WHOLE CLASS INTERVENTION TO IMPROVE VOCABULARY LEARNING SKILLS IN POST-PRIMARY SCHOOL STUDENTS

Final Year Project: MSc Speech and Language Therapy

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Abstract

**Background:** There is a need for evidence-based interventions that target the language skills of adolescents from areas of socioeconomic disadvantage. This study will implement a whole class vocabulary intervention programme, in schools in an area of disadvantage. A whole class approach allows the intervention to target adolescents at risk of delayed language in a natural setting. It also fosters collaboration between teachers and Speech and Language Therapists.

**Objectives:** 1) To investigate if a whole-class vocabulary intervention can improve vocabulary learning skills in first year post-primary school students. 2) To investigate the relationship between behaviour and improvement on vocabulary measures.

**Method and Procedure:** Vocabulary assessments were used to measure vocabulary skills of 245 first year students in an area of socioeconomic disadvantage. A Pre-Post-Test repeated measures design was used. Two schools (149 students) received a twelve week teacher-led vocabulary intervention, in collaboration with a Speech and Language Therapist. Two schools (96 students) did not receive intervention.

**Results:** Treated schools raw scores improved significantly more than the Control schools on three assessments; the ‘Word Classes Expressive’ subtest, the ‘Word Associations’ subtest and ‘BPVS3’ assessment. There was a weak significant negative relationship between students’ ‘SDQ’ ‘Overall Stress’ score and amount of improvement they made on the vocabulary measures.

**Conclusions and Implications:** The vocabulary intervention significantly improved scores of first students attending the Treated schools, in comparison to Control Schools. This suggests that the whole class vocabulary intervention was successful at improving some vocabulary learning skills. A weak significant relationship between behaviour and vocabulary improvement suggests that, students with greater social, emotional and behavioural difficulties did not improve as much as other students. This warrants further research.

**Keywords:** Adolescence, Language Assessment, Vocabulary, Whole-Class Intervention, Social Disadvantage, Teachers, Collaborative Intervention.
**Language and Adolescence**

Language continues to be acquired throughout adolescence and into adulthood (Nippold 2006). However language difficulties that occur in adolescence often go undetected. As a result, adolescents are not provided with specialist support (Joffe and Black 2012; Larson and McKinley 2003). Language difficulties can often remain hidden through compensatory strategies or become obscured by social, behavioural or emotional difficulties (Bercow 2008; Benner 2002; Cohen 1998; Murphy 2011). Language disorders are pervasive and continue into adulthood (Clegg et al 2005; Nippold et al 2009; Nippold and Schwartz 2002). Children who coped academically in primary school, may have difficulty when faced with the more complex language required of them at post-primary school level (Nippold 2006; Bryant et al 2003). They can have difficulty understanding and using both oral and written language (Leonard 1991; Clegg et al 2005). The post-primary curriculum requires adolescents to use higher level metalinguistic skills and abstract thought to analyse and acquire more complex language (Nippold 2006; Nippold and Rudinski 1993).

Adolescent language is predominately acquired through literacy (Nippold 2006), primarily within the school setting. However, Myers and Botting (2008) found that children who had difficulty with reading comprehension also scored poorly on spoken language assessments. Lexical development is known to continue to develop throughout the lifespan. Adolescents acquire on average 2000-3000 new words each year (Nippold 2006). Many of these are curriculum specific words that are essential in order to access the curriculum.

**Language and Behaviour**

It is now recognised that children with language impairments are at greater risk of developing social, emotional and behavioural difficulties (SEBD) than typically developing children (Joffe and Black 2012; Durkin and Conti-Ramsden 2010; Botting and Conti-Ramsden 2000). Behavioural difficulties are measured by examining hyperactivity, conduct problems, anti-social behaviours, emotional difficulties such as depression and anxiety, and difficulties with interpersonal relationships (Benner 2002; Lindsay and Dockrell 2000; Goodman et al 2000).
Assessment of juvenile offenders has shown that they perform significantly lower on language assessments when compared to the normative population (Bryan et al. 2007). Cohen et al. (1998) found that children referred to child psychiatric services often have previously undiagnosed language impairments, and are more likely to have more serious behavioural problems than children without language difficulties.

Joffe and Black (2012) found that despite the absence of diagnosable emotional, behaviour and social difficulties, children with speech and language difficulties were more likely to be viewed by others as having behavioural difficulties. This coincides with previous research that language difficulties often become eclipsed by behavioural difficulties (Benner 2002, Cohen et al. 1998).

Language and literacy influence future academic and life attainments (Nippold 2006). Adults with a history of developmental language difficulties are more likely to have prolonged unemployment, difficulty with social relationships and are at a greater risk of developing a psychiatric illness (Bercow 2008; Clegg et al. 2005). Considering the impact language difficulties may have on a student’s function and role in society, it is vital that these adolescents receive the help and support they need. The ability to access language is essential in order to succeed both academically and socially. Currently there is limited speech and language therapy and educational support for adolescents in both the UK and Ireland (IASLT 2007; Bercow 2008; Joffe and Black 2012).

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**Language and Disadvantage**

Children from disadvantaged backgrounds are more likely to have delayed language skills (Locke et al. 2002; Spencer et al. 2012). Language difficulties are also more likely to go undetected in children from these backgrounds (Spencer et al. 2012; Bercow 2008). While the Irish government recognises these risks, the focus is currently on early intervention programmes in these areas (Hayes et al. 2012).
Adolescents attending school in an area of socioeconomic disadvantage score significantly lower on language assessments than those attending school in an area of relative advantage (Spencer et al 2012). These difficulties arise in both literacy and spoken language (Myers and Botting 2008). Spencer et al (2012) found that adolescents in areas of socioeconomic disadvantage were particularly likely to score lower on measures of vocabulary compared to normative population. They highlighted the need for whole school support for vocabulary learning in these areas.

Language Intervention and Adolescents

Despite the clear need for evidenced based language interventions for adolescents, particularly those in disadvantaged areas, there are significant gaps in the research (Cirren and Gillam 2008; Joffe and Nippold 2012). Research that currently exists is limited by the lack of Randomised Control Trials (RCTs). Many studies fail to compare the treatment group with a control group, in order to account for the effects of time and maturation in the adolescents’ developing language (Cirrin and Gillam 2008). However previous research has produced positive indicators that vocabulary intervention in school-age children and adolescents can produce significant improvements (Crowe 2003; Thronberg et al 2000; Lesaux et al 2010).

Crowe (2003) used meaning based communicative reading strategies to improve school-age childrens’ expressive vocabulary, in comparison to a control group. However participants actually got worse on receptive vocabulary measures which required further investigation. Thronberg et al (2000) found that the use of morphological analysis strategies improved word reading and comprehension; however results were not compared to a control group. Both interventions were carried out on children with recognised language learning difficulties. Lesaux et al (2010) carried out a classroom based intervention that found improvements on knowledge of taught words, word meaning in context and morphological skills.

As vocabulary learning skills are core to accessing the curriculum, research into interventions in this area is essential. Teaching adolescents strategies to analyse,
understand and use vocabulary has been shown to increase reading comprehension skills which are essential for academic progress (Lesaux et al 2010; Kelley et al 2010).

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**Vocabulary Learning Strategies**

Vocabulary is acquired through a combination of three main strategies; direct instruction, contextual analysis and morphological analysis (Nippold 2006, Lesaux et al 2010). Direct instruction is a commonly used method of teaching vocabulary in classrooms. This includes the use of dictionaries; however instruction on how to use a dictionary is not commonly provided in school. Therefore, many students do not have the skills required, such as decoding and using guidewords, to use the dictionaries effectively (Bryant et al 2003). Direct instruction enhances students’ knowledge of word definitions. However, this does not directly translate into understanding and appropriate use of these words (Nippold 2006; Bryant et al 2003). Contextual analysis means using the semantic and/or syntactic context and clues to determine the meaning of an unknown word. However students require higher level metalinguistic skills in order to use this strategy. Many students require instruction in order to develop the ability to recognise these context clues (Bryant 2003; Nagy and Scott 2000). Morphological Analysis involves breaking down a word into its individual components to determine its meaning. This includes finding the root of the word and analysing inflectional and derivational morphemes. It is viewed as an effective and widely applicable strategy for deciphering new vocabulary (Baumann et al 2003; Ebbers and Denton 2008; Nippold and Sun 2008).

Teaching a combination of strategies is important so that students have the range of tools to interpret vocabulary (Bryant et al 2003, Lesaux et al 2010). As vocabulary acquisition is open to individual experience, it is important that students need to be able to use these strategies independently (Bryant et al 2003, Spencer et al 2012).
Whole Class Vocabulary Intervention

While previous research has concentrated on the application of vocabulary instruction to reading comprehension skills, further research is required into the application of these strategies to spoken language.

Service Delivery

Service delivery is an important factor when considering intervention for adolescents. Individual therapy is constrained by limited resources. If the resources are available, removing students from class is not popular with adolescents as it highlights their difference from their peers (Larson and McKinley 2003). Vocabulary should be acquired within a meaningful context which is more likely to occur in the classroom (Nippold 2006).

The Irish Department of Education’s ‘National Strategy to Improve Literacy and Numeracy Report’ (2011) recommended that the collaboration of teachers and Speech and Language Therapists (SLTs) is required in order to help improve literacy in both pre-school and school-age children from disadvantaged backgrounds. Collaboration between SLTs and teachers, where teachers are the agents of intervention, is considered a more comprehensive and effective method of intervention (Lindsay et al 2010, Larson and McKinley 2003, Thornburg et al 2000, Starling et al 2012). Further high quality clinical research is required to establish the effectiveness of this method of service delivery.

Whole class intervention

Whole class intervention, in collaboration with teachers, has been shown to produce significant improvements in the language abilities of children and adolescents (McIntosh et al 2007; Starling et al 2012, Lesaux et al. 2010). Spencer et al (2012) revealed that there is a need for whole school intervention in areas of socioeconomic disadvantage. Therefore, there is a warrant for research into the effectiveness of whole class intervention in these areas in particular.

Starling et al (2012) carried out a RCT targeting oral and written language using whole class teaching with post-primary school students. The study focused on the teaching practices of teachers who received specialist training from SLTs. They showed that when teachers changed their instructional teaching practices,
students in their classes showed significant improvements in their listening comprehension and written expression skills. The use of these techniques was also sustained overtime without the aid of the SLT. Therefore whole class intervention can be efficient, both in terms of cost and student outcomes. However it does not provide information on interventions that focus on increasing students’ abilities to interpret new language as they continue through post-primary school.

A US study found that a whole class intervention approach targeting academic vocabulary in adolescents, significantly increased students’ knowledge and awareness of vocabulary (Lesaux et al 2010). However, this study focused on written vocabulary and reading comprehension. Oral vocabulary skills are also key to language and academic development. Research is required to investigate how a whole class intervention could improve these skills.

School based interventions are particularly applicable to schools in areas of socioeconomic disadvantage, whose students are typically at greater risk of having undetected speech and language difficulties (Joffe and Black 2012; Larson and McKinley 2003; Spencer et al 2012). The whole-class approach has shown to be effective in treating preschool children from low socio-economic background with language difficulties, to the extent that they performed equivalent to children with average socioeconomic backgrounds (McIntosh et al 2007).

Research into the effectiveness of collaborative interventions is only considered to be in the developing stages (Lindsay et al 2010). Further research is required to investigate the efficacy of whole class interventions and establish the benefits of this approach so that it is more widely used.

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**Current Research**

There is a need for evidence based interventions that target the language skills of adolescents from areas of socioeconomic disadvantage. Vocabulary has been found to be particularly weak in adolescents from areas of socioeconomic disadvantage. Therefore, a vocabulary interventional study is warranted in these areas (Spencer et al 2012).
The current study will implement a vocabulary intervention programme using the whole class approach, in schools in areas of socioeconomic disadvantage. By teaching students strategies to analyse, understand and use new vocabulary in a meaningful context, it is predicted that they will be better able to access the curriculum, therefore aiding their academic progress. The intervention will teach a combination of vocabulary strategies including direct instruction, morphological analysis and contextual analysis. As both current teaching methods and previous research focus on written language and reading comprehension, the current study will include a mixture of oral work, comprehension and written work to support students’ understanding of strategies and concepts (Hartshorne 2011; Joffe 2006).

Working at a whole class level ensures that the intervention is carried out in a natural setting, making it more likely that the treatment gains will continue post-intervention. It also encourages collaboration between teachers and SLTs, which is the recommended method of service delivery for school age students (Bercow et al 2008, Lindsay et al 2010). The results of initial studies show that a teacher-led, whole class intervention approach is promising, and the current study may further add to these positive findings (McIntosh et al 2007; Starling et al 2012; Lesaux et al 2010).

Some students may require additional direct individual intervention in order to make progress, due to more pervasive language disorders (Larson and McKinley 2003). However it is expected that many of these students will have previously undetected speech and language impairments, therefore taking part in the study may uncover these deficits (Joffe and Black 2012).

The current study will involve carrying out the whole-class vocabulary intervention with first year students attending two schools in an area of disadvantage over a period of one school term. The results of this intervention will be compared to two non-intervention schools in the same area of disadvantage. The relationship between language and behaviour will also be investigated, in order to examine if social, emotional and behavioural difficulties are linked with the amount of improvement made on vocabulary measures post intervention.
Objectives:

1) To establish the efficacy of a whole-class vocabulary intervention as a method of improving vocabulary learning skills of first year post-primary students’ scores on selected vocabulary measures, in schools in an area of socio-economic disadvantage.

2) To examine the relationship between students with greater social, emotional and behavioural difficulties and the amount of improvement they make on selected vocabulary measures post intervention.
Method

Participants
The study was conducted with 245 first year students. All students attended four post-primary schools. They were recruited by convenience sampling in a geographical area of socioeconomic disadvantage. All schools participated on a voluntary basis. The sample consisted of 75 male students and 170 female students, aged between 11 and 14 years (M=152.49 months SD=6.58 months). All schools included in the study were single-sex education schools.

Inclusion Criteria: Participants were required to be first year students in the selected schools in an area of socio-economic disadvantage. Informed written consent was required from the participant and their parent/guardian (See Appendix A and B).

Exclusion Criteria: Participants who did not provide written parental consent were excluded from pre and post testing (See assessment procedure). No other exclusion criterion was implemented as the sample is representative of students attending schools in disadvantaged areas (Lesaux et al 2010). Therefore 31 students who were identified as having English as an additional language were included in the study.

Withdrawal Criteria: Students that left school during the intervention or those who were not in attendance on days of post testing were withdrawn from the study. 14 students were not assessed during Time 2 assessments, meeting the studies withdrawal criteria. 8 students withdrew from post testing in the Control schools, 6 students withdrew from post testing in the Treated schools.

Ethics
Ethical approval was granted by the University of Limerick, Faculty of Education and Health Sciences Research Ethics Committee. Informed consent was given by all participating schools, parents and students. In line with ethical approval, Control schools received intervention post research.
Study Design

This intervention study employed a Pre-Test/Post-Test Repeated Measures design. It comprised of a 2 (Intervention: Treated vs. Control) x 2 (Pre-Testing vs. Post-Testing) between-within-subjects design.

The study was a Randomised Control Trial. Two schools were randomly allocated to the Treated condition (N=149, Males=75, Females = 74). Two schools were assigned to the Control condition (N=96, Males=0, Females = 96). Double blinding was not carried out as the assessors were aware of which schools had received intervention at post testing. However, the assessors were blind to students pre-testing results at post-testing. It was ensured that no assessor assessed the same student twice.

Participants in the Treated schools condition (N=149) received a teacher-implemented vocabulary intervention (Independent Variable) which resulted in a manipulation of scores on pre and post-testing vocabulary measures (Dependent Variable). Participants in the Control schools condition (N=96) did not receive the vocabulary intervention.

Materials/Assessments

The Clinical Evaluation of Language Fundamentals- 4th edition UK (CELF-4; Semel et al 2006)

Three subtests of the CELF-4-UK were administered to measure both expressive and receptive vocabulary. The ‘Word Classes’ subtest requires participants to identify and explain the relationship between two words. It is separated into Expressive and Receptive responses. A raw score is then calculated out of a maximum of 24 correct responses for each part of the subtest. The ‘Word Definitions’ subtest requires the students to analyse the meaning of a word and provide a definition, after the presentation of an introductory sentence that includes the word. It evaluates the participant’s expressive vocabulary by asking them to define the word using descriptive language. A raw score is calculated by counting the number of correct responses, out of a maximum 48. All subtests were presented orally. Raw scores and standard scores were calculated for all subtests. The CELF-4-UK subtests standard scores are based on the standardisation of the assessment on children between 5;0 and 16;11 years in the UK (Semel et al 2006).
The ‘Word Associations’ subtest on the CELF-4-UK is a naming task where the student is asked to name words in a specified category within one minute. This provides further information on the participant’s ability to name words within semantic group under time limit. As a criterion referenced subtest only a raw score is calculated (Semel et al 2006).

**The British Picture Vocabulary Scale: Third Edition (BPVS3; Dunn and Dunn 2009)**

The ‘BPVS3’ was used as a measure of the students’ receptive vocabulary. It requires the student to respond to an auditory presentation of a single word by selecting the picture (out of four options) that best illustrates the word’s meaning. A raw score is calculated out a maximum score of 168. A standard score is calculated from normative data based on the standardisation of the assessment on children between 3;0 to 16;11 in the UK (Dunn and Dunn 2009).

**Strengths and Difficulties Questionnaire (SDQ; Goodman 2005)**

The “Strengths and Difficulties Questionnaire” was used to examine participants’ Social, Emotional and Behavioural Functioning (Goodman 1997; Goodman et al 2000; Bourdon et al 2005). The teacher version of the ‘SDQ’ was selected and completed by teachers implementing the intervention. It requires teachers to respond to 25 statements on a 3 point rating scale, on fours subscales; Emotional Symptoms, Conduct Problems, Hyperactivity, Peer Relationship and Prosocial Behaviour. An ‘Overall Stress’ score is calculated from these subscales out of 40. Higher ‘Overall Stress’ score may indicate greater Social, Emotional and Behavioural Difficulties (SEBD) (Joffe and Black 2012; Goodman et al 2000). 130 Teacher-reported ‘SDQs' were obtained from the Treated schools. As the first year students were unfamiliar with their teachers at pre-testing, SDQ’s were obtained at post-testing so that the teachers could provide accurate responses.

**Fidelity Checklist**

Teachers were required to record the attendance of students at each session, and identify which students had particular difficulty with each session.
Assessment Procedure

**Pre Testing:** 245 students were assessed at Time 1 (September 2013) over a two week period. They were assessed individually in a quiet location in their schools. Administration of the assessments were conducted as per instructions provided in the assessment manuals for the ‘CELF4-UK’ and the ‘BPVS 3’ (Semel et al 2006; Dunn and Dunn 2009). Assessments were administered by two Speech and Language Therapists and six final year Speech and Language Therapy students. Participants were assessed on the vocabulary measures over the course of one session. Each assessment session took between 25 and 45 minutes to complete.

**Post Testing:** 231 students were re-assessed at Time 2 (January 2014) over a two week period. Assessment procedure was implemented as per Time 1. Assessment administrators were blind to the participant’s assessment scores in Time 1, and each administrator did not reassess any students they had assessed in Time 1. Teachers completed the SDQ’s at Time 2 post-testing.

Vocabulary Intervention Programme

The first year students in the Treated schools received an adapted version of the ‘Vocabulary Enrichment Programme’ (Joffe 2011). The programme comprised of twelve sessions, each taking 2 forty minutes classes to complete. Joffe’s programme (2011) was adapted by the lead researcher, a qualified Speech and Language Therapist, to fit a whole class approach in a shorter time frame. It consisted of sessions 1-10 of the ‘Vocabulary Enrichment Programme’, with two revision sessions added. The programme targeted vocabulary learning strategies so that students could learn to independently interpret new words, through word associations, categorisation, word maps, mind mapping, word building, understanding and analysing morphology, as well as understanding multiple meanings and idiomatic and figurative language. It also included training in the use of dictionaries (Joffe 2011). It is based on the British school curricular vocabulary, therefore making it appropriate for a school based programme. It included session plans that outlined session objectives, suggestions on how each objective could be taught, and homework options.
**Teacher training**

A Speech and Language Therapist provided training to the English teachers and Resource Teachers who administered the vocabulary programme to the treatment group. They were provided with a teacher’s booklet containing an overview of the adapted ‘Vocabulary Enrichment Programme’ (Joffe 2011), as well as session plans for each individual session. They were also provided with ongoing weekly support from the Speech and Language Therapist over the 12 week programme.

**Data reductions/statistical analysis**

Validity and reliability of the selected assessments were carried out by the developers of the ‘CELF- 4-UK’ and the ‘BPVS3’ and ‘SDQ’ assessments (Semel et al 2006, Dunn and Dunn 2009, Goodman 1997, 2005).

Parametric tests were used to analyse the data. Although the data was not normally distributed, this is due to the large sample size. It was also ratio type data, and there was equal variance across groups. Therefore parametric statistical tests were appropriate (Coolican 2009).

A Repeated Measures mixed ANOVA was used to analyse the effects of Intervention vs no Intervention on students’ scores on vocabulary measures from Time1 to Time 2. A Repeated measures ANOVA was also used to analyse if gender influenced on the amount of improvement made on the vocabulary measures from Time 2 to Time 2. Independent and paired t-tests were used to establish significance differences between the groups’ scores at Time 1 and Time 2, and to analyse the amount of improvement each group made separately. Statistical analysis was carried out on both raw scores and standard scores.

A Pearson’s test of Correlation was used to examine the relationship between students’ scores on the ‘SDQ’ and the amount of improvement they made on vocabulary measures from Time 1 to Time 2. Amount of improvement was calculated by subtracting students’ Pre-testing scores from their Post-testing scores.

A criterion for reaching significance was set at $p < 0.05$ on all statistical analyses.
The pre-test scores of students who met the withdrawal criteria could not be compared to post-test scores; therefore SPSS excluded them from the ANOVA statistical analyses. Therefore 88 students in the Control schools were compared to 143 students in the Treated schools.

Absence scores were not analysed due to the low level of absenteeism during the intervention.
Results

Control Vs Treated Schools at Pre-testing
Independent t-tests, for all measures, showed that the difference between Treated and Control schools at Pre-testing was not significant (See Table 1). Treatment groups did differ significantly on the selected vocabulary measures before the implementation of the vocabulary intervention.

Intervention Scores Pre vs Post
A Repeated Measures mixed between-within ANOVA was used to examine the effect of Time and Intervention on Treated schools vs Control schools.

BPVS 3 Raw Scores
There was a significant interaction effect between Time and Intervention on the ‘BPVS3’ raw scores $F(1, 229) = 6.454, p = 0.012$, partial $\eta^2 = 0.003$. This shows that there was a significant difference between the Treated schools’ improvement on the ‘BPVS3’ raw scores than the Control schools’ raw scores (See Figure 1).

The within subjects main effect of Time on the ‘BPVS3’ raw scores was significant $F(1, 229) = 42.745, p = 0.0001$, partial $\eta^2 = 0.157$. Students ‘BPVS3’ raw scores improved significantly over time regardless of treatment group.

The between subjects main effect of Treatment group on the ‘BPVS3’ scores was not significant $F(1,229) = 0.727, p=0.395$, partial $\eta^2 = 0.003$. There is no significant difference between the two conditions’ raw scores.

A paired t-test showed that the mean difference between pre and post testing in the Treated schools was -4.3357. The 95% Confidence Interval for the estimated population mean difference was between -5.5479 and -3.1234. There was a significant difference in scores from pre-testing to post-testing ($t=-7.070, df = 142, p =.0001$, two tailed).
Table 1: Independent T-test Pre Testing: Treated vs Control Schools’ scores

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Mean</th>
<th>SD</th>
<th>Mean Diff</th>
<th>95% C.I.</th>
<th>T</th>
<th>df</th>
<th>P</th>
<th>Tailed</th>
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<tbody>
<tr>
<td><strong>Word Classes</strong></td>
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<tr>
<td><strong>Receptive RS Pre</strong></td>
<td>12.423 (Treated) 12.490 (Control)</td>
<td>4.0205 (Treated) 4.3601 (Control)</td>
<td>-.0668</td>
<td>Between -1.1383 and -1.0048</td>
<td>-.123</td>
<td>243</td>
<td>.902</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>Expressive RS Pre</strong></td>
<td>7.611 (Treated) 7.521 (Control)</td>
<td>3.3626 (Treated) 4.0105 (Control)</td>
<td>.0899</td>
<td>Between -.8458 and 1.0256</td>
<td>.189</td>
<td>243</td>
<td>.850</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>Definitions RS Pre</strong></td>
<td>16.738 (Treated) 16.823 (Control)</td>
<td>7.8244 (Treated) 9.4724 (Control)</td>
<td>-.0847</td>
<td>Between -2.2776 and 2.1083</td>
<td>-.076</td>
<td>243</td>
<td>.939</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>BPVS RS Pre</strong></td>
<td>124.785 (Treated) 124.052 (Control)</td>
<td>17.8903 (Treated) 20.7407 (Control)</td>
<td>.7332</td>
<td>Between -4.1792 and 5.6455</td>
<td>.294</td>
<td>243</td>
<td>.769</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>Word Association RS Pre</strong></td>
<td>45.738 (Treated) 48.719 (Control)</td>
<td>11.2851 (Treated) 13.1643 (Control)</td>
<td>-2.9805</td>
<td>Between -6.0881 and 1.271</td>
<td>-1.88</td>
<td>243</td>
<td>.060</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>Receptive SS Pre</strong></td>
<td>7.416 (Treated) 7.375 (Control)</td>
<td>3.1795 (Treated) 3.4466 (Control)</td>
<td>.0411</td>
<td>Between -.8061 and .8883</td>
<td>.096</td>
<td>243</td>
<td>.924</td>
<td>2 tailed</td>
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<tr>
<td><strong>Expressive SS Pre</strong></td>
<td>5.980 (Treated) 5.729 (Control)</td>
<td>2.8391 (Treated) 3.2750 (Control)</td>
<td>.2507</td>
<td>Between -.5271 and 1.0285</td>
<td>.635</td>
<td>243</td>
<td>.526</td>
<td>2 tailed</td>
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<tr>
<td><strong>Definitions SS Pre</strong></td>
<td>6.054 (Treated) 5.990 (Control)</td>
<td>2.8493 (Treated) 3.4054 (Control)</td>
<td>.0641</td>
<td>Between -.7346 and .8628</td>
<td>.158</td>
<td>243</td>
<td>.875</td>
<td>2 tailed</td>
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<tr>
<td><strong>BPVS SS Pre</strong></td>
<td>82.99 (Treated) 83.58 (Control)</td>
<td>12.843 (Treated) 13.059 (Control)</td>
<td>-.590</td>
<td>Between -3.923 and 2.743</td>
<td>-.349</td>
<td>243</td>
<td>.728</td>
<td>2 tailed</td>
</tr>
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*Note:* Results show the difference between the Control schools’ and Treated schools’ scores at Time 1. RS = Raw Score; SS = Standard Score
Figure 1: BPVS Raw Score Improvement from Time 1 to Time 2

**Note:** Significant Interaction effect. Graph shows a significant difference between Control schools’ and Treated schools’ improvement over time on the ‘BPVS3’ measure.
A paired t-test showed that the mean difference between pre and post testing in the Control schools was -2.730. The 95% Confidence Interval for the estimated population mean difference was between -3.2993 and -0.5189. There was a significant difference between pre and post test raw scores in the Control schools ($t = -2.730, df = 87, p = 0.008$, two-tailed).

**Word Classes Expressive Raw Scores**

There was a significant interaction effect between Time and Intervention on the ‘Word Classes Expressive’ raw scores; $F(1, 229) = 6.062, p = 0.015$, partial $\eta^2 = 0.026$. This shows that there was a significant difference between the Treated schools’ improvement on the ‘Word Classes Expressive’ raw scores and the Control schools’ raw scores (See Figure 2).

The within subjects main effect of Time on the ‘Word Classes Expressive’ raw scores was significant; $F(1, 229) = 26.696, p = 0.0001$, partial $\eta^2 = 0.104$. Students’ raw scores improved on the ‘Word Classes Expressive’ measure in both conditions.

The between subjects main effects of Treatment condition was not significant; $F(1, 229) = 2.175, p = 0.142$, partial $\eta^2 = 0.009$. There is no significant difference between the two conditions’ raw scores.

A paired t-test showed that mean difference between pre and post testing in the Treated schools was -1.5385. The 95% Confidence Interval for the estimated population mean difference was between -2.0608 and -1.0162. There was a significant difference in Treated schools’ raw scores from pre to post testing ($t = -5.823, df = 142, p = 0.0001$, two tailed).

A paired t-test showed that the mean difference between pre and post testing in the Control schools was -0.5455. The 95% Confidence Interval for the estimated population mean difference was between -1.1073 and -0.0164. There no significant difference between pre and post test raw scores in the Control schools ($t = -1.930, df = 87, p = 0.057$, two-tailed).
Figure 2: Word Classes Expressive Raw Score Improvement from Time 1 to Time 2

Note: Significant Interaction effect-Graph shows a significant difference between Control schools’ and Treated schools’ improvement over time on the ‘Word Classes Expressive’ measure.
**Word Associations Raw Score**

There was a significant interaction effect between Time and Intervention; F(1,229)= 6.811, p = 0.010, partial $\eta^2 = 0.029$. This shows that there was a significant difference between the Treated schools' improvements and the Control schools' improvement on the 'Word Associations' measure (See Figure 3).

The within subject main effect of Time was significant; F(1,229)= 14.729, p = 0.0001, partial $\eta^2 = 0.060$. Students' raw scores improved significantly on the 'Word Associations' measure in both conditions.

The between subjects main effect of Treatment group was not significant; F(1,229)= 0.444, p = 0.506, partial $\eta^2 = 0.002$. There is no significant difference between the two conditions' raw scores.

A paired t-test showed that mean difference between pre and post testing in the Treated schools was -3.6993. The 95% Confidence Interval for the estimated population mean difference was between -5.1741 and -2.2245.

There was a significant difference in Treated schools' raw scores from pre to post testing ($t=-4.959, df = 142, p =0.0001$, two tailed).

A paired t-test showed that mean difference between pre and post testing in the Control schools was -0.7045 and 95% Confidence Interval for the estimated population mean difference was between -2.3306 and -0.9216.

There no significant difference between pre and post test raw scores in the Control schools ( $t = -0.861, df = 87, p=0.392$ , two-tailed).
Figure 3: Word Association Score Improvement from Time 1 to Time 2

Note: Significant Interaction of effect-Graph shows a significant difference between Control schools’ and Treated schools’ improvement over time on the ‘Word Associations’ measure.
Vocabulary Measures: Additional Findings

The main effect of time was significant on the remaining vocabulary measures ($p<0.001$). There was no significant interaction effect on the remaining vocabulary measures. There was no significant difference between treatments groups on the vocabulary measures (See Appendix 3).

The paired t-test showed that students improved significantly on all subtests in the Treated schools (See Table 2). The Control schools did not improve on 'Word Classes Expressive' raw scores and standard scores, and 'Words Associations' scores (See Table 3).

Gender

An independent t-test showed that females scored significantly higher on the 'Word Classes Receptive and Expressive' subtest at pre-testing (See Appendix 4). A 2x2 mixed-between-within ANOVA showed that there was no significant difference in improvement between Males and Females from Time 1 to Time 2 on all vocabulary measures in the Treated schools (See Table 4).
### Table 2: Treated Schools Paired t-test Improvement on Measures over Time

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Mean</th>
<th>SD</th>
<th>Mean Diff</th>
<th>95% C.I.</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Tailed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word Classes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive RS Pre vs Post</td>
<td>12.552</td>
<td>3.9569</td>
<td>-1.1748</td>
<td>Between -1.6066 and -0.7431</td>
<td>-5.379</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td>Expressive RS Pre vs Post</td>
<td>7.671</td>
<td>3.3751</td>
<td>-1.5385</td>
<td>Between -2.0608 and -1.0162</td>
<td>-5.823</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>Word Definitions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS Pre vs Post</td>
<td>17.056</td>
<td>7.7802</td>
<td>-1.9371</td>
<td>Between -2.7405 and -1.1336</td>
<td>-4.766</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>BPVS RS Pre vs Post</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre vs Post</td>
<td>125.042</td>
<td>17.7303</td>
<td>-4.3357</td>
<td>Between -5.5479 and -3.1234</td>
<td>-7.070</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>Word Associations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS Pre vs Post</td>
<td>45.825</td>
<td>11.3251</td>
<td>-3.6993</td>
<td>Between -5.1741 and -2.2245</td>
<td>-4.959</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>Word Classes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive SS Pre vs Post</td>
<td>7.510</td>
<td>3.1464</td>
<td>-0.7133</td>
<td>Between -1.0754 and -0.3512</td>
<td>-3.894</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td>Expressive SS Pre vs Post</td>
<td>6.035</td>
<td>2.8443</td>
<td>-0.8881</td>
<td>Between -1.3229 and -0.4533</td>
<td>-4.038</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>Word Definitions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS Pre vs Post</td>
<td>6.175</td>
<td>2.8217</td>
<td>-0.5804</td>
<td>Between -.8717 and -0.2892</td>
<td>-3.939</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>BPVS SS Pre vs Post</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre vs Post</td>
<td>83.09</td>
<td>12.748</td>
<td>-2.7622</td>
<td>Between -3.8974 and -1.6271</td>
<td>-4.810</td>
<td>142</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
</tbody>
</table>

**Note:** Results show the amount of improvement made by the Treated schools from Time 1 to Time. RS = Raw Score; SS = Standard Score
Table 3: Control Schools Paired t-test—Improvement on Measures over Time

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Mean</th>
<th>SD</th>
<th>Mean Diff</th>
<th>95% C.I.</th>
<th>T</th>
<th>df</th>
<th>p</th>
<th>Tailed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word Classes</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Receptive RS Pre vs Post</strong></td>
<td>12.398</td>
<td>4.3748</td>
<td>-.7841</td>
<td>Between -1.2686</td>
<td>-3.217</td>
<td>87</td>
<td>0.002</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>13.182</td>
<td>4.4838</td>
<td></td>
<td>and -0.2996</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Expressive RS Pre vs Post</strong></td>
<td>7.477</td>
<td>4.0028</td>
<td>-.5455</td>
<td>Between -1.1073</td>
<td>-1.930</td>
<td>87</td>
<td>0.057</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>8.023</td>
<td>4.1161</td>
<td></td>
<td>and 0.0164</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Definitions RS Pre vs Post</strong></td>
<td>16.750</td>
<td>9.1227</td>
<td>-1.5682</td>
<td>Between -2.5936</td>
<td>-3.040</td>
<td>87</td>
<td>0.003</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>18.318</td>
<td>9.7421</td>
<td></td>
<td>and -0.5428</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>BPVS RS Pre vs Post</strong></td>
<td>124.148</td>
<td>20.1646</td>
<td>-1.9091</td>
<td>Between -3.2993</td>
<td>-2.730</td>
<td>87</td>
<td>0.008</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>126.057</td>
<td>20.8318</td>
<td></td>
<td>and -0.5189</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Association RS Pre vs Post</strong></td>
<td>48.352</td>
<td>12.5881</td>
<td>-.7045</td>
<td>Between -2.3306</td>
<td>-.861</td>
<td>87</td>
<td>0.392</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>49.057</td>
<td>13.6174</td>
<td></td>
<td>and 0.9216</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Receptive SS Pre vs Post</strong></td>
<td>7.330</td>
<td>3.4632</td>
<td>-.4773</td>
<td>Between -0.8899</td>
<td>-2.299</td>
<td>87</td>
<td>0.024</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>7.807</td>
<td>3.7197</td>
<td></td>
<td>and -0.0646</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Expressive SS Pre vs Post</strong></td>
<td>5.705</td>
<td>3.2806</td>
<td>-.2955</td>
<td>Between -0.7612</td>
<td>-1.261</td>
<td>87</td>
<td>0.211</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>6.000</td>
<td>3.3114</td>
<td></td>
<td>and 0.1703</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Definitions SS Pre vs Post</strong></td>
<td>5.943</td>
<td>3.3196</td>
<td>-.5795</td>
<td>Between -0.9700</td>
<td>-2.950</td>
<td>87</td>
<td>0.004</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>6.523</td>
<td>3.5493</td>
<td></td>
<td>and -0.1891</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>BPVS SS Pre vs Post</strong></td>
<td>83.39</td>
<td>12.937</td>
<td>-1.6023</td>
<td>Between -2.8955</td>
<td>-2.463</td>
<td>87</td>
<td>0.016</td>
<td>2 tailed</td>
</tr>
<tr>
<td></td>
<td>84.989</td>
<td>14.4941</td>
<td></td>
<td>and -0.3090</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Results show the amount of improvement made by the Control schools from Time 1 to Time. RS = Raw Score; SS = Standard Score
Table 4: Mixed ANOVA-Effect of Gender on improvement post intervention

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Df, error</th>
<th>F</th>
<th>( P )</th>
<th>( \eta^2 )</th>
<th>F</th>
<th>( p )</th>
<th>( \eta^2 )</th>
<th>F</th>
<th>( p )</th>
<th>( \eta^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPVS RS</td>
<td>1,141</td>
<td>.081</td>
<td>0.777</td>
<td>.001</td>
<td>49.560</td>
<td>0.0001</td>
<td>.260</td>
<td>1.441</td>
<td>0.232</td>
<td>.010</td>
</tr>
<tr>
<td>BPVS SS</td>
<td>1,141</td>
<td>.001</td>
<td>0.974</td>
<td>.000</td>
<td>22.959</td>
<td>0.0001</td>
<td>.140</td>
<td>.036</td>
<td>0.850</td>
<td>.000</td>
</tr>
<tr>
<td>Word Classes Expressive RS</td>
<td>1,141</td>
<td>.382</td>
<td>0.538</td>
<td>.003</td>
<td>33.592</td>
<td>0.0001</td>
<td>.192</td>
<td>11.999</td>
<td>0.001</td>
<td>.078</td>
</tr>
<tr>
<td>Word Classes Expressive SS</td>
<td>1,141</td>
<td>.503</td>
<td>0.479</td>
<td>.004</td>
<td>16.122</td>
<td>0.0001</td>
<td>.103</td>
<td>15.529</td>
<td>0.0001</td>
<td>.099</td>
</tr>
<tr>
<td>Word Classes Receptive RS</td>
<td>1,141</td>
<td>3.211</td>
<td>0.075</td>
<td>.022</td>
<td>29.781</td>
<td>0.0001</td>
<td>.174</td>
<td>18.095</td>
<td>0.0001</td>
<td>.114</td>
</tr>
<tr>
<td>Word Classes Receptive SS</td>
<td>1,141</td>
<td>.590</td>
<td>0.444</td>
<td>.044</td>
<td>15.240</td>
<td>0.0001</td>
<td>.098</td>
<td>16.407</td>
<td>0.0001</td>
<td>.104</td>
</tr>
<tr>
<td>Word Definitions RS</td>
<td>1,141</td>
<td>.251</td>
<td>0.617</td>
<td>.002</td>
<td>22.484</td>
<td>0.0001</td>
<td>.138</td>
<td>2.275</td>
<td>0.134</td>
<td>.016</td>
</tr>
<tr>
<td>Word Definitions SS</td>
<td>1,141</td>
<td>.017</td>
<td>0.897</td>
<td>.000</td>
<td>15.425</td>
<td>0.0001</td>
<td>.099</td>
<td>3.130</td>
<td>0.079</td>
<td>.022</td>
</tr>
<tr>
<td>Word Associations RS</td>
<td>1,141</td>
<td>1.488</td>
<td>0.225</td>
<td>0.010</td>
<td>.852</td>
<td>0.0001</td>
<td>.148</td>
<td>.010</td>
<td>0.922</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note: The results show non-significant interaction effects between Males and Females over Time, the significant main effects of Time on measures, and the non-significant between effects of gender category. RS = Raw Score; SS = Standard Score.
Results: Language and Behaviour

Two tailed Pearson’s correlations were used to explore the relationship between participants ‘Improvement on Vocabulary measures’ and their ‘Overall Stress’ scores on the ‘SDQ’ at post testing. Of the 149 Treated school students assessed at post testing, 130 completed ‘SDQ’ forms were returned and analysed.

**Raw Scores**

There was a weak non-significant negative correlation between ‘Amount of Improvement’ on the ‘Word Classes Receptive’ raw score and ‘Overall Stress’ score. \( r = -0.005, N = 130, p = 0.954, \text{two tailed} \). There was a weak significant negative correlation between ‘Amount of Improvement’ on the ‘Word Classes Expressive’ raw scores and ‘Overall Stress’ score \( r = -0.241, N = 130, p = 0.006, \text{two tailed} \). There was a weak significant negative correlation between ‘Amount of Improvement’ on the ‘Word Definitions’ raw scores and ‘Overall Stress’ score \( r = -0.238, N = 130, p = 0.006, \text{two tailed} \). There was a weak non-significant positive correlation between ‘Amount of Improvement’ on the ‘Word Associations’ subtest and ‘Overall Stress’ score \( r = 0.007, N = 130, p = 0.936, \text{two tailed} \). There was a weak non-significant negative correlation between ‘Amount of Improvement’ on the ‘BPVS’ raw score and ‘Overall Stress’ score \( r = -0.105, N = 130, p = 0.235, \text{two tailed} \).

**Standard Scores**

There was a weak non-significant negative correlation between ‘Amount of Improvement’ on the ‘Word Classes Receptive’ standard score and ‘Overall Stress’ score. \( r = -0.065, N = 130, p = 0.460, \text{two tailed} \). There was a weak significant negative correlation between ‘Amount of Improvement’ on the ‘Word Classes Expressive’ standard score and ‘Overall Stress’ score. \( r = -0.253, N = 130, p = 0.004, \text{two tailed} \). There was a weak significant negative correlation between ‘Amount of Improvement’ on the ‘Word Definitions’ standard scores and ‘Overall Stress’ score \( r = -0.184, N = 130, p = 0.036, \text{two tailed} \). There was a weak significant negative
correlation between ‘Amount of Improvement’ on the ‘BPVS’ standard scores and ‘Overall Stress’ score (r = .112, N = 130, p = 0.204, two tailed).
Discussion

The aim of this study was to examine the effects of a whole class vocabulary intervention programme on first year students’ scores on selected vocabulary measures. A secondary aim was to investigate a relationship between behaviour and the amount of improvement students made on the vocabulary measures.

Vocabulary Intervention Findings

The results showed there were no significant differences between the Treated schools and Control schools at Pre-testing on both raw scores and standard scores. This ensures that significant differences in amount of improvement on vocabulary measures over time can be attributed to the treatment effect of intervention.

Analysis showed that the Treated schools’ raw scores improved significantly more than the Control schools on the ‘BPVS3’ assessment and the ‘Word Classes Expressive’ subtest on the ‘CELF-4 UK’ at post-testing. Their scores on the criterion referenced ‘Word Associations’ subtest also improved significantly more than the Control schools’ scores. The results suggest that the intervention was successful in improving students’ receptive knowledge of vocabulary, expressive ability to explain semantic relationships between vocabulary, and their ability to name members of semantic groups within a time limit. This suggests that the intervention targeting vocabulary strategies can improve these aspects of vocabulary skills and knowledge. This supports previous research that found that vocabulary intervention can improve receptive and expressive vocabulary knowledge (Crowe 2003; Cirrin and Gillam 2008; Lesaux et al 2010). However previous research did not focus on spoken language skills. Myers and Botting (2008) found that children in areas of socioeconomic disadvantage, who had difficulty with vocabulary in reading comprehension, also had difficulty with spoken language skills. The current intervention study provides a new foundation of evidence that vocabulary interventions may improve oral language abilities.

When looking at the overall improvement of the students assessed as pre and post testing, analysis showed that there was a significant improvement of scores from Time 1 to Time 2 on all vocabulary measures. This can be attributed to maturation,
as well as the demands of entering post-primary schools where they encountered new vocabulary on a daily basis. Therefore, improvement over time was expected. This highlights the importance of comparisons of Treated groups’ scores to a Control group, so that this effect of time is not falsely attributed to the intervention (Cirrin and Gillam 2008). This limitation has been highlighted in previous vocabulary intervention research (Thronberg et al 2000; Joffe 2006).

On further analysis, the study found that the Treated schools improved significantly on all vocabulary measures; raw scores and standard scores. However the Control schools did not improve significantly on the ‘Word Classes Expressive’ raw scores and standard scores and the ‘Words Associations’ criterion referenced scores. The improvement on ‘Word Classes Expressive’ standard scores is of particular interest as standard scores allow for the comparison of the participants scores to the normative population. (Paul and Norbury 2012). Further investigation is required to examine if this significant improvement may due be the effect of intervention.

As significant interaction effects were not found on standardized scores, these results cannot be compared to the normative population, therefore limiting the clinical significance of the study findings. However considering the lack of evidence base for interventions for adolescent language, these results are promising (Cirrin and Gillam 2008).

Overall the study showed positive indicators that the implementation of the whole class vocabulary intervention was successful at improving students’ scores on selected vocabulary measures. It is a promising addition to previous research into the use of the whole-class approach as a method of service delivery (McIntosh et al 2007; Starling et al 2012; Lesaux et al 2010). It supports the recommendations that schools in areas of socioeconomic disadvantage should be treated on a whole-school basis (Spencer et al 2012). Treating all first year students, and incorporating it into their regular English class has several benefits. It anchors the intervention in curricular based language and ensures vocabulary is targeted in a classroom setting where the majority of vocabulary is acquired during
adolescents. It also averts the typical “pull out” treatment strategy where students not only miss class, but may also feel stigmatised due to being singled out from their peers for treatment. (Nippold 2006; Larson and McKinley 2003).

**Gender**

All schools were single-sex education schools. Both Control schools were all girls’ schools. There was a difference between males and females a pre-testing with females scoring higher on all measures. However the results showed that gender did not impact on the amount of improvement made at post testing in the treated schools. This supports evidence that girls have higher verbal abilities than boys at adolescence, but this does not have an impact on the current interventions treatment gains (Galsworthy et al 2000).

**Limitations of Vocabulary Intervention Findings**

Treatment gains were only found on raw scores. As significant treatment gains were not found on standard scores, the treated schools improvement cannot be compared to the normative population. It is possible that standard scores were not sensitive enough to show the effects of treatment in a short four month period from Time 1 to Time 2.

As the Word Associations subtest is a criterion referenced assessment, the use of this assessment in future studies should be carefully considered (Paul and Norbury 2012). As it is not a standardized assessment, changes in scores cannot be compared to the normative population. However it provides important information on students’ ability to categorise vocabulary, semantic knowledge and processing abilities within a time limit.

The study did not record if students had a pre-existing diagnosis of speech and language impairment. It is expected that some students with language impairments will require additional individual intervention to make significant progress (Larson and McKinley 2003). Further investigation is needed to examine whether students with standards scores lower than the normative population improved significantly due to the intervention. As language difficulties during
adolescence often remain hidden, the study is likely to bring to light students with previously undiagnosed language impairments (Joffe and Black 2012).

Investigation needs to be undertaken into the inclusion of students who have English as an Additional Language (EAL), and how much they improved. This aspect was not examined in the current study. However due to the increasing linguistic diversity in schools, the inclusion of EAL students was considered to be more representative of a typical school in a socioeconomically disadvantaged area. Leseux et al (2010) suggested that language interventions for adolescents should be beneficial to language minority students, while also being appropriate for monolingual students, without diminishing the effect of the intervention.

Language and Behaviour

A weak significant negative relationship was found between students’ ‘Overall Stress’ scores on the teacher-reported SDQs and their amount of improvement on the ‘Word Classes Expressive’ raw scores and standard scores, the ‘Word Definitions’ standard scores and the ‘BPVS3’ standard scores. This suggests a relationship between higher ‘Overall Stress’ scores and students who made less improvement on vocabulary measures from Time 1 to Time 2. However this is a weak significant relationship, therefore we cannot suggest that students with social emotional and behaviour difficulties (SEBD) are less likely to benefit from the intervention. Previous research has found that teachers’ perceptions of greater SEBD may be indicative of lack of resources to meet childrens’ needs (Dockrell and Lindsay 2001).

Further investigation is required to examine if students with higher ‘Overall Stress’ scored lower on vocabulary measures at pre-testing. In order to comprehensively examine this, SDQ’s would need to be obtained from parents and the students’ themselves. Meltzer (2000) found that student reported SDQs were the most reliable in predicting SEBD.
However results do highlight the need for further investigation into the link between behaviour and language. Is it the SEBD that impedes language acquisition, even with the input of language intervention? Or are these students’ language difficulties causing them to be viewed as having behaviour problems, as suggested by Joffe and Black (2012). If students with greater SEBD do not improve as much other students, the current study’s intervention may still be an effective method of intervention. A lack of resources and the prevalence of undiagnosed language impairments in adolescents from disadvantaged areas, means that a whole class approach may be the only method of ensuring students’ are provided with the resources they need.

Clinical Implications

This study makes a valuable contribution towards establishing an evidence based whole-class intervention for vocabulary in adolescents from areas of socioeconomic disadvantage. It targets students who are at particular risk of delayed vocabulary development (Spencer et al 2012).

However as there was no significant interaction effect on standard scores improvement from Time 1 and Time 2, we cannot assume that results of the study are clinically significant (Bothe and Richardson 2011; Lesaux et al 2010). Further research is required to establish if this intervention successfully aids students’ vocabulary, to the extent that the vocabulary knowledge of students from socioeconomically disadvantaged areas is consistent with the vocabulary knowledge in students from areas of relative advantage (Bothe and Richardson 2011; Spencer et al 2012). Clinically significant results would highlight the benefits of investing resources into the whole class vocabulary intervention across socioeconomically disadvantaged areas.

Future Directions

As there is a limited research base in this area, future research should focus on the replication of these findings in schools in other areas of disadvantage. An investigation into possible predictors of improvement on the intervention is also
required. Further investigation is also required into the impact of the intervention on students who scored below the average range on standardised vocabulary measures.

The long term effects of this intervention will also warrant further research. As the intervention aims for the students to be able to use the vocabulary learning skills to decode new vocabulary independently, it is expected that these skills will continue to benefit students in the future (Joffe 2011).

The vocabulary measures do not show what strategies students use to decode new vocabulary. It is recommended that a specialised assessment will be developed to specifically analyse these strategies. This is important for the further development and improvement of the intervention. By understanding which strategies are most helpful, the intervention can become more effective and efficient.

**Conclusion**

In conclusion, the current study shows that a whole-class vocabulary intervention is a successful method of improving vocabulary skills and knowledge in first year students in areas of socio-economic disadvantage. The study creates a foundation for further research in this area, so that the whole-class method of service delivery can be used as an evidenced based intervention to target vocabulary skills, across schools in areas of socio-economic disadvantage. This would create awareness in post-primary schools about language impairments in adolescence and ensure that students who have language difficulties, receive the intervention they require.
References


Goodman, R. (2005) Strengths and Difficulties Questionnaire (SDQ) [online] available:


IASLT (2007) ‘Specific speech and language impairment in children: definition, service provision and recommendations for change’ [online] available:


Joffe, V. L. and Black, E. (2012) ‘Social, emotional, and behavioural functioning of secondary school students with low academic and language performance:
Perspectives from students, teachers, and parents', *Language, Speech, and Hearing Services in Schools*, 43(4), 461.


Appendices

Appendix A: Participant Information and Consent Forms

**Information for Students: Pilot of Vocabulary Strategies Assessment**

<table>
<thead>
<tr>
<th>Research Project: Measuring the efficacy of a whole class intervention to improve vocabulary learning skills in post-primary school students</th>
</tr>
</thead>
</table>

**What is this about?**

You are being asked to trial or pilot a new assessment for identifying the vocabulary learning skills of teenagers.

This will be used as part of a research project on teaching vocabulary learning skills in post-primary schools.

**What do I have to do?**

You are being asked to complete a vocabulary strategies assessment with the research speech and language therapy students. This will take 15 minutes.

They will ASK YOU to read two short paragraphs, give the meanings of ten words and explain how you know that.

**What if I do not want to take part?**

You can decide to not take part at any time and we WILL NOT use your information in the project.

**What happens to the information?**

The information will be **written down** by the speech and language therapist.

All the information you give the Speech and Language Therapist is kept in a locked filing cabinet.

Nobody can read this information except the Speech and Language Therapists working on the project.
The information collected will be kept for kept on the main researcher's computer, which will have a password to protect it.

There will be NO information about your name, date of birth, address or school in the research.

**What happens if something goes wrong?**
In the unlikely event that something goes wrong during the assessment session, the assessment will immediately stop until the researcher and students are ready to start again or the session would be stopped completely.

**How does this help you?**
The information will help teachers, speech and language therapists and others to understand how difficult school is for students who find it hard to learn new words and use new words and sentences as well as understand what you read.

**What are the risks?**
You might find some questions difficult or feel uncomfortable with some of the questions in the assessment. If this happens you can stop the assessment or refuse to answer the question.

**Who else is taking part?**
Approximately twenty four 12-14 year old students from your area will be asked to complete the assessment

**What happens at the end of the study?**
At the end of the study the information will be used to present results but the information here will have no names, school names or any other information about you.

The information will be written up and may be published on the internet.

All subject detail/information and data will be held by the principal investigator for up to 7 years in a password-protected computer.
The results of the project will be available to you if you write a letter to the speech and language therapists working in the project.

**What if I have more questions or do not understand something.**
If you do not understand something during the assessment you can ask the researcher at any time.

**What if I change my mind during the study?**
If you change your mind during the study, you can ask for your information not to be included in the research. You can decide if you want your information included or not.
STUDENT PARTICIPANT INFORMED CONSENT FORM

Title of Project: Measuring the efficacy of a whole class intervention to improve vocabulary learning skills in post-primary school students

Should you agree to participate in this study please read the statements below and if you agree to them, please sign the consent form.

I have read and understood the participant information sheet.
I understand what the project is about, and what the results will be used for.
I understand that what the researchers find out in this study may be shared with others but that my name will not be given to anyone in any material developed.
I am fully aware of all of the procedures involving myself, and of any risks and benefits associated with the study.
I know that my participation is voluntary and that I can withdraw from the project at any stage without giving any reason.

I agree to my involvement in this research project after agreeing to all the above statements.

Name: (please print): __________________________

Signature: ___________________________ Date: __________

Witness Signature __________________________ Date: __________

Investigator’s Signature __________________________ Date: __________
Appendix B: Parental Information and Consent Forms

Information for Parents: Pilot of Vocabulary Strategies Assessment

Research Project: Measuring the efficacy of a whole class intervention to improve vocabulary learning skills in post-primary school students

What is this about?
Your son/daughter is being asked to trial or pilot a new assessment for identifying the vocabulary learning skills of teenagers.

This will be used as part of a research project on teaching vocabulary learning skills in post-primary schools.

What do I have to do?
Your son/daughter is being asked to complete a vocabulary strategies assessment with the research speech and language therapy students. This will take 15 minutes.

He/she will be asked to read two short paragraphs, give the meanings of ten words and explain how you know that.

What are the benefits of the study for your son/daughter?
The information from the assessments will be used to help teachers, speech and language therapists and others to identify if the programme helps students improve their vocabulary and ability to learn new words.

What are the risks of the study for your son/daughter?
Your son/daughter might find some questions difficult or feel uncomfortable with some of the questions in the assessment. If this happens the assessment will be stopped or the question skipped.

Who else is taking part?
Approximately twenty four 12-14 year old students from your area will be asked to complete the assessment.
What if something goes wrong?
In the unlikely event that something goes wrong during the assessment session, the assessment will immediately stop until the researcher and students are ready to start again or the session would be stopped completely.

What happens to the information?
The information about your son/daughters progress in the programme will be included in research completed through the University of Limerick:
This information will be written down, recorded and kept in a locked filing cabinet.

The information will be analysed and written up for publication in a journal for people to read.

NO identifying information will be printed in the research: Your son/daughters name, date of birth, address or school name will NOT be written in the research.

What happens at the end of the study?
At the end of the study the information will be used to present results but the information will be completely anonymised.
All data gathered from the research will be held by the principal investigator for up to 7 years in a password-protected computer.
The results of the final year project will be available to participants on written request to the Principal Investigator.

What if I have more questions or do not understand something?
You can contact either of the investigators at any time during the study.

What happens if I change my mind during the study?
You can choose if you want your son/daughter to be included in the research. You can withdraw your son/daughter from the research at any time. Your son/daughter can still be included in the programme even if you do not wish them to be included in the research.
PARENTS'/GUARDIANS' INFORMED CONSENT FORM

**Title of Project:** Measuring the efficacy of a whole class intervention to improve vocabulary learning skills in post-primary school students

**I give consent** for my/our son/daughter to be involved in the above research

I have read and understood the parent/carer information sheet.

I understand what the study is about, and what the results will be used for.

I consent for the data to be used anonymously in report format and published output.

I am fully aware of all of the procedures involving my child, and of any risks and benefits associated with the study.

I know that my child's participation is voluntary and that I can withdraw my child's participation in the study at any stage without giving any reason.

**For the Parent/Guardian**

I permit consent for ________________ (name of child) to participate in the above study.

Name of child: (please print): ________________

Name of parent/carer: (please print): ________________

Parent Signature: ___________________________ Date: ____________

Investigator's Signature ___________________________ Date: ____________
Appendix 3: 2x2 Mixed-Between-ANOVA-Pre-Post Results

<table>
<thead>
<tr>
<th>Subtest</th>
<th>DF, Error</th>
<th>F Inter Within</th>
<th>Inter Within Sig</th>
<th>( \eta^2 ) Inter Within</th>
<th>F Main Within</th>
<th>Main Within Sig</th>
<th>( \eta^2 ) Main Within</th>
<th>F Main Between</th>
<th>Main Between Sig</th>
<th>( \eta^2 ) Main Between</th>
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</thead>
<tbody>
<tr>
<td>Word Classes Rec RS</td>
<td>1; 229</td>
<td>1.338</td>
<td>0.249</td>
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<td>33.629</td>
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<td>0.003</td>
<td>17.487</td>
<td>0.0001</td>
<td>0.071</td>
<td>0.468</td>
<td>0.495</td>
<td>0.002</td>
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<td>0.13</td>
<td>12.460</td>
<td>0.0001</td>
<td>0.052</td>
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<td>0.003</td>
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<td>0.000</td>
<td>22.798</td>
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<td>0.091</td>
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<td>0.007</td>
<td>23.91</td>
<td>0.0001</td>
<td>0.095</td>
<td>0.027</td>
<td>0.870</td>
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</tr>
</tbody>
</table>

*Note: The results show non-significant Interaction Effects between Treated and Control schools over Time, the significant main effects of Time on measures, and the non-significant between effects of Treatment condition. RS = Raw Score; SS = Standard Score*
### Appendix 4: Independent t-test: Pre gender scores difference

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Mean</th>
<th>SD</th>
<th>Mean Diff</th>
<th>95% C.I.</th>
<th>T</th>
<th>df</th>
<th>p</th>
<th>Tailed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word Classes Rec</strong></td>
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</tr>
<tr>
<td><strong>RS Pre</strong></td>
<td>10.973</td>
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<td>-4.741</td>
<td>147</td>
<td>.0001</td>
<td>2 tailed</td>
</tr>
<tr>
<td><strong>(Males)</strong></td>
<td>13.892</td>
<td>3.4025</td>
<td></td>
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<td><strong>(Females)</strong></td>
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<tr>
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<td>147</td>
<td>.003</td>
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<td><strong>(males)</strong></td>
<td>13.892</td>
<td>3.4025</td>
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<tr>
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<td><strong>RS Pre</strong></td>
<td>17.730</td>
<td>7.6289</td>
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<tr>
<td><strong>BPVS3 RS Pre</strong></td>
<td>123.360</td>
<td>20.5259</td>
<td>-2.8697</td>
<td>Between -8.6556 and 2.9161</td>
<td>-.981</td>
<td>134.4</td>
<td>.328</td>
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<tr>
<td><strong>(Males)</strong></td>
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<td>14.7514</td>
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<td>1.0103</td>
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<tr>
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</table>

**Note:** RS = Raw Score; SS = Standard Score. The means show that females scored higher on all measures with the exception of the 'Word Associations' subtest. This difference was significant on 'Word Classes Receptive and Expressive' measures.