Overcoming difficulties with written expression

Executive summary

Anne Ozdowska, PhD Scholar

Dr Jill Ashburner, Project leader

Professor Peta Wyeth, QUT

Professor Suzanne Carrington, QUT

Dr Libby Macdonald, Griffith University

December, 2018

Overcoming difficulties with written expression

Contributors:

Anne Ozdowska PhD Scholar, Autism CRC, **Dr Jill Ashburner** Autism Queensland, The University of Queensland, **Professor Peta Wyeth,** Electrical Engineering, Computer Science, Computer Human Interaction, QUT, **Professor Suzanne Carrington** Assistant Dean (Research), Faculty of Education, Office of Education Research, QUT, **Dr Libby Macdonald,** Griffith University

Acknowledgements

The Cooperative Research Centre for Living with Autism (Autism CRC)

The Cooperative Research Centre for Living with Autism (Autism CRC) is the world's first national, cooperative research effort focused on autism. Taking a whole-of-life approach to autism focusing on diagnosis, education and adult life, Autism CRC researchers are working with end-users to provide evidence-based outcomes which can be translated into practical solutions for governments, service providers, education and health professionals, families and people on the autism spectrum.

autismcrc.com.au

1. Introduction

Many students on the autism spectrum are challenged by both the physical aspects of writing by hand (Kushki, Chau, & Anagnostou, 2011), and the conceptual work involved in composing written texts (Harbinson & Alexander, 2009). These challenges often affect the motivation of students on the spectrum leading them to avoid writing (Broun, 2009) and detrimentally impacting their academic performance (Allen-Bronaugh, 2013). The overall objective of this research was to support students on the spectrum to undertake writing tasks in mainstream classrooms through the development and evaluation of an intervention package consisting of an iPad application, 'Power Writer' and ancillary materials.

Power Writer incorporates strategies previously been shown to be effective for students on the spectrum, including:

(a) writing support software;
(b) a means of scaffolding written compositions known as Self-Regulated Strategy Development (SRSD); and
(c) video-modelling.

Writing support software has previously been used to overcome challenges with the physical act of handwriting (Bouck, Meyer, Satsangi, Savage, & Hunley, 2015) and improve spelling ability and sentence construction (Hetzroni & Shrieber, 2004).

In this project, a writing support software called TextHelp Read&Write for iPad, hereafter referred to as Read&Write (TextHelp Ltd., 2015) offered students writing support features including: (a) speaking the words as they are typed (text to speech), (b) word prediction, (c) a dictionary to clarify words as they are typed, and (d) a vocabulary list and a personal glossary. SRSD was also incorporated into the Power Writer app with the aim of scaffolding conceptual idea generation and sequencing (Asaro-Saddler, 2016). The SRSD strategy used in this research was the POW+TREE strategy (Harris, Graham, & Mason, 2002) which has been shown to improve the persuasive writing outcomes for students on the spectrum (Asaro-Saddler & Bak, 2014).

Both the writing support software and SRSD were introduced to the students through video-modelling, which has been shown effectively support the learning of students on the spectrum (Burton, Anderson, Prater, & Dyches, 2013). The intervention was underpinned by a Universal Design of Learning (UDL) approach in that it was designed to be accessible to students with a diverse range of learning needs (Denning & Moody, 2013).

The research questions were:

RQ1: How can a targeted yet inclusive intervention be designed for teaching and scaffolding SRSD instruction?

RQ2: What is the quality and length of written compositions of students on the spectrum when producing written text via: (A) handwriting, (B) writing support software supported by video-modelling, or (C) SRSD with either handwriting or writing support software supported by video-modelling?

RQ3: How effective is providing fully-scaffolded SRSD instruction through the co-designed Power Writer app in assisting students on the spectrum to overcome their difficulties in written expression?

RQ4: Is the Power Writer app perceived by students on the spectrum and teachers to be an effective and socially and ecologically relevant tool for inclusive class wide teaching and learning?

2. Phase 1: Co-design phase

This phase involved the following seven stages of co-design of educational software and videos:

Stage 1: Analysis of existing primary school educational apps.

Stage 2: Development of a low fidelity prototype in collaboration with a graphic designer with the aim of achieving functionality suitable for primary school students in grades 4, 5 and 6.

Stage 3: Four co-design focus groups that included a total of 13 students not on the spectrum and four students on the spectrum aged 8 to 11 years who provided feedback on the look and feel of the app prototype and the video.

Stage 4: Employment of two experienced app developers to create a high-fidelity prototype that incorporated the feedback from the focus groups.

Phase 5: Development of video models to teach students to use the POW+TREE writing strategy and the Read&Write software.

Stage 6: Prototype refinement based on feedback from semi-structured interviews of four teachers, one adult on the spectrum, an 11-year-old child not on the spectrum and a 9-year-old child on the spectrum.

Stage 7: Final adjustments to prototype based on participant feedback.

3. Phase 2: Evaluation of Writing Support Materials

During Phase 2, the efficacy of the intervention was explored using quantitative single subject experiment design (Horner et al., 2005) involving a double baseline ABAC design, where A = handwriting, B = writing support software alone, and C = using Power Writer for SRSD instruction and then completing a writing task with a choice of handwriting or writing support software.

3.1 Participants

Eight primary school students on the spectrum experiencing challenges with written expression and their teachers participated in Phase 2 of the study.

3.2 Procedure

Pre-baseline assessments included the *Clinical Evaluation of Language Fundamentals - Fourth Edition* (Semel, Wiig, & Secord, 2003), the *Kaufman Brief Intelligence Test – Second Edition* (Kaufman & Kaufman, 2004) the *Handwriting Speed Test* (Wallen, Bonney, & Lennox, 1996) the *Test Of Legible Handwriting* (Larsen & Hammill, 1989), a typing speed test which included observations of the student's typing method (Ashburner, Zivniani,& Pennington, 2012), the *Oral Reading Fluency Assessment* (Hasbrouck & Tindal, 2006) and an oral persuasive language assessment (Dockrell & Connelly, 2009). Conditions A[1], B and C consisted of five sessions in which the students wrote a persuasive writing composition based on one of two NAPLAN-style prompt sheets.

The second handwriting condition (A[2]) consisted of three sessions, as the students were very reluctant to return to using handwriting to complete their compositions. Both the writing support software and the SRSD were introduced to the students using video modelling. Students completed interviews and surveys both before and after the study, and teachers were interviewed at the end of the study, to investigate attitudes towards the intervention strategies and the acceptability of the Power Writer app for providing writing support in inclusive, mainstream classrooms.

3.3 Data analysis

Each student's written compositions were analysed with respect to (a) the length (word count) and (b) the quality measured using NAPLAN criteria marked by two experienced NAPLAN markers. The results of both the word count for each composition and the NAPLAN marking were analysed through (a) visual examination of the graphed data, and (b) the Tau-U method of statistical analysis (Parker, Vannest, Davis, & Sauber, 2011).

3.4 Results

The writing support software significantly improved the writing quality of four students, and the word count of two students. Following SRSD training provided by Power Writer, the writing quality of one student significantly improved, and the word count of three students significantly improved. Individual characteristics of the student participants appeared to impact the way in which the different intervention elements affected their writing performance. For example, a student who was already a proficient writer, had little room for improvement in his NAPLAN scores over the course of the study.

The lack of typing proficiency of two students appeared to influence their ability to work with the Read&Write writing support software. The capacity of students to internalize the SRSD training also had an impact, as two students did not maintain the gains they made during training in condition C. It is hypothesized that further SRSD training sessions may be required for some students to achieve internalisation of this strategy.

The attitudes of both students and teachers towards the Power Writer app components were positive. All students chose to continue using the writing support on the iPad during condition C which may indicate that they were motivated to use the app. Most of the students also reported more positive feelings about writing and greater self-efficacy after the study. Teachers reported the intervention being helpful for most of the students and were willing to recommend it to others.

4. Phase 3: Ecological Relevance

In Phase 3, focus groups were run with teachers who had used the intervention on a whole-of-class basis to assess the broader social validity of the intervention materials. The focus group questions explored each teacher's opinions of the Power Writer app as a tool for teaching purposes, the responses of students to the video-modelling strategies, and student preferences for Read&Write writing support software as compared to handwriting.

4.1 Participants

Seven classes (grades 4, 5 or 6) with at least one student on the spectrum from three schools used the app as part of a lesson. Nine teachers who were involved in instructing the students and/or facilitating the activity, participated in one of three focus groups.

4.2 Procedure

The students were provided with iPads, the POW + TREE worksheets and two NAPLAN prompt sheets. The students watched one or two of the example videos and wrote a persuasive

composition using one of the two NAPLAN prompt sheets. The researcher and a research assistant wrote observations of the class as a whole. The teacher focus groups focused on the utility of the Read& Write, Power Writer app, and the videos for teaching persuasive writing in mainstream classrooms.

4.3 Results

Teachers commented favorably on the capacity of Power Writer to improve student self-efficacy, self-regulation, and engagement. The use of writing support software was perceived as advantageous for many students, although there were some concerns about its use for assessment tasks. Both teachers and students provided feedback on the need to create more game features and levels for more competent writers and the need for ways to mark and edit work.

While teachers perceived that their struggling writers' self-efficacy and self-regulation improved during the Power Writer writing task, they described the need to provide more extension for competent writers. All teachers commented positively on the motivation provided by the peer modelled instructional videos. Overall, the Power Writer app was considered to be a useful and ecologically relevant tool for students who were struggling with writing.

5. Discussion

The three phases of this project have facilitated the development and evaluation of the Power Writer app. Using a Universal Design for Learning framework and a co-design process worked to produce an app with direct relevance to its intended users and the mainstream classroom setting.

The second phase of the project demonstrated that the Power Writer app could be helpful in supporting students on the spectrum with their written expression. However, while most of the eight students in the evaluation study saw some improvement to the quality and length of their writing with the introduction of writing support and SRSD, a number of students saw no positive change in some areas. This inconsistency in results is likely to be associated with variations in ability in a number of areas. In particular, differences in typing ability may have impacted on the capacity of students to benefit from the use of writing support software.

A second difference related to the capacity of students to internalise the SRSD training, as some students did not maintain the gains made in training when the scaffolding was removed. A third difference was that the highest performing student did not show improvements, suggesting that the current version of Power Writer app may not be effective in extending the learning of high performing students.

Despite these issues, motivation to use the app was high among both the students in the double baseline study and those who trialed the app in the third phase of this project. Self-efficacy was shown to improve with the use of the Power Writer app, with students gaining confidence in their writing abilities, and teachers noting that their students were more willing to engage with writing tasks.

Limitations

Unavoidable limitations when conducting research in school settings include unpredictable events, absences, and time restrictions. In this study, time restrictions impacted on the length of the writing task and the number of training sessions the students received. Additionally, although the NAPLAN marking criteria provided an ecologically relevant measure, it is designed to rate students with a broad range of abilities and thus appeared to be insufficiently sensitive to detect small within-participant changes. In some schools, limitations such as insufficient numbers of iPads and access to Wi-Fi were also evident.

6. Conclusion

This research has shown that the use of writing support software in conjunction with SRSD scaffolding can have a positive impact on the length and quality of writing completed by students on the spectrum who find written expression challenging. Furthermore, the implementation of these strategies using the Power Writer app has led to noticeable improvements in student motivation and self-efficacy. The continued refinement of the Power Writer app may build on this success by increasing its relevance to students with established writing skills.

7. References

Allen-Bronaugh, D. (2013). *The effects of self-regulated strategy development on the written language performance of students on the autism spectrum* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 3562266)

Asaro-Saddler, K. (2016). Using evidence-based practices to teach writing to children with autism spectrum disorders. *Preventing School Failure: Alternative Education for Children and Youth, 60*(1), 79-85.

Asaro-Saddler, K., & Bak, N. (2014). Persuasive writing and self-regulation training for writers with autism spectrum disorders. *Journal of Special Education, 48*(2), 92-105.

Ashburner, J., Ziviani, J., & Pennington, A. (2012). The introduction of keyboarding to children with autism spectrum disorders with handwriting difficulties: A help or a hindrance? *Australasian Journal of Special Education, 36*(1), 32-61.

Bouck, E. C., Meyer, N. K., Satsangi, R., Savage, M. N., & Hunley, M. (2015). Free computer-based assistive technology to support students with high-incidence disabilities in the writing process. *Preventing School Failure: Alternative Education for Children and Youth, 59*(2), 90-97.

Broun, L. (2009). Take the pencil out of the process. *Teaching Exceptional Children, 42*(1), 14-21.

Burton, C. E., Anderson, D. H., Prater, M. A., & Dyches, T. T. (2013). Video self-modeling on an iPad to teach functional math skills to adolescents with autism and intellectual disability. *Focus on Autism and Other Developmental Disabilities, 28*(2), 67-77.

Denning, S. B. & Moody, A.K. (2013). Supporting students with autism spectrum disorders in inclusive settings: Rethinking instruction and design. *Electronic Journal for Inclusive Education, 3*(1), 1-19.

Dockrell, J. E., & Connelly, V. (2009). The impact of oral language skills on the production of written text. *British Journal of Educational Psychology, 2*(6), 45-62.

Harbinson, H., & Alexander, J. (2009). Asperger syndrome and the English curriculum: Addressing the challenges. *Support for learning, 24*(1), 11-18.

Harris, K. R., Graham, S., & Mason, L. (2002). POW plus TREE equals powerful opinion essays. *Teaching Exceptional Children, 34*(5), 74-77.

Hetzroni, O. E., & Shrieber, B. (2004). Word processing as an assistive technology tool for enhancing academic outcomes of students with writing disabilities in the general classroom. *Journal of Learning Disabilities, 37*(2), 143-154.

Kaufman, A. S., & Kaufman, N. L. (2004). Kaufman Brief Intelligence Test (2nd ed.) [Measurement instrument]. Circle Pines, MN: American Guidance Service.

Kushki, A., Chau, T., & Anagnostou, E. (2011). Handwriting difficulties in children with autism spectrum disorders: A scoping review. *Journal of Autism and Developmental Disorders, 41*(12), 1706-1716.

Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining nonoverlap and trend for single-case research: Tau-U. *Behavior Therapy, 42*(2), 284-299.

Semel, E., Wiig, E., & Secord, W. (2003). Clinical Evaluation of Language Fundamentals (4th ed.) [Measurement instrument]. Toronto, Canada: PsychCorp.

TextHelp Read&Write [Computer software]. (2015). Retrieved from https://www.texthelp.com/en-au/products/read-write/

Wallen, M., Bonney, M.-A., & Lennox, L. (1996). The handwriting speed test. Newington, Australia: Helios Art and Book Co.

Wood, D., Bruner, J. S., & Ross, G. (1976). The Role of Tutoring in Problem Solving. *Journal of Child Psychology and Psychiatry, 17*(2), 89-100. doi:10.1111/j.1469-7610.1976.tb00381.x