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The Dyslexia Guild
LITERACY SPECIALISTS · TEACHERS · ASSESSORS

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Seeing the future: The Eyejustread Project in action

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Editorial

Welcome to the Summer Edition of Dyslexia Review. On the eve of our annual conference we have an exciting line up of speakers to hear in Birmingham as well as contributors to this edition of the journal. Gill Cochrane from our postgraduate department introduces Professor Jeff Bowers from Bristol University whose recent research questions the phonics-based approaches that have been adopted in schools. Supported by a case study from Dr Peter Bowers this article is a feast of research revelations.

Dyslexia Review is delighted to welcome two international contributions to this issue of the journal. Maja Kelić, a Croatian speech and language therapist and Michela Bettinelli, an Italian specialist teacher and adviser present their own research into aspects of English language learning for second language learners in their respective countries. This is an insightful article that not only explains similar and different difficulties encountered by their learners but also explains much about methods of language teaching and learning in Italy and Croatia and how these impact on the learner.

From Denmark we welcome Sigrid Klerke and Janus Askø Madsen from the Eyejustread (EJR) project. Using cutting edge eye tracking technology EJR have tracked the eye movements of learners with literacy difficulties and enabled specialist teachers to use this as part of a remedial and recovery programme for reading. This project is making great headway in Denmark and we anticipate that it will soon be available to the UK market as an additional tool for our specialists to use.

Still on a European theme and keeping the home flag flying, Helen Trory and Sheena Bell from the University of Northampton present the conclusion of the European Commission supported project into disability and employment transition. A best practice project with useful publications which can be accessed through the supporting website. Our Units of Sound specialists will be pleased to hear from Margaret Rooms and the team at UoS who provide a feature on working with ESOL students and a special offer to Guild members.

From the team at Dyslexia Action we bring you an article on Credit and Level designed to demystify the qualification arena and to help you brush up your continuing professional development ideas going forward. Jan Beechey also provides a round-up of the latest books on academic writing and a summary on GDPR legislation just in case anyone has missed this detail in their email of late! We hope to see you at conference and wish you all an enjoyable summer of reading wherever you are.

Kathryn Benzine
Editor

Seeing reading through students' eyes

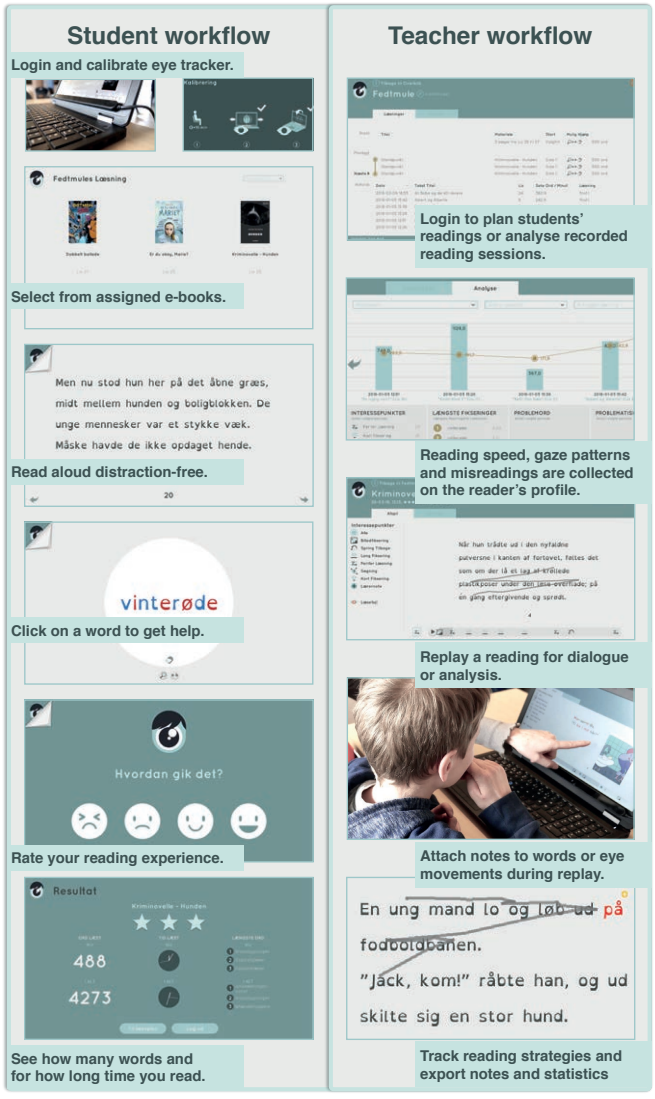
Sigrid Klerke

Janus Askø Madsen

Sigrid Klerke and Janus Askø Madsen from Eyejustread in Denmark describe how their project is helping to identify and support students with literacy difficulties at an early stage.

Summary

EyeJustRead (EJR) uses eye tracking technology to empower specialist reading teachers, beginning with a focus on Danish schools. This means bringing a technology that used to be reserved for research laboratories into the school environment. The benefit to teachers is ultimately the time saved on manual tasks can be better spent evaluating and acting on the needs of each reader. In this article, we present the case for using eye movements in specialist reading teaching and share some strategies that specialist reading teachers have started to develop in their work using EJR. The illustration below shows the typical workflows of students and teachers when using the tool.



Visible reading behaviour

Our eyes are the only parts of our body that need to move to read a text. Simply looking at the eyes of someone reading fluently reveals the signature unconscious staccato dance of the pupil from side to side. However, moving the eyes along lines of text is not in itself considered reading – much more must happen inside the reader. When working with beginner and struggling readers, assessment of students' progress is therefore based on other types of evidence, in particular reading aloud and various schemes designed to probe comprehension.

Leaving the psycholinguistic lab

Despite there being a long tradition of using eye tracking in reading research (see e.g. Rayner (1998)), measurements of eye movements are entirely absent from practical reading teaching. There are at least two reasons for this; firstly, although eye movements are directly observable, they are too fast and too small for humans to track and evaluate in any meaningful detail while viewing readers live. Secondly, the technology of recording eye movements reliably was, until very recently, only found in research laboratories because of the high price and necessary technical skill set.

Eye-mind hypothesis

The eye-mind hypothesis states that what a viewer looks at corresponds to what the viewer is mentally paying attention to. Daydreaming is one of several examples where the hypothesis does not hold, but in reading, it has been shown to be a reasonable assumption. Only the very central 1–2 degrees of humans' field of view is rendered in sufficiently sharp detail to distinguish letters clearly. In order to perceive visual input, the eyes stand almost still for a brief time before skipping in rapid motion and stabilising to start perceiving the next bit of visual input. The planning and execution of these jumps, and the resulting coherent mental imprint of the visual scene, happens involuntarily. The rapid movements are called 'saccades' and the short, stable gazes are called 'fixations'. To perceive a linear text, readers must therefore fixate anything that cannot be guessed easily and keep all that information ordered while it is being processed. This is why an eye movement pattern of steady forward-directed saccades is a reasonable strategy. If something becomes too unclear, the reader must interrupt the forward strategy and may produce backwards saccades to revisit text that was already read or search for clues in an illustration. The automation of this ongoing eye movement programming is a necessary part of skilled reading and the eye movement trace records this development precisely.

The most important work

The ultimate goal of EyeJustRead's users, who are providing specialist reading teaching, is to deliver effective intervention. Evaluating whether this goal is met requires assessment, record keeping and time spent analysing these assessments and records. It is this work that forms the backbone of key decisions regarding potential diagnosis, choice of teaching methodology and assistive tools. The quality of the intervention therefore hinges on the quality and availability of the notes and observations made while a student is reading and being assessed. The same is true for the quality of the coaching of students; a teacher can only highlight and nurture the progress that gets noticed.

Trading time

The new possibilities which arise from being able to keep detailed recordings of live readings,and to analyse and re-analyse readings at any time after they are performed, have proven to be a valued feature with the Danish teachers who use EyeJustRead. They emphasise, for instance, how they are able to go back and point out progress from early recordings to later ones and use this to motivate or illustrate something to students or their parents when the need arises. Similarly, when an intervention takes a new direction, it becomes possible to revisit a student's reading history with colleagues, for instance if the intervention fails to produce the expected outcomes or a teacher needs to hand over a student. For students and teachers alike, the increased flexibility can also help relieve some of the pressure that comes with live reading observation and assessment, resulting in a more valid assessment of the student's functional reading level.

Any method, one tool

Reading specialist teachers employ a wide range of teaching methods. The choice of one over the other is based on the experience, habits, tradition and background knowledge of the expert as well as on concrete observations of a given student. EyeJustRead is a simple, method-agnostic tool which depends on the expertise that the reading teachers bring to the table, just as much as on the hard work that the students put into practising reading.

Supporting evidence-driven experts

The one lesson that can be drawn from every research paper is that more research is always needed. There is always uncertainty in how well a treatment outcome will generalise and even the most elegant experiments have known biases and limitations. Eye-tracking research in reading is mostly concerned with variations that can be observed in a fully controlled research environment. This allows the researchers to attribute any observed variation e.g. in fixation duration to the independent variable being researched. Because EyeJustRead does not enforce a standardised protocol to assimilate a research lab environment, we focus initially on providing low-level metrics and feedback such as time read, words read, reading speed, reading replay and annotation of simple scanning patterns such as long fixations, re-fixations and image viewing. This approach relies on teachers' expertise to assign value to the raw evidence based on their situated knowledge, and recognises their need to make hard practical decisions also in cases where more research is still needed. The intention at EyeJustRead is not to stop at providing low-level metrics, however.

The foundation is data

As EyeJustRead collects and keeps records of reading data to support the reading teachers, we also use anonymised data (where consent has been obtained) to help us study how eye movements reflect specific reading behaviour. In collaboration with researchers at three Danish universities, we actively seek answers to the open questions which could help us to help reading teachers save more time. An example of such a question is whether students' misreadings can be detected automatically as Bingel et al., (*2018*) have attempted. The goal of this research is to use machine learning technology to distinguish patterns in eye movements that accompany successful and failed reading strategies and thereby help teachers' identify the data that is most informative to them. Other possibilities include mapping individual readers' progress to samples of previously recorded comparable readings and developing better informed student feedback systems.

Communicating data

We have found that by enabling the reading specialist to work with this data, a range of new dialogues based on this data are opened up (Klerke et al., 2018). For example, the intuitive use of replay for retrospective think aloud can become an integrated part of collaborating with a student. One reading specialist explains her approach in this way: "When the replay is used in a conversation with the student, the student becomes aware of which strategies they employ, but can actually also often provide valuable observations and information about what they do or think when they read. […] When there is a reading that you analysed yourself, and talked through with the student, it is possible to determine much more precisely what should be the focus of the teaching."

Learning from the best

EyeJustRead also aims to open up this new window into the reading profiles of struggling readers outside of the Danish context. Successfully doing this, however, requires continuing to learn from specialist teachers and researchers who know what struggling to read looks like.

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