of typical teaching practice, but it would be important for future research to include an additional intervention group to monitor the potential for placebo effects. This is particularly important when minimising any differences found in staff motivation as a result of schools ‘buying in’ intervention programmes. This could have confounded results reported in this study, as the intervention school had already purchased the WA programme prior to the onset of the research.

The qualitative analysis produced themes that highlight important features of the intervention that are likely to contribute to the potential for word learning in younger children. For example, teaching staff reported on the repeated exposure of words that were embedded in natural playful interactions, which also offered a multi-sensory experience of word learning. The children were perceived as engaging in what was described as fun activities involving the puppet character "concept cat" that was used as a means of creating a

narrative that incorporated the target words. These features align with strategies reported in studies that have documented effective word learning through the promotion of word processing depth (Han et al., 2010; Hong and Diamond, 2012; Marulis and Neuman, 2010; Neuman, et al., 2011).

For any school-based intervention to be routinely embedded within the curriculum, teaching staff utilising the approach must believe it to be useful and accessible (Diamond and Powell, 2011). The teaching staff commented on the ease with which the resources could be used in practice and were impressed with the insight it gave them on their pupils' word knowledge. Despite the challenges of utilising all aspects effectively under time constraints, teaching staff still made every effort to ensure that these were included. Teachers, therefore, seemed to perceive the potential benefits of WA as outweighing the effort needed to incorporate this alongside their other teaching duties. This was also helped by the support provided by the student speech and language therapists (SLTs) in which strategies used to activate the teaching of concepts were modelled and applied within playful interactions with the children. In addition, the students themselves reflected on how the whole school approach utilised by WA, increased their self-confidence and the perceived sense of responsibility they had in proactively engaging with teaching staff to support the delivery of the programme. The use of teamwork, responsibility, and scaffolding support has been documented as important for successful collaboration between teaching and SLT staff (Glover et al., 2015). Graduate SLTs have also reported an increase in autonomy and self-sufficiency after work experience and believe it to be an important aspect of practice that is currently missing from typical practice placement within SLT degree courses (O'Leary and Cantillon, 2020).

This study provided a rare insight into the student experience of supporting a whole-school intervention as part of a research-based clinical placement. Students commented on an increased awareness of the challenges of working in such a busy and time-pressured environment. Student SLTs on inter-professional education placements have reported a similar increased understanding of the role of a teacher (Wilson et al., 2017). As a result of their involvement in the delivery of this research project, the students felt more confident in pursuing research in their future clinical practice and were appreciative of the benefits that this would have in pursuing evidence-based practice. These are important findings given that student SLTs perceive research and evidence-based practice negatively, often failing to see its relevance to clinical practice (Spek et al., 2013). With this in mind, consideration should be made in incorporating practice-based research to placement wherever possible, whilst ensuring that that information shared with students and practiced educators demonstrates how research elements of placement are explicitly aligned with modular learning outcomes. This was achieved in this study, through a long-arm approach to supervision that encouraged the development of confidence and independence as reported by the students. It is also worth noting that research examining intervention that involves a student SLTs-teacher pairing such as this, could produce different results to that of schools that contain only a teacher-led intervention and so it would be beneficial for future research to account for any differences in the student therapist-teacher dynamic.

Limitations

The lack of difference in improvement on conceptual understanding found between both groups of children may have been due to methodological limitations in the design of the

study that could be addressed in larger-scale funded research. For example, whilst the SLTs worked closely with staff in supporting the delivery of the programme, teaching staff delivering the intervention should be observed and their behaviour recorded and analysed during phases of the intervention, to ensure fidelity is met and maintained over time. It would also be beneficial to do the same for the control schools to account for any overlap in teaching strategy that may resemble components of the intervention being studied. A study designed to examine specific components of the Word Aware (WA) approach may provide more scope for monitoring and controlling for this.

Further, it is important to note that socio-economic status is considered a strong predictor of language development in children (Hart and Risley, 1992; Hoff, 2003). Two schools included in this study were situated in areas of low socio-economic status. However, whilst both schools were matched on some indices of deprivation, closer examination revealed that the intervention school did present itself as slightly more disadvantaged based on the number of children receiving free school meals and who were identified as having special educational needs and or disabilities. It is impossible to ascertain whether this group difference had an impact on the finding that the intervention group did not present as much improvement in vocabulary knowledge as expected. However, evidence reports vocabulary intervention as being more beneficial for children of higher socio-economic status (Marulis and Neuman, 2010), which may explain this finding.

This study consisted only of two purposively identified schools. Ideally, a larger sample of schools should be recruited to provide access to a larger sample of children. Larger samples will provide more power in detecting differences where any exist (Dancey and Reidy, 2004). Schools (particularly those that are not equally matched) should then be randomly allocated to either the intervention or a control group to control for the impact that confounding differences may have on the findings (Haley et al., 2017). This is especially important given the fact that the two schools recruited to this study differed on the number of children receiving intervention for speech and language therapy (See Table 1). It is therefore possible that this difference could have confounded and even reduced the potential for any language learning expected from the intervention group.

Results from the standardised assessment suggest that there was a lack of generalisation from the learning of words that formed the intervention to the similar concepts tested by the Pre-School Clinical Evaluation of Language Fundamentals (CELF-2) subtest. However, ceiling effects were apparent for all children on this subtest including at the pre-intervention phase and so this would have inevitably masked any potential for word generalisation. The finding that all children performed so well on this subtest prior to any intervention adds to the argument that this study would have benefited from a sample of younger-aged children.

Adhering to the administrative procedure specified by the WA programme resulted in some children not being assessed on their Level 3-word knowledge during the pre-intervention phase. This decision was taken to reduce testing fatigue and to manage the ethical risk of likely repeat failure on the Level 3 words, which may have been too difficult for this subgroup of children based on their poor performance on the Level 2 words. It is plausible that by omitting the testing of all words in the informal assessment, the scores obtained for this subgroup of children may not have accurately represented their true

conceptual knowledge. This in turn could have hindered the potential they had for learning more of the target words. It is also possible that the informal measure used in this study may not have been sensitive enough in its ability to detect gains made in vocabulary depth. Hoffman et al., (2014) note the benefits of using assessments that require children to express their knowledge of the words, allowing the potential to capture a more detailed understanding of vocabulary depth compared to a picture-based receptive measure assessing vocabulary breadth.

Conclusion

Vocabulary interventions that incorporate examples of explicit instruction similar to that adopted by the WA programme have been found to support word learning in pre-school children beyond the effects found from comparison groups that offer typical classroom instruction (Kelley et al., 2015; Neuman et al., 2011). Such interventions tend to focus on specific aspects of explicit instruction that promote deeper processing and slow mapping of conceptual knowledge (Han et al., 2010; Hong and Diamond, 2012; Marulis and Neuman, 2010; Neuman et al., 2011). It would therefore be important to target specific elements of the WA programme to understand which of these offer the potential for word learning to take place. The fact that the teachers perceived the 'concept cat' stories as engaging for children suggests that this would be a useful component to explore further. In addition, parental engagement was reported by teachers as being inconsistent, due to issues with confidence in accessing aspects of the programme. Monitoring the impact of whole-school approaches such as this on the home environment would be an interesting development and could be achieved by exploring parental experience more directly. This whole-school approach also encompassed a collaborative student SLT-education model that had positive outcomes for the developing student practitioner. Exploring the pedagogical benefits that such a collaborative model may have on student learning, would therefore be important to consider for practice-based education within the disciplines of allied health and education.

This is the first study to examine the effectiveness of the WA programme with the inclusion of a control group. Despite finding no significant difference in word learning between the groups over the intervention period, teaching staff valued the programme and its ability to engage children in activities that aimed to support word learning. Further research that addresses the limitations of this particular study is required to accurately examine the effectiveness of the WA programme for concept development in a sample of nursery-aged children.

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Appendix 1A

Words selected from the Word Aware informal measure that were targeted for intervention

Level 2:

Some

Day

A-Bit

Level 3:

Thick

Thin

Smooth

Whole

Early

Half

Later

Appendix 1B

Data on the percentage of incorrect responses from the children in both groups on the target words at pre-testing phase.

	Intervention Group (N=	Control Group (N=
Target Words		
Some	**57%**	**45%**
A bit	**52%**	**42%**
Day	**35%**	**36%**
Thick	**56%**	**70%**
Thin	**63%**	**65%**
Smooth	**48%**	**48%**
Half of	**52%**	**39%**
Early	**37%**	**44%**
Whole	**38%**	**39%**
Later	**68%**	**83%**

Appendix 1C

The interview schedule used to explore the experience that both students and teacher had collaborating together on the word aware programme.

TEACHERS

Word Aware experience and training

What did you know (if anything) about the Word Aware programme before you began the training on using it in schools?

What thoughts did you have about the Word Aware programme on receipt of the initial training?

How did you find the training? *What was good about it and what would you change?*

How does the Word Aware programme compare to any other school language or literacy programmes that you have supported or been involved in? *How similar or different is it to others and what makes it similar or different? What do you think it offers that other programmes might not?*

Implementation

What in your opinion, is the main focus of the Word Aware programme?

How easy do you think it is to implement the Word Aware programme into your teaching and school curriculum? *What makes this easy to use/what are the difficulties in implementing this? How do you implement this into your teaching activities?*

How often would you incorporate the Word Aware programme in your teaching? When do you normally do this?

Evaluations of the WA programme

What do you like most about the Word Aware programme? *Provide reasons for your answer.*

What (if anything) about the Word Aware programme could be improved or developed further? *Why do you think this is?*

Engagement (child and parent)

In your experience of using the Word Aware programme, how much do you think it impacts on the language and literacy develop of pre-school children? *Reasons for this?*

To what extent does the Word Aware Programme engage children? *What is it about the programme that engages them or what do you they enjoy most? What aspects of the programme are problematic for children to engage in?*

What feedback have you had from parents about the Word Aware programme?

Collaboration

What was your experience working alongside student speech and language therapists like in delivering the Word Aware programme during the last 12 weeks? *What was good about this experience and what was difficult/challenging? How could this have been improved?*

How much collaboration is involved in delivering the programme? *Who would you collaborate with and what does this look like in day to day practice?*

How much of this collaboration involves parents/speech and language therapists?

How do you find working with parents/SLTs in delivering this approach?

How much do you think having a collaborative approach adds to the delivery of language programs such as the Word Aware programme?

Would you recommend using the Word Aware programme to colleagues in pre-school education? *If so/if not, why?*

STUDENT SLTS

Word Aware Training

What did you know (if anything) about the Word Aware programme before you began the training on using it in schools?

What thoughts did you have about the Word Aware programme on receipt of the initial training?

How did you find the training? *What was good about it and what would you change?*

How does the Word Aware programme compare to any other school language or literacy programmes that you have supported or been involved in? *How similar or different is it to others and what makes it similar or different? What do you think it offers that other programmes might not?*

What in your opinion, is the main focus of the Word Aware programme?

Implementing Word Aware in clinical practice

How easy do you think it is to implement the Word Aware programme into classroom teaching and the school curriculum? *What makes this easy to use/what are the difficulties in implementing this? How did you implement this into the teaching activities? How challenging did you find it?*

Would you consider implementing any of the Word Aware programme to your therapy management in the future? If so, why this aspect of the programme? If not, why not?

Evaluation of Word Aware

What do you like most about the Word Aware programme? *Provide reasons for your answer.*

What (if anything) about the Word Aware programme could be improved or developed further? *Why do you think this is?*

Child and parent engagement

In your experience of using the Word Aware programme, how much do you think it impacts on the language and literacy develop of pre-school children? *Reasons for this?*

How much would you say that children engage in the Word Aware programme? *What is it about the programme that engages them or what do you they enjoy most? What aspects of the programme are problematic for children to engage in?*

What feedback if any have you had from parents about the Word Aware programme?

Collaboration with teachers

What feedback have you received from teachers about the Word Aware programme? *Based on your observations and working with teachers over the past 12 weeks, how much would you say they engaged in the programme? What if anything did they find challenging or difficult? Which aspects did they find easy?*

How much collaboration is involved in delivering the programme? *Who would you collaborate with and what did this consist of during the weeks you were supporting the programme?*

How much of this collaboration involves teachers/parents?

What was your experience of working with teaching staff in delivering this approach? *What was good about this experience and what was difficult/challenging? How could this have been improved?*

How much do you think having a collaborative approach adds to the delivery of language programs such as the Word Aware programme?

Student placement

How did this placement (Word Aware) compare to others you have had so far including days outside of Word Aware during this year's placement?

Has your perception of this placement experience changed over time – For example is your view of this experience different now to how it was at your mid-way visit?

What was different about it and how much did you value/enjoy this difference?

To what extent were you able to manage the research elements of this project (assessment/data handling) alongside your placement and how did you manage this?

How much opportunity were you given to meet the learning outcomes of your placement during your involvement in the Word Aware programme?

What would you say to other students who were thinking about being part of a research project alongside placement?

How much support were you provided with during the Word Aware placement? Was this enough for you or would you have preferred to have more?

How much would you say that being involved in this research project has changed your perception of research? Provide reasons.

Appendix 1D

Themes and sub-themes obtained from the qualitative interviews with the teaching staff and students.

The sharing and transfer of knowledge

Increased vocabulary awareness (insight)

Challenging pre-conceptions

Developing existing knowledge

Developing awareness of the importance of language

Word generalisation and processing

Student-teacher scaffolding

Collaboration

Indirect dissemination to parents

Parent engagement

Accessibility of WA at home and in school

Time restrictions

Depth of processing and embedding meaning

Fun and engaging (play)

Creativity

Narrative

Concept Cat

Songs and videos (Media)

Applied effort (teachers)

Accessibility/engagement of parents

Multi-sensory experience

Repetition

Embedding in natural playful context

Word generalisation

The developing student practitioner

Transfer of responsibility

Problem solving

Independent enquiry

Increased confidence

Collaboration

Being pro-active

Ownership and responsibility (inc transfer of this)

Empowerment

Trust

Perception of research methods

Application of research methods to practice

Whole-school collaboration/challenges