Scoping Review of the Evidence Base

for Dyslexia-friendly Classroom Teaching

and Whole School Approaches

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This scoping review of the evidence base for dyslexia-friendly classroom teaching and whole school approaches was commissioned by the Department for Education (DfE) as part of the two-year DfE-funded *Dyslexia / Specific Learning Difficulties (SpLD) Support Project* which has run between 2016 and 2018, led and coordinated by the British Dyslexia Association (BDA).

Four different types of scoping studies are described by Arskey and O'Malley (2005) as those which (1) examine the extent, range and nature of research activity; (2) determine the value of undertaking a full systematic review; (3) summarise and disseminate the research findings; and (4) identify gaps in the literature. Colquhoun (2016) identifies a fifth purpose as making recommendations for future research. The first type of study is outside the range of this scoping review due to time and cost restraints. The second is deemed un-necessary. The purpose of this scoping review is:

- to summarise and disseminate research into dyslexia friendly practices;
- to identify gaps in the dyslexia research literature;
- to make recommendations for funding future research projects.

The review follows a five stage framework described by Arskey and O'Malley (2005, p21) as:

Stage 1: identifying the research question

Stage 2: identifying relevant studies

Stage 3: study selection

Stage 4: charting the data

Stage 5: collating, summarizing and reporting the results

1. Identifying the Research Question

The first task was to explore the research question to define terms. There appears currently to be no clear definition of what Dyslexia-friendly teaching is. An earlier study reported by

Norwich, Griffiths and Burden (2005) described a *dyslexia-friendly school* as 'one where all teachers are appropriately trained, aware of the impact of cognitive difficulties on teaching their subject and aware of the strengths and weaknesses of individuals with dyslexia' (p148). However, the study did not explore how teachers used their training or made use of their knowledge of cognitive difficulties to make the curriculum more accessible and develop literacy skills (the focus was on the process of becoming dyslexia friendly). The British Dyslexia Association website (2018) refers to dyslexia-friendly teaching as *good practice* that involves accommodating individuals with dyslexia by employing appropriate teaching methods and providing learning environments that are dyslexia-friendly. In the 'Ten Top Tips' for making a classroom dyslexia-friendly listed by Leicester City Council in the BDA Dyslexia-friendly Schools Good Practice Guide (2012), strategies for improving both teaching and the learning environment are suggested.

In the brief given to Manchester Metropolitan University by the BDA, the following research question was presented: *What is the evidence base for Dyslexia-friendly teaching and whole class approaches?* This is interpreted within the scoping review as meaning: what is known in existing literature about dyslexia friendly practices, which strategies / approaches are successful in making the curriculum more accessible to learners with dyslexia, and what evidence is there of impact on learning?

2. Identifying Relevant Studies

The initial search was conducted on the 8th & 9th February 2018 over 15 hours (two days). A number of sources were searched including four electronic data bases: British Education Index (BEI), the Education Resource Information Centre (ERIC), the Education Endowment Fund (EEF), and the EPPI Centre, plus internet sites, professional journals and some grey literature. The search was limited to:

- Anglophone countries;
- English texts;
- Studies involving children or adolescents in mainstream classrooms;
- Studies evaluating impact of dyslexia friendly practices;
- Studies published since 2003.

The initial search was conducted using a variety of keyword terms commonly found in dyslexia literature (see appendix for list of terms). Many of these drew blanks, indicating gaps in the research literature.

3. Study Selection

A total of 63 studies were found that looked promising from the abstracts in answering the research question. On further reading, a number of these did not fall within the parameters established for the scoping review and so were excluded:

- Studies written in English but conducted in non-Anglophone countries (14);
- Studies in HE (4);
- Articles discussing support strategies but not evidence based (11);
- Studies focussing on withdrawal or 1:1 intervention (6);
- Studies focusing on difficulties (causation) with only implications for teaching (11).

The initial screening eliminated 46 studies leaving 17 potential studies. However, there was one study conducted in a non-Anglophone country that was not excluded because it was considered of interest and relevant to the research question. The next stage of the study selection involved examining the evidence of impact. A number of studies reported little or no impact on learning and so were excluded. Having read the articles in full, 10 were chosen to summarise.

4. Charting the data

Data was extracted from the research studies using where possible a combination of what Pawson (2002, p171) refers to as a numerical approach (focussed on outcomes) and a narrative review (examining what happened with each intervention / approach) so that the outcomes are contextualised. For each of the 10 studies summarised below the following information was recorded:

- Author, year of publication, publisher;
- Size of study and age range of students;
- Aims of the study;
- Data collection methods;
- Data analysis techniques;
- Important results or findings;
- Conclusions drawn by the researcher/s.

5. Collating, summarising and reporting the results

Among the studies selected two themes emerged: those concerned with whole school approaches to developing dyslexia-friendly teaching and improving access (dyslexia-friendly schools); and those examining the effectiveness of specific teaching approaches (dyslexia-friendly practices).

Dyslexia-friendly (whole-school) Approaches to Improving Curriculum Access

Coffield, M. et al (2008) Dyslexia Friendly Primary Schools: What can We Learn from Asking the Pupils? In The SAGE Handbook of Dyslexia, (2008) Gavin Reid, Angela J. Fawcett, Frank Manis & Linda S. Siegel (Ed.) p356-368

The study involved schools in Swansea who had taken part in the county's project on dyslexia-friendly schools which ran over a two year period. Thirty-seven primary schools took part. Twenty-five primary schools were invited to take part in the research project: 17 from the first year (of which ten took up the offer) and 8 of the schools from the second year of the project. Six pupils from each of the 18 schools (108 in total) were asked to complete a questionnaire which had been developed in consultation with the local authority. Key staff from the project schools had previously identified many positive benefits from taking part in the project but there was no information from the pupils themselves about the impact the project had on them. The aim of the study was to ascertain the views of primary pupils on the 'dyslexia-friendliness' of their classroom teachers. The questionnaire was designed to find out if they were aware of dyslexia-friendly practices, resources and strategies in the classroom. Staff were asked to identify two higher, two middle and two low achieving pupils, ideally from within the same class at Key Stage 2. The sample included children who had been identified with dyslexia but also pupils with different special educational needs and some pupils with no special educational needs at all. For the majority of questions and statements the children were given the option of choosing between four different levels of agreement (usually, sometimes, occasionally, never). Not all the questionnaires were returned. A total of 43 questionnaires from children with dyslexia, 8 from children with a different SEN, and 53 from children without dyslexia or any other SEN were completed.

Results: According to the children with dyslexia, the most common way in which teachers supported them was:

- Reading important information out to the class rather than expecting them to read it independently (65%).
- Providing support materials such as word mats, alphabet strips, special dictionaries and tables squares (57%).
- Being prepared to repeat instructions (53%).
- Making worksheets easy to follow by highlighting important information (45%).

The strategies were also identified by those without dyslexia in similar proportions. However, teachers who were using 'dyslexia-friendly' approaches tended to focus on explaining tasks clearly and providing support materials to help children to write their own answers rather than on ways of helping pupils with the writing process itself.

The majority of children were able to identify some aspects of classroom practice that they found beneficial. They identified getting help from the teacher, supportive resources and working with a partner as the most beneficial strategies. However, the study concluded that there were still too many children having to face potentially stressful situations like being asked to read aloud in class, being given insufficient time to write down homework and having their work covered in corrections and negative comments. The authors point out that having one or two strategies in place that are generally considered suitable will not suffice in meeting a range of needs and that a 'menu' of strategies is needed.

Ross, H. (2017) An exploration of teachers' agency and social relationships within dyslexia-support provision in an English secondary school, British Journal of Special Education, Volume 44, No. 2.

The study offers a snapshot of an English secondary school. Data was collected in a large high-performing secondary school in the South-East of England from teachers, KS3 pupils (age 11-14) and parents, through lesson observations, focus groups and semi-structured interviews. The aim of the study was to explore how teachers' conceptualisations of dyslexia and their own role as teachers affect their interactions with pupils. Observations took place over a five month period. Nine teachers were observed in lessons at KS3. Seven of the observed teachers and three others were interviewed including two dyslexia specialist teachers and two who had management responsibility.

Notes were taken during lesson observations. Data was entered onto an encrypted computer using NVivo v.10. Interviews were coded and recoded as themes emerged. Data was explored using Jenkins (2008) 'levels of interaction' to provide a framework for analysis.

Results: Teachers felt that they still had a lot to learn in making the curriculum more accessible. They doubted themselves as professionals in their ability to support students with dyslexia adequately. Teachers with responsibility for literacy-based subjects were more likely to highlight their lack of knowledge of dyslexia or be dissatisfied with their lessons. Some undertook additional training to address this 'lack' of knowledge as they felt they had not received sufficient (if any) input on it on their teacher training course. Even so, they were able to identify a number of strategies for improving access:

- the use of technology to reduce students' dependence on the teacher;
- low tech aids such as a 'reading ruler' to support students' reading;
- use of pictures to support understanding;
- peer support;
- fostering positive working relationships.

The specialist teachers felt limited in their ability to transfer practices they had been trained in to their subject area as the focus of their course had been on literacy. The study reports,

though, that teachers acted to reduce social distances between individuals in their classroom and that they had positive understandings of dyslexia, presenting it as an impairment that did not equate to 'lack of intelligence'. These positive understandings informed teachers' interactions with students and how they directly addressed dyslexia in the classroom.

The researcher concludes that, despite having a degree, the teachers doubted their own knowledge and abilities; that they were constrained by the lack of technological resources; and that there was a tension between parental perception of teachers and teachers' ability to negotiate provision for young people with dyslexia. Some teachers suggested that they were not always fully able to meet the needs of pupils with dyslexia and that they were subject to political pressures. The study highlights the need for whole school training in inclusive practices for pupils with dyslexia and other learning difficulties, even in high performing schools. It points to the need for dyslexia training to consider subject based pedagogy for secondary teachers.

Higgins, S. et al (2017) Improving Literacy in Key Stage 2 Guidance Report, Education Endowment Fund

The Education Endowment Fund launched a five year campaign in 2015 working with 880 schools in the North-East of England. The aim of the project was to improve primary literacy outcomes for disadvantaged children in the NE by building on existing good practice. The guidance report (2017) focusses on pedagogy and approaches that are supported by good evidence in making recommendations to schools. They review evidence in seven different areas that are relevant for students with dyslexia and other learning difficulties.

The recommendations made in the report are based primarily on a synthesis of research evidence developed by Higgins and colleagues at Durham University but draw also on a wide range of evidence from other studies and reviews regarding literacy development and teaching. In each of the seven areas the team indicate the strength of the evidence grading it as: very extensive, extensive, moderate to limited and very limited.

Results:

(1) The development of listening and speaking skills through activities such as:

- Reading books aloud and discussing them;
- Developing expressive and receptive language;
- Collaborative learning where pupils share thoughts;
- Structured questioning to develop comprehension;
- Teachers modelling inference making by thinking aloud;
- Pupils articulating their ideas verbally before starting writing.

The evidence (based on nine meta-analyses) is considered to be *extensive* and the impact of collaborative learning is consistently positive.

(2) Supporting pupils in developing fluent reading through:

- Guided reading and instruction where teachers model the text and then pupils read the same text with appropriate feedback;
- Repeated reading –pupils read a short and meaningful passage a number of times until they reach a suitable level of fluency.

The evidence base for these approaches was considered to be *moderate* based on fifteen meta-analyses of different approaches to reading.

(3) The teaching of reading comprehension strategies through modelling:

- Asking pupils to predict what might happen next as a text is read;
- Pupils generating their own questions to check understanding;
- Pupils identifying areas of uncertainty and seeking information to clarify meaning;
- Pupils summarising sections of the text;
- Inferring the meaning of sentences from the context and the meaning of words from their spelling pattern;
- Thinking about what they already know on a topic from reading and other experiences and making links.

The evidence base was considered to be *very extensive* and was based on eight meta-analyses which consistently demonstrated the impact of teaching metacognitive strategies on reading comprehension.

(4) Teaching writing composition strategies through modelling and supported practice, encouraging students to:

- Plan by setting goals before they start writing;
- Draft by noting key ideas;
- Share ideas or drafts with other pupils and act on feedback;
- Evaluate their writing by checking with goals set;
- Present work so that others can read it (publishing).

The evidence base for teaching written composition was considered to be *extensive* based on three meta-analyses.

(5) The transcriptions skills of spelling, handwriting (or typing) and sentence structure and impact of developing automaticity in these on writing composition.

Writing practice had to be:

- Extensive in order to develop fluency;
- Motivating and engaging to achieve the required amount of practice;
- Supported by effective feedback.

Sentence construction was developed through activities such as sentence combining to make longer more complex sentences.

Feedback studies typically showed high impact effects on learning. However, the team considered the evidence base to be *limited* because they tended to be based on reviews of single case studies.

(6) Targeted teaching based on assessment:

- Changing the focus to target an aspect that needs more support;
- Changing the approach, e.g. scaffolding to provide the right level of support.

There was *moderate* evidence from several reviews where an accurate base-line assessment was given to ensure that intervention was appropriate.

(7) Structured targeted intervention - common features of successful interventions were:

- Brief (about 30 mins) and regular sessions (3-5 times per week) over a sustained period and carefully timetabled to enable consistent delivery;
- Involves extensive training (5-30 hours) from experienced trainers or teachers;
- Uses structured resources and/or lesson plans with clear objectives;
- Based on assessments that identify pupil need and track progress;
- Tuition is additional to and explicitly linked to normal lessons;
- Connections are made between out-of-class learning and classroom teaching.

The evidence base is considered to be *extensive* and considerable based on 6 meta-analyses of pupils 7-11 years of the impact of structured interventions and intensive 1 to 1 support.

The report concluded that the teaching approaches recommended should not be used in isolation but as a combined approach and that schools should pilot strategies before rolling them out across the school.

Sheehy K. et al (2009) A systematic review of whole class, subject-based pedagogies with reported outcomes for the academic and social inclusion of pupils with special educational needs: EPPI-Centre report no 1706, University of London.

The research team undertook a 3 year programme of systematic review of studies of children aged between 7 and 14 years with SEN in mainstream classrooms. The aim of the study was to investigate the nature of whole class, subject-based pedagogies that have reported outcomes for academic and social inclusion of children with special educational needs. The focus on children with SEN included those with a specific learning difficulty.

The research group focused on as wide and comprehensive a range of research studies as possible and included work that was both qualitative and quantitative. Searches were conducted using electronic databases. In total 134 studies were considered and 11 of these reviewed in-depth. Each of these was carried out in the United States of America.

The inclusion and exclusion criteria for the in-depth reviews were:

- Learning aims were set for the whole class;
- Learning task were subject specific;
- Teaching practice is stated and described.

Data from the in-depth studies was extracted using EPPI tools. The weight of evidence allocated to each study was considered.

Results: The reviews highlighted the importance of teachers early in their careers to connect with a pedagogic community within which they can reflect on and develop inclusive whole class teaching. Approaches were rated and the majority found to be effective for children with learning difficulties as well as those without. These included:

(1) Those designed to help students understand concepts through structured project phases. (*High*)

(2) Literacy activities that encourage multiple responses -drawing on text, their own experiences and viewpoints of peers. (*Medium-High*)

(3) Reciprocal teaching (RT) to enhance ability to generate questions and short summaries about texts in order to improve comprehension. (*Medium-High*)

(4) Mnemonic strategies for learning / remembering curriculum material. (*Medium-Low*)

(5) Tightly structured sequential teaching (e.g. of multiplication facts) using support materials. (*High*)

(6) Supported writing including discussion of literacy concepts and how to read and compose texts. (*Low*)

(7) Working in co-operative project groups using multi-media materials. (*High*)

(8) Guided enquiry (science lessons) to enable students to develop understanding. (*High*)

(9) A technique called anchored instruction in which video is used to provide background information about a problem situation – the learners interact to discuss different approaches and viewpoints to addressing the problem. (*Medium*)

(10) Peer tutoring of spelling. (*Medium*)

(11) Co-operative learning approach for story related activities, direct instruction on reading comprehension, and integrated writing and language arts. (*Medium*)

The research group concluded that, in the studies reviewed, the pedagogy gave importance to social interaction as a means of developing knowledge. The learning activities used different modalities, making the subject matter accessible to a diverse range of learners. Further development of understanding occurred through planned scaffolding of the subject's cognitive and social content using activities which the learner found meaningful. Thus, the curriculum was made accessible to pupils both with and without learning difficulties.

Dyslexia-friendly (Inclusive) Practices and Impact on Learning

Conway, P.F. and Amberson, J. (2011) Laptops meet schools, one-one draw: m-learning for secondary students with literacy difficulties, Support for Learning, Volume 26, Number 4

Thirty-one schools participated in the *Laptops Initiative* for post primary students with dyslexia or literacy difficulties in Irish classrooms. The aim of the study was to understand school-level dynamics of laptops and literacy by providing personalised access to ICT at any time to students with Special Educational Needs to enable them to work independently in mainstream classrooms. The overarching aim was to identify how laptops can best be used to support students with dyslexia and other reading and writing difficulties.

There were 840 students involved in the Laptops Initiative with 180 of them (21%) assessed as having dyslexia, the other 79% had either not been assessed or were deemed to have other reading and writing difficulties. Data was collected via teacher surveys, focus groups, case studies, classroom observations and teacher / student interviews over a three year period. Research and data analysis were interpretive in nature.

Findings: The three main models of laptop use that emerged were 'fixed', 'floating' and 'fostered deployment'. The fixed model of laptop use refers to the use of laptops in one

location, such as learning support rooms or library, but they were mobile within that space so that students could work together collaboratively or sit facing the teacher. Floating lap top use was where they were used in varying locations, e.g. in withdrawal or classrooms, some were used by whole classes. The fostered deployment model was where a student received a laptop for their sole use. In some cases they used it both at home and at school, in others at school only or at home only.

In schools where there was a fixed model of laptop use the students were observed to learn and work collaboratively. Students experienced membership of a learning community and were willing to share their work. However, it put considerable restraint on mobility and uses as personal learning tools. Floating laptops saw students take ownership and develop independence but there were varying responses from other students in the class to the presence of the laptops. The fostered deployment model had clear impact on parental, student, peer and school involvement. It fostered a sense of responsibility from students in relation to their own learning and the equipment they used.

The study concluded that the use of laptops fostered the development of a more inclusive environment and provided significant learning opportunities for students with literacy difficulties. The recommendation was that laptops be introduced into classrooms for all students so that learners with dyslexia were fully included and became part of the learning community or where a fixed model was used that they could collect laptops from the library or some such location (this would support students who need to use laptops outside school).

Firth, N. et al (2013) Coping Successfully with Dyslexia: An Initial Study of an Inclusive School-Based Resilience Programme, DYSLEXIA 19: 113–130

The research group argue that children with dyslexia are often at risk of responding to their difficulties by using maladaptive strategies that may further exacerbate the problem. They highlight the need to focus on the whole school environment including support for the emotional difficulties experiences by those with dyslexia. A dyslexia coping programme was implemented within a whole school context in two co-educational primary schools on the west side of Melbourne, Australia. The aim of the study was to investigate the effectiveness of the coping programme and maintenance effects for students on transfer to secondary school. One hundred Year 6 students aged 10-11 years took part, including 23 with dyslexia.

Students identified as having dyslexia were all performing two or more years below their chronological age with reading, spelling or mathematics and had cognitive processing difficulties associated with dyslexia, such as poor phonic analysis or auditory short-term memory. Intervention took the form of a withdrawal coping programme for children with

dyslexia nested within a classroom coping programme for all Year 6 pupils, which in turn was nested within whole-school professional development and change. The whole school component consisted of a 2 hour professional development session for all staff.

A 10 session universal coping programme was provided to all Year 6 students including those with dyslexia and involved awareness of current coping strategies, use of positive thinking, assertion, goal setting and problem solving. Students were encouraged to use active, productive coping strategies such as thinking positively, persevering and working directly with the problem in preference to strategies such as self-blame, giving up and ignoring the problem. Personal goals, including one related to academic achievement, were chosen by the students and they were encouraged to use coping strategies that were likely to lead to them achieving these goals. Ten additional concurrent sessions were held on a withdrawal basis for students with dyslexia, which focused all the strategies being taught on dyslexia related situations. Teachers were given onsite fortnightly support during the ten week intervention period by the researcher who had experience of working with students with dyslexia.

Data was collected by surveys pre-test, post-test and at 1 year follow up. During the follow-up year funding was made available to recruit a contrast group of 39 students from four local secondary schools which included ten students with dyslexia. Four aspects were measured at each stage of the project: locus of control, coping strategies, well-being and school engagement using evaluation scales and a questionnaire. The data was analysed statistically using Cronbach's alpha.

Results: There were no differences between students with and without dyslexia on the baseline assessments. Following intervention there was significant and sustained improvement in locus of control for all students, who improved on average by three points ($p<0.001$), and in school connectedness ($p<0.001$). There were reductions in both groups in non-productive coping at post-test and follow-up. At year 7 the students with dyslexia who had received the intervention had higher well-being than students in a contrast group who had dyslexia but had not received the intervention, although not statistically significant ($p<0.07$). At transition to secondary school the children with dyslexia in the intervention group had similar perceived control and adaptive coping to those without dyslexia in the intervention group.

The authors conclude that targeted adaptive coping programmes and environmental supports can give students with dyslexia more access to opportunities to use high abilities, to feel included and in control, and to lead productive and happy lives.

Chwen, C. J. and Keong, M. W.Y. (2017) Affording inclusive dyslexia-friendly online text reading, Inf Soc (2017) 16: 951–965

The researchers point out that guidance for designing inclusive dyslexia-friendly online learning environments that take into account both learners with and without dyslexia is still scarce. The aim of their study was to derive practical guidelines on this aspect by exploring the experiences of students with dyslexia and students without dyslexia in using online text. Although the study was conducted in Malaysia it has been included in the review because of its wider application and relevance to the research question. The study involved 12 secondary pupils with dyslexia and 12 without dyslexia aged between fourteen and eighteen years.

Three types of online reading were used: printed text mode, standard guidelines mode, and screen reader mode. The 'printed text mode' was based on the layout and typefaces of conventional books; the 'standard guidelines mode' adopted dyslexia-friendly text guidelines as suggested by the British Dyslexia Association; and the 'screen reader mode' was similar to the standard mode but with the addition of a screen reader. The study examined the students' engagement with the three modes. Participants had to read a passage in each of these modes on three separate occasions using different passages. The sessions were video-recorded. The first session used printed text mode, the second used the standard guidelines mode, and the third used the screen reader mode. The study did not employ counterbalance design to control for order effects. An interview was conducted with each student after the three sessions. The researcher also took observational notes. The data was analysed qualitatively by coding and categorising data into themes. Analysis was based on two learning experience aspects: perceived learning and engagement.

Findings: All the students with dyslexia perceived that the knowledge they gained from the print mode was little and of lower quality than from the other two modes. They had difficulty understanding and remembering the passage. Several mentioned how long sentences and the high contrast of black on white caused them discomfort and made it difficult for them to read and remember the passage and a few found the font size too small. Those without dyslexia perceived that they had gained knowledge from the print mode but it was less than from the other two modes, fewer reported difficulties in remembering. Behavioural engagement with the text was moderate but the majority disliked the layout, finding the text confusing with long passages that did not aid understanding.

All students with and without dyslexia responded positively to the standard mode and said that they could understand and remember more easily than the print mode. They reported that the larger text size (18 point compared to 12-14 point in print mode) made reading easier. They attributed their higher learning quality to clear presentation, bullet points, highlighted or bolded keywords, and increased line spacing. They also found it more comfortable to read the text with the coloured background of the standard mode as there was less glare when they looked at the screen. Behavioural engagement with the text was

moderate to high. All participants had high cognitive engagement. None had a negative emotional response.

A mixture of responses was given for the screen reader mode with more positive than negative. Around half of the students showed a strong preference for the screen reader, greatly improving comprehension, retention and articulation. Some said they were able to rely on their listening skills, which aided comprehension. Others thought that this mode had only moderate impact, preferring the standard mode because they found the screen reader distracting and it posed a challenge for simultaneous reading and listening. The majority of students had moderate behavioural engagement and high cognitive engagement. Emotional responses were mixed across both groups, with some high, some moderate and some low (three found the reading speed too fast).

The researchers conclude that the print text mode yielded a poor learning environment with low satisfaction as well as low cognitive engagement during the reading task. Findings suggest that learners often feel unexcited, lazy and easily bored when faced with such presentation of text on the computer. Students both with and without dyslexia had a positive experience when reading with the standard (dyslexia-friendly) mode, which included use of bullet points, left justified, 1.5 line spacing, sans serif font, font size 16-18 point and black font on beige background. The majority of students with dyslexia had positive perceptions of learning quality with the screen reader and some students without dyslexia also found it beneficial, although some found it distracting. Therefore, making screen readers an optional aid for reading web text was recommended.

Foster-Cohen, S. and Mirfin-Veitch, B. (2017) Evidence for the effectiveness of visual supports in helping children with disabilities access the mainstream primary school curriculum, Journal of Research in Special Educational Needs, Vol. 17, No. 2: 79–86

A qualitative study was carried out in New Zealand between 2009 and 2012 to evaluate the impact of a home-school visual support programme for 23 children aged between 5 years and 7 months and 11 years and 10 months. The children attended 22 different schools in the Christchurch area. Most of the children had a diagnosis of dyspraxia alongside other specific learning difficulties such as dyslexia and/or ADHD. The project was managed by a small group consisting of a speech and language therapist, an occupational therapist, and a number of visual resource specialists. Data was collected via interview and questionnaire. Initial concerns about school challenges were determined through structured interviews. There was also direct observation of the child at home and school to determine the particular visual supports to introduce. At the end of the project there was a final observation of progress made towards the goals set for the child. Parents completed an evaluation questionnaire and there were exit interviews. Data was analysed qualitatively.

The most common concern of parents was inability to carry out a routine task either at home or school. Many reported that the child had difficulty following verbal instructions, particularly if it involved multiple steps, and needed constant prompting. Another common concern was inability to organise belongings or equipment needed for tasks. Distractibility and difficulty sustaining attention were also mentioned. Difficulty starting a task and shifting from one task to another was identified as challenging. Some teachers identified slow processing as a reason for poor task performance. The negative impact of these challenges had resulted in anxiety, frustration, difficulties in peer relationships and low self-esteem. Individual targets were set for the children using visual prompts produced by 'Boardmaker'. Most children had goals relating to following sequences of activities and routines at school.

Findings: The visual supports reduced anxiety and frustration, provided structured reminders of tasks and equipment needed, and permitted greater involvement in home and class routines. A positive impact on distractibility, task completion, classroom independence and perseverance was also reported. Twenty-one out of twenty-three families reported increased independence with routines. Some were so impressed with the power of visuals that they used them beyond the scope of the project. Teachers of more than half the children reported they were better able to follow classroom routines and work independently in class. There was also feedback from the pupils themselves who understood the purpose of visuals and found them supportive both at home and at school. The study concluded that it would be worth looking at ways of using visuals for all children so that those using them do not feel marginalised.

McMurray, J. et al. (2009) Motor processing difficulties: guidance for teachers in mainstream classrooms SHARON, Support for Learning, Volume 24, Number 3

This single case study looked at strategies for improving fine motor skills and was conducted with an 8 year old within a mainstream primary school. Intervention was set up with the class teacher and an occupational therapist for 20 minutes three times per week. It was done in the classroom and was incorporated into the class structured play time. The aim was to understand the impact of motor processing difficulties on the development of literacy as they are often seen in children with specific learning difficulties and many children with dyslexia also have dyspraxia. The study examined a range of presenting issues in the classroom and evaluated practical strategies that are often recommended by class teachers in mainstream classrooms.

The child is described as having high-average verbal ability (as measured on BPVS) and an active participant in class discussion. However, the teacher observed specific literacy difficulties, especially in relation to handwriting. Ability to communicate through the written word was very limited and there was a growing reluctance to engage in written activities. An intervention programme was implemented by the class teacher on advice from an

occupational therapist. It included a combination approach of task orientated activities and a developmental approach to develop fine motor skills.

The developmental approach involved activities such as Lego, moulding with plasticine or clay, threading beads, small peg board work and other fine manipulatives. In addition, strategies taking a compensatory approach were included, e.g. pencil grip, placing a large dot on the page to indicate where to start writing, green dots on the left hand side to indicate where to start a new line, red dot on the right hand side to indicate where the line should finish, squared paper in mathematics to improve organisation, and demonstration of finger spaces.

Findings: The authors report the combined approach was extremely effective in remediating handwriting difficulties, with immediate improvement in organisation of work on page and steady improvement in handwriting. (The impact on content of writing is not discussed, however.) They conclude that it is important that teachers are familiar with strategies and approaches that will have a positive effect on ability to participate in everyday activities.

Singleton, C., and Henderson, L. M. (2007) Computerized Screening for Visual Stress in Children with Dyslexia, DYSLEXIA 13: 130–151

The researchers point out that children with dyslexia are reported to be more susceptible to visual stress than normal age readers but the relationship between visual stress and dyslexia remains controversial. Studies linking visual stress to the visual magnocellular system in people with dyslexia have been criticised for suggesting it may be an underlying cause and that by implication dyslexia can be 'cured' by use of colour (e.g. Uccula et al, 2014; Torjensen, 2015). Currently, visual stress is predominantly seen as being separate to dyslexia and several studies suggest that where a child has dyslexia and visual stress the symptoms may be alleviated by the use of colour (e.g. Northway et al, 2010; Evans, 2017).

Many of the studies have been criticised for the small number of participants (some as few as three students) and methodological issues such as definitions of visual stress. This study refers to visual stress as unpleasant visual symptoms that are experienced when reading, including eye strain, sore or tired eyes, headaches, photophobia and visual perceptual distortions, such as illusion of shape, motion and colour and transient instability. The study had two objectives: to evaluate the predictive value of the Visual Stress Screener (ViSS) and to examine the hypothesis that visual stress is more common in children with dyslexia when compared to reading-age controls.

Forty-four 10 year old children took part in the study, twenty-two with a formal diagnosis of dyslexia and twenty-two without dyslexia who formed the control group. They were matched for reading age. Both groups were assessed using 11 different coloured acetate overlays, Wilkins Rate of Reading test, British Ability Scales (BAS-11) Word Reading test and

the Visual Stress Screener (ViSS). They were also asked to complete a visual stress symptom questionnaire consisting of nine questions relating to symptoms of visual stress.

The order in which the tests were administered was counter balanced to control for order effects. Data was analysed statistically using two-tailed tests of probability. Fourteen children were assigned to a 'high visual stress' group as their search time for visually stressful items was significantly longer than for non-visually stressful items. The other 30 children were put into a 'low stress group' as the difference was not significant.

Results: The children with dyslexia did not have slower response times when compared to Reading Age controls on items of low visual stress, only on items of high visual stress. Although both dyslexic and non-dyslexic children with high visual stress had increases in reading rate with overlays, those with dyslexia showed an increase in rate of more than 20% compared to an increase in reading age controls of around 5%.

Children with dyslexia and high levels of visual stress had higher increases in reading rate with a coloured overlay on visually stressful items compared to children with dyslexia and low visual stress (p<0.05). The reading age controls with high visual stress also had a significant increase in reading rate with a coloured overlay compared to reading age controls with low visual stress (p<0.05).

More children with dyslexia were found to experience visual stress than those without: 40.9% (9/22) compared to 22.7% (5/22).

The researchers conclude that ViSS is able to identify which children with dyslexia are also susceptible to visual stress and that almost twice as many children with dyslexia experienced visual stress as those without dyslexia. Whilst this is based on a relatively small sample size they conclude that it suggests that visual stress is significantly more common amongst people with dyslexia than amongst people without dyslexia. The results might, therefore, support a recommendation to use coloured backgrounds / paper and assess for use of overlays.

Gaps in the Dyslexia-research Literature

The initial search identified a number of gaps in dyslexia research literature:

- Targeted teaching of study skills
- Multisensory approaches in mainstream classrooms
- Strategies for remembering
- Impact of vocabulary development on reading comprehension and writing skills
- Links between teaching spelling and writing speed / composition
- Auditory processing activities

- Teaching morphology to children with dyslexia
- Strategies for developing fine motor skills
- Mentoring and school counselling
- Use of peer support
- Pupil voice (limited studies)

Discussion and Conclusions

The purpose of the scoping review was to find an evidence base for dyslexia-friendly teaching, including whole-school approaches. Much of the evidence for whole-school approaches to supporting children with literacy difficulties comes from research into inclusive practices. Approaches that appear particularly effective for children with special educational needs including dyslexia are those that are understanding based, use problem solving, develop language skills, model strategies, structure and scaffold learning, offer opportunities for co-operative group work, make use of multi-media materials, and link teaching to assessment (of individual needs). Evidence from dyslexia-research is more limited as the focus of much of it is still on underlying causes as opposed to how to meet the needs of children with dyslexia. Whole-school approaches suggested in the dyslexia literature are often based on what students say is effective. Students identify a number of strategies that support their literacy difficulties, such as not being asked to read aloud in front of the class, the teacher reading key information to them, being prepared to repeat instructions, providing support materials, simplifying worksheets, and working with a partner.

Dyslexia-friendly teaching based on supporting particular cognitive weaknesses such as working memory difficulties, slow processing speed, auditory and visual perception, and phonological processing difficulties is considered more in the dyslexia research than that on inclusion, but studies tend to be small-scale and not large in number. Nevertheless, there is an evidence base to support recommendations made by the British Dyslexia Association for improving curriculum access by targeting areas that children with dyslexia find particularly difficult or stressful. Assistive technology has been found to make students with dyslexia more independent and to enable greater curriculum access. Background colour can easily be changed on iPads and computers to accommodate learners experiencing visual stress. The use of coloured overlays or coloured paper is a low tech solution and whilst dyslexia charities have been criticised for suggesting overlays can help reading difficulties (Henderson, Taylor, Barrett and Griffiths, 2014) there is sufficient evidence of coloured backgrounds alleviating eye discomfort to offer students the choice of changing page colour. Some studies also report significant increases in reading speed with coloured overlays or backgrounds. Using dyslexia-friendly layout of text was found to enhance reading comprehension amongst students both with and without dyslexia. Teaching coping

strategies has been successful in enabling children with dyslexia to cope as well with affective issues as their non-dyslexic peers. The use of visuals to support memory and organisational difficulties has been found to reduce anxiety and frustration in children with specific learning difficulties and to facilitate the following of routines. As specific learning difficulties often co-exist, some students with dyslexia will need support in developing motor co-ordination but only one single case study was found on how to do this within the mainstream classroom.

Recommendations for funding future research

There has been a focus over many years in the dyslexia field on identification, causation and labelling. Very little of the dyslexia research has been concerned with evaluating the impact of specific teaching approaches and/or strategies for making the curriculum more accessible and inclusive. There are many gaps in the research literature and where there is evidence based research, studies are often sparse and small-scale in nature. Research into inclusion of children with SEN has been widely funded but dyslexia-friendly practices less so. What little research there is suggests that strategies that support cognitive weaknesses in learners with dyslexia do also benefit other students. Future funding might be used to strengthen the evidence base for dyslexia-friendly practices. In particular this scoping review highlighted a need for research into how to adapt the principles of structured, multisensory teaching for whole-class subject-based pedagogy.

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Appendix 1: Search Terms

Dyslexia Friendly + teaching/classrooms/schools

Dyslexia + support

Dyslexia + working memory

Dyslexia + memory training

Dyslexia + visual stress

Dyslexia + coloured paper / overlays / filters

Dyslexia + computers

Dyslexia + parents

Dyslexia + assistive technology

Dyslexia + Inclusion

Dyslexia + study skills

Dyslexia + Intervention

Dyslexia + morphology

Dyslexia + morphology + teaching

Dyslexia + verbal rehearsal

Dyslexia + visual aids

Dyslexia + resources

Dyslexia + reading strategies

Dyslexia + spelling strategies

Dyslexia + scaffolding learning

Dyslexia + handwriting

Dyslexia + alternative recording methods

Dyslexia + writing

Dyslexia + pupil /student voice

Dyslexia + motivation

Dyslexia + self-esteem

Dyslexia + learning environment

Dyslexia + counselling

Appendix 2: Internet sites

onlinelibrary.wiley.com

www.springer.com

www.ncbi.nlm.nih.gov

www.equator-network.org