

Teachers' and pupils' experiences of reading aids

Accessibility Library Celia report 2023

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Summary

In 2022-2023, Accessibility Library Celia studied teachers' and pupils' experiences of using reading aids. The data for the study consists of a survey of teachers (N=475). The survey was designed by Celia's experts and carried out by research company Innolink. The interview data supplementing the survey was collected from interviews of pupils who had an identified need for support in reading (N=35). The interviews were conducted by Celia's experts. The qualitative content analysis of the pupils' interview answers and the statistical analysis of the teachers' survey were carried out by Innolink. Celia's experts analysed open-ended answers to the survey using qualitative content analysis.

Based on the study, pupils' reading difficulties were found to be individual and cumulated. A great need was identified for diverse ways to support reading. E-learning materials and applications provided by publishers were most frequently used to support reading. Teachers considered plain language texts and audiobooks to be the best reading aids, especially when combining audiobooks with reading from a printed book or display screen. However, teachers felt that plain language books and learning materials were only occasionally available. There were also not enough books available that could be read and listened to at the same time. E-learning materials and learning platforms were considered poorly accessible to pupils in need of support in reading.

Pupils' experiences of reading were mainly positive, and the majority said they liked reading. They reported that reading difficulties sometimes made reading difficult and identified their reading difficulties accurately. They were able to name several methods that they felt supported reading. During the interview, the pupils liked to use Celia's DaisyTrio audio-assisted illustrated book and felt that the format made reading easier and comfortable.

The results of the study can be used to improve the accessibility of learning materials and books, especially the accessibility of content. The study's results highlight the importance of plain language as a way to support reading. Above all, the results can be used to promote literacy in groups who experience reading difficulties.



Summary in plain language

Teachers' and pupils' experiences of reading aids

In spring 2023, Accessibility Library Celia studied what kind of reading aids help pupils read.

Teachers and pupils were asked, and 475 teachers answered Celia's survey.

The survey was carried out by research company Innolink.

Celia's experts also interviewed 35 pupils who had reading difficulties.

Celia and Innolink compiled the results of the study.

The study found that

it is important to support pupils' reading with many different types of aids.

Because pupils have different reading difficulties, the same aids are not suitable for everyone.

Teachers most commonly use e-learning materials and applications when teaching.

Teachers feel that e-learning materials are difficult for those pupils who need support in reading.

Teachers believe that reading is best supported by plain language texts and audiobooks.

However, more plain language books are needed.

Also, more books are needed which pupils can read and listen to at the same time.

Celia's study also interviewed pupils who need support in reading.

Most of the pupils said



that they like to read,
even though reading is sometimes difficult.

The pupils could name several ways
to make reading easier.

The results of the study can be put to good use
by making textbooks and learning materials easier to read.

The use of plain language is important,
because it supports and makes reading easier.

Translation of the summary in plain language: Sanna-Leena Knuuttila



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We would like to thank each teacher who responded to our survey on reading aids. Your answers form the backbone of this study. They will help us, and hopefully others working with reading support, to develop better reading aids.

Thank you to all the schools and teachers who extended an invitation to Celia. We enjoyed our time all over Finland and learned a lot about pupils' strengths and needs related to reading. Thank you to all the pupils who shared their reading experiences with us. Without your input, this study would not have been possible.

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Veera Kivijärvi, Pedagogical Specialist, Accessibility Library Celia



1 Introduction

More and more people are facing challenges with reading. Reading difficulties impact many aspects of life, especially learning and learning outcomes in the case of children and young people. According to a report by the Finnish Education Evaluation Centre (FINEEC), individual differences in learning outcomes are significant and can be linked to pupils' reading ability (Ukkola & Metsämuuronen 2023). The deterioration of Finnish pupils' learning outcomes (ibid.), increasingly strong differentiation of reading skills (Leino et al. 2019, Leino et al. 2023) and decrease in time spend reading (Hanifi, Haaramo & Saaremaa 2021) are phenomena for which Accessibility Library Celia is also seeking solutions by developing accessible books and learning materials.

The mission of Accessibility Library Celia is to produce accessible books and learning materials for people who find reading challenging due to illness, learning difficulties or disability, for example. The restriction on the right of use is based on section 17 of the Finnish Copyright Act. The law makes it possible to produce accessible versions of works for the visually impaired and other people who have difficulties reading printed books. The law on Accessibility Library Celia was amended at the start of 2023. At the same time, the name of the agency was changed from the Library for the Visually Impaired to Accessibility Library Celia. Celia's statutory duty is to provide accessible books to all persons with print disabilities also in the future.

Celia's clientele consists of approximately 21,700 minors, for whom children's and young people's literature and learning materials are produced. Schools are an important partner of Celia. Since 2018, teachers have registered pupils as Celia's customers. The registration is based on the teacher's assessment that Celia's services can help the pupil's reading difficulties. However, practice has shown that many pupils registered by teachers use Celia's books very seldom or not at all. However, as Celia has many customers and the need for reading support is great, it is necessary to identify by which means and tools support should be provided.

Reading aids refer to devices, applications and other aids that compensate for the harm caused by print disabilities and enable the reader to obtain information from the text (Paloneva & Mäkipää 2019). With the development of technology, reading aids have evolved from concrete aids, such as reading sticks and special audiobook



players, to applications, internal features of computer software and games, for example. In this study, we examine reading aids extensively. We have extended the review to cover all available supplies and materials that facilitate or enable reading in the context of teaching.

Previously, only a small amount of research has been published in Finland on the experiences of users of reading aids. The most recent published study is a report by the Niilo Mäki Institute and the Finnish Diverse Learners' Association (Pieviläinen et al. 2020) on reading aids used by adults. Half of the adults participating in the study who experienced learning challenges used audiobooks as learning aids and a third used various reading rulers.

The effectiveness of reading aids in supporting reading has been studied to some extent both internationally and in Finland. In recent years, studies have been published on various reading assistive technologies, such as software and games. Technology-assisted support for reading seems to be effective in terms of reading fluency and comprehension, as well as in supporting several areas of reading at the same time (Alqahtani 2020). Interventions carried out in various schools have tested the effectiveness of rehabilitative games in helping pupils practice reading (see e.g. Saine et al. 2011) Audiobooks have been studied as a reading aid from the perspective of young people's reading fluency, reading comprehension and study skills, for example (Milani et al. 2010, Kuismanen & Holopainen 2013, Nash 2023).

The research problem of this study was what kind of experiences teachers and pupils have with reading aids. The research problem is divided into the sub-questions presented below.

The following three sub-questions were answered using the results of the teacher survey:

1. What reading aids are used in schools?
2. Which aids are the most effective?
3. What issues are there in the availability of reading aids?

The following three sub-questions were answered using the results of the interviews with pupils:

1. What is pupils' opinion of reading?
2. What means and tools are there to support reading?



3. What is pupils' opinion of Celia's books?

It is important to find out what reading aids children and young people use to support reading, and which ones pupils and teachers feel are the most effective. This is helpful to both Celia as well as authors and publishers of learning materials. This information allows the development of products, content and materials that are more effective for a wider group of children and young people with reading difficulties. Digital learning platforms have rapidly and permanently transformed the kinds of learning materials that can be offered. Taking readers in need of support and accessibility into consideration is important in times of rapid changes. With the help of the study, we highlight issues in currently available materials so that learning materials in general can be developed to better meet the needs of all learners. The purpose of the study is to provide research-based information on reading aids and materials so that teachers have an easier time finding and using the aids in the planning and implementation of support.



2 Background to the study

The most common types of print disabilities among Celia's customers are learning difficulties, physical disabilities such as visual impairment, and various permanent or temporary illnesses. In practice, pupils who are entitled to Celia's services have been identified by the school to have a need for support. Special education teachers draw up learning plans in accordance with the pupil's level of need for support, including the planned forms of support and the means and tools for implementing them.

Celia's core mission is to edit and produce books and learning materials to them accessible to people with reading difficulties. In a broad sense, accessibility means the ability to use a (web-based) service despite various limitations (Hyppönen 2022, 44).

In the context of learning and reading support, accessibility should be examined especially from the perspective of cognitive accessibility. Cognitive accessibility means that, for example, a website is designed in such a way that it can be used by as large a percentage of the population as possible, regardless of cognitive ability (Johansson 2016). Cognitive accessibility relates to the clarity of content, layout, images and materials (Selkeästi meille 2023). Accessible materials are especially needed by persons with reading difficulties for one reason or another. However, easy-to-read and accessible books, websites and other materials and publications serve all readers by providing information in an easy-to-understand format.

2.1 Reading difficulties

Reading difficulties can be examined on the one hand through print disabilities which are not directly related to an individual's literacy and, on the other hand, challenges that affect literacy either directly or indirectly. For example, visual impairment is not directly linked to reading comprehension (DeVerdier & Ek 2014). However, many reading difficulties affect an individual's ability to read fluently and understand what they read. For example, challenges in language development that are also evident in verbal communication can affect reading comprehension skills (Hulme & Snowling 2011).



According to the international PIRLS 2021 reading literacy survey, 16% of Finnish pupils in year four fall below a satisfactory level of reading proficiency when assessing reading non-fiction and fiction texts. The proportion of pupils with poor reading skills has doubled in the past decade. (Leino et al. 2023.) There are often one or several factors explaining why a pupil performs below the satisfactory level in reading proficiency tests. Reading difficulties may have a slight impact on technical reading proficiency and/or reading comprehension, or prevent the reading of printed text altogether. Individuals may also have compounding and simultaneous reading difficulties. Some issues that affect reading, such as mental health problems, may be temporary, while others, such as visual impairment, are more permanent.

2.2 Most common types of reading difficulties

Dyslexia is a neurological learning disability that manifests itself as challenges in learning to read and slow and inaccurate reading. In addition to inaccurate and slow reading, people affected by dyslexia have challenges with reading fluency and comprehension as their reading is not automated to a sufficient level. (Hulme & Snowling 2016.) Dyslexia is a common learning disability that is found in approximately 5-10% of the population (Kairaluoma & Takala 2019). Dyslexia complicates learning and schooling in many ways and is permanent. However, early, preventive support is helpful for most children who are identified to have a risk of reading difficulties. (Holopainen 2019.)

Developmental language disorder complicates linguistic communication, which manifests itself as difficulties in producing and understanding speech. It is usually detected already in early childhood as slow speech learning, difficulties in listening comprehension and lack of linguistic communication. (Finnish Brain Association 2023.) Developmental language disorder can also manifest itself later in childhood in the form of learning difficulties, such as problems with reading comprehension (Nudel et al. 2023).

Non-specific learning difficulties refer to varying degrees of difficulties in learning new things and applying them (Peltopuro 2022). They affect all learning at school, and pupils often attend partially or fully individual instruction in special education (Seppälä et al. 2019). Pupils with intellectual disabilities can learn to read



satisfactorily (Närhi, Peltomaa & Aro 2014), but some do not achieve independent literacy (Smith 2005).

Different factors that affect reading ability can occur simultaneously in an individual. For example, attention deficit hyperactivity disorder has been found to be more common in people with learning difficulties (Wilcutt & Pennington 2000, Germanò et al. 2010). Pupils with one diagnosed neurological difficulty perform slightly better in tasks involving language and perception than pupils with multiple diagnosed difficulties (Crisci et al. 2021). In a survey by Riina Pieviläinen et al. (2020), respondents who had more than one challenge affecting learning were more likely to use reading aids than those with only one diagnosed learning challenge. Reading difficulties are also linked to other learning difficulties, such as difficulties in learning mathematics (Moll et al. 2014).

Physical disabilities can be a barrier to reading printed books. Visual impairment, such as low vision or blindness, can completely prevent an individual from reading printed text. Cerebral palsy, on the other hand, is a neurological disorder that affects movement, balance and posture. It can also be accompanied by dyslexia. (CP-liitto 2023). A common feature of muscular disorders is the weakening of voluntary muscles (Finnish Association of Muscular Diseases 2023), which affects a person's motor ability. Cerebral palsy and various muscular disorders can make it difficult to use and read printed books.

According to data from Celia's customer registration forms, 68% of Celia's underage users list a learning disability as the reason for their print disability. One third of Celia's registered customers have not reported the nature of their print disability. For two per cent of underage customers, the reason for the customer relationship with Celia is a visual impairment.

2.3 Reading aids

This study focuses on tools and materials that support reading. Various support models and exercise programmes to support reading have been excluded from the study. The study focuses on the use of reading aids in all levels of basic education instead of exclusively during the phase when reading skills are practiced, for example.



Physical print disabilities, such as low vision or blindness, require special aids or assistive technologies that enable reading (Regional State Administrative Agency 2023). These aids include audiobooks, Braille books and screen readers, among others. Cognitive reading difficulties among children and young people, such as learning difficulties and problems with attention and executive functioning, do not necessarily require special reading aids, but they can be of significant help in facilitating reading performance and maintaining motivation (Paloneva & Mäkipää 2019).

Plain language

In Finland, the development of plain language began in the 1980s in the form of news, magazines and other media aimed particularly at people with intellectual disabilities (Leskelä 2021). At that time, children's books were also adapted and written in plain language. The purpose of the standards and guidelines for writing plain language is to ensure that the text is understandable to people who need to read in plain language.

In Finland, more and more fiction in plain language is published for children and young people, even though the number of titles is still modest compared to other books for children and young people. For the time being, learning materials in plain language are available only sporadically. No studies have been published in Finland on the impact of plain language on different areas of reading or learning.

Pictures that are used to support the understanding of the message and not just to serve as illustrations are known as visual aids. Visual aids can help understand phenomena that are difficult to describe linguistically. (Selkokeskus 2023.) Visual aids can be used to reinforce the message conveyed by written language. In this case, the picture presents the information that can also be found in the text as accurately as possible (Selkeästi meille 2023).

Audiobooks and audio-assisted books

Audiobooks and various enriched digital learning materials are common reading aids in schools (Paloneva & Mäkipää 2019). Schools use audio materials by publishers and enriched materials from textbooks. Polyline is an audiobook service that sells licenses for the use of in-app audio-assisted books in schools (ILT Education 2023). Celia's audiobooks designed for print-disabled people, and the enriched DaisyTrio



audio-assisted illustrated books, which include text and images in addition to audio, are available free of charge for anyone with reading challenges.

According to a study by the University of Eastern Finland, the majority of schoolchildren who use audiobooks consider them to be a useful learning tool. Audiobooks make it easier to focus and understand the content. Research has also shown that audiobooks support independent reading and promote learning. (Kuismanen & Holopainen 2013.) For visually impaired readers, audiobooks or other audio materials replace printed books (Finnish Federation of the Visually Impaired 2023a). In other words, an audiobook can be considered both as a technical aid that enables reading and as an aid to cognitive accessibility.

Celia's DaisyTrio books are an example of a multichannel book format that combines reading and listening to an audiobook. Multichannel reading, or reading printed text simultaneously with listening to audio material, has attracted interest in the field of reading support, especially when combined with gamified and communal practices (Marchetti & Valente 2015). A study by Wood, Pillinger and Jackson (2010) found that a talking book with images and audio supported pupils' phonological awareness, learning of letters and vocabulary development, especially when supported by an adult. Since then, various audio-assisted books have been studied by Schiavo, Mana, Mich and Zancanaro (2021), among others. According to their intervention study, reading aids that allow text to be followed in both printed and audio form support reading comprehension among people with dyslexia.

Accessible learning materials

Cognitive accessibility means that a product or service is designed so that it is as easy to perceive and understand as possible. From the point of view of learning materials, cognitive accessibility means clarity in terms of both the layout and structuring as well as the content of the text. Multichannel learning, such as reinforcing written text with pictures and audio, also promotes cognitive accessibility (Selkeästi meille 2023). The largest publishers producing learning materials produce very little materials or textbooks aimed at pupils who need support in reading and where cognitive accessibility is particularly taken into account. However, some learning materials are available in plain language, and more and more texts are also accessible in audio format.



Learning materials suitable for special education are offered, for example, by the Opike service of the Finnish Association on Intellectual and Developmental Disabilities. Opike's selection includes some amount of plain language textbooks in different subjects. (Opike 2023.) The Finnish National Agency for Education (2023a) has produced learning materials suitable for special needs education, such as for language studies. In addition, individual companies, such as Early Learning Oy, produce teaching materials intended for special education. The accessibility of these materials has been taken into account in part, for example, in terms of plain language and visual aids, but only a small portion of the materials take both cognitive and technical accessibility extensively into account.

In addition, teachers produce a great deal of learning materials that are individually designed for specific learning challenges or for specific pupils. No research has been published on learning materials produced by teachers themselves or the reasons for creating the materials or their content.

Text-to-speech and scanning applications

Text-to-speech refers to features built into many reader programs that convert text into speech. Sounds or words that have been converted into speech can support learning grapheme-phoneme correspondences when practicing reading, for example. (Paloneva & Mäkipää 2019.) Speech-to-text and text-to-speech applications have proven to be useful tools in special education. In a study by Nordström, Nilsson, Gustafson and Svensson (2018), among others, 82% of primary school aged test subjects continued to use a text-to-speech application after a text-to-speech intervention in the class.

There are applications available for mobile devices that allow the reader to change the font size and background colour of texts to make reading easier. According to McLaughlin and Kamei-Hannan (2018), text adapted to individual needs on a tablet computer more effectively supported reading comprehension and reading fluency for visually impaired pupils than printed text in a large font.

Reading games

Games suitable for training language skills have been developed in various countries and for different language areas. Games developed especially for the early stages of learning to read have proven to be both effective (Saine et al. 2011) and motivating (Ronimus 2012) ways to practice reading. In Finland, Ekapeli



(Lyytinen, Ronimus, Alanko, Poikkeus & Taanila 2007) is a widely used, free digital learning game that teaches basic reading skills. Ekapeli has been translated into several languages under the name GraphoGame. For example, the digital sound game Headsprout has been used successfully to help children with intellectual disabilities learn to read (Herring, Grindle & Kovshoff 2019).

In Finland, many publishers offer digital learning materials that include gamified exercises. So far, no research has been published on the impact of learning materials such as Sanoma Pro or Otava on reading or learning.

Braille and tactile learning materials

Braille consists of embossed characters that are read using fingers. Braille is used by readers with a visual impairment. There are few readers proficient in Braille in Finland, as the majority of visually impaired people read with the help of various aids, such as audio materials and applications that enlarge text. However, for people with total blindness or a severe visual impairment, Braille is an important means of acquiring information independently. (Finnish Federation of the Visually Impaired 2023b.) In addition to printed Braille materials, Celia's selection includes digital Luetus books that can be read on a Braille display (Celia 2023).

Raised reliefs are tactile materials which are used to provide a visually impaired person with information about various physical objects and phenomena. For example, a map with colours and textures can be produced as a raised relief to convey the information of a printed map in a tactile format. Celia's selection includes raised-relief appendices for Braille and Luetus e-textbooks, for example.

Tactile books are designed to convey the phenomena and stories of the book using a variety of materials, shapes and colours. Tactile books can include interactive elements, such as parts that are movable or produce sound. The books usually contain both text and Braille writing. Tactile books are intended for children who find it challenging to read printed fiction due to intellectual or visual impairments, for example. (Celia 2023.) In a study by Kamei-Hannan, Chang and Fryling (2020), tactile storytelling strengthened the linguistic skills of visually impaired children, such as narrative skills and reading comprehension.

A linguistically rich environment and access to literature are essential for the development of reading literacy for both sighted and visually impaired children. The early use of tactile materials and Braille and audiobooks together with a



guardian promotes early language skills which are in turn linked to literacy. (Chen & Dote-Kwan 2018.)

Reading overlays and rulers

Reading overlays and rulers can be used to make printed text easier to read.

Reading rulers are aids that are placed under the text being read and can be moved at the pace of reading to make it easier to follow the printed text. Reading overlays can be used to change the background colour of text to make letters stand out more easily. (Papunet 2023).

2.4 Reading support in schools

In Finland, reading instruction begins already in preschool as children are familiarised with letters. Reading literacy is practiced in year one of primary school by learning letters and their corresponding phonemes. Decoding is achieved when the pupil combines the phonemes of letters into words. In addition to decoding, pupils discuss what they have read and do various exercises based on the read stories. This way, practicing decoding and reading comprehension go hand in hand. (Ketonen 2019.)

Depending on the reading difficulties and their severity, reading is supported in teaching in different ways. The special education teacher plans individually suitable forms of support for the pupil. If challenges affecting the learning of reading are known when the pupil starts school, forms of support are identified in multidisciplinary cooperation already when the pupil moves from preschool to primary education. If reading challenges are detected at school, it is possible for the pupil to receive support for reading in the form of general support. If the need for support is more long-term and individual, the pupil is moved to intensified support. If intensified support is not sufficient to support the pupil's learning and school attendance as a whole, the next stage is special support. The starting point of support for reading are pedagogical solutions designed in multidisciplinary cooperation. (National Board of Education 2023b.)

Dyslexia is often detected during the first two years of primary school as pupils learn reading. It manifests itself as slowness in learning to read, challenges in detecting phoneme-letter correspondences and slow automation of reading. Pragmatic reading difficulties can usually be diagnosed if the pupil has learned



decoding but has challenges with reading comprehension. There are various methods, programmes and additional exercises for rehabilitating reading difficulties, especially during the learning phase, and which can be used to support different areas of reading (Holopainen 2019).

Depending on the nature of their reading difficulty, some pupils become familiar with reading aids already in the early stages of learning reading skills. For example, pupils who are visually impaired receive individual assistive devices under the direction of the Valteri school. Blind pupils are able to attend the Valteri school Onerva for a period of time to familiarise themselves with assistive devices and their use. (Valteri 2023.) Many pupils who experience problems in different areas of reading at an early stage use tools such as Ekapeli to assist in practicing reading (Lyytinen et al. 2019).



3 Data collection

Celia's study on the use of reading aids in schools was carried out by conducting a survey of teachers who use assistive reading aids in their teaching and by interviewing pupils who need reading aids. The interviews were conducted by Celia's working group specialising in cooperation with educational institutions. The working group's members were pedagogical specialist Veera Kivijärvi, planner Sami Määttä and pedagogical information specialist Minna Katela. The survey data was collected by research company Innolink. The quantitative responses to the interviews and survey material were analysed by Innolink. Veera Kivijärvi and Sami Määttä analysed the answers to open-ended questions.

3.1 Survey

The purpose of the survey was to collect information on teachers' experiences of reading aids and what issues they are facing with currently used reading aids. A questionnaire containing both open-ended and multiple-choice questions was chosen as the method for conducting the survey. The survey was designed by Celia's working group and analysed by Innolink.

Survey group

The survey was answered by teachers who use reading aids in their teaching. The survey was sent to teachers who had a Celia registration ID, in other words the possibility to register children and young people as users of Celia's services. These teachers were assumed to be familiar with other reading aids in addition to Celia's services. A total of 475 teachers responded to the survey. The survey could be taken in Finnish or Swedish, and 12 of the answers were submitted in Swedish.

The majority of the teachers who responded to the survey were special education teachers or special class teachers. In addition, class teachers and secondary school teachers, as well as a few subject teachers, responded to the survey. The Helsinki Metropolitan Area was the most actively represented region. In other regions of Finland, the respondents were fairly evenly distributed.



Figure 1

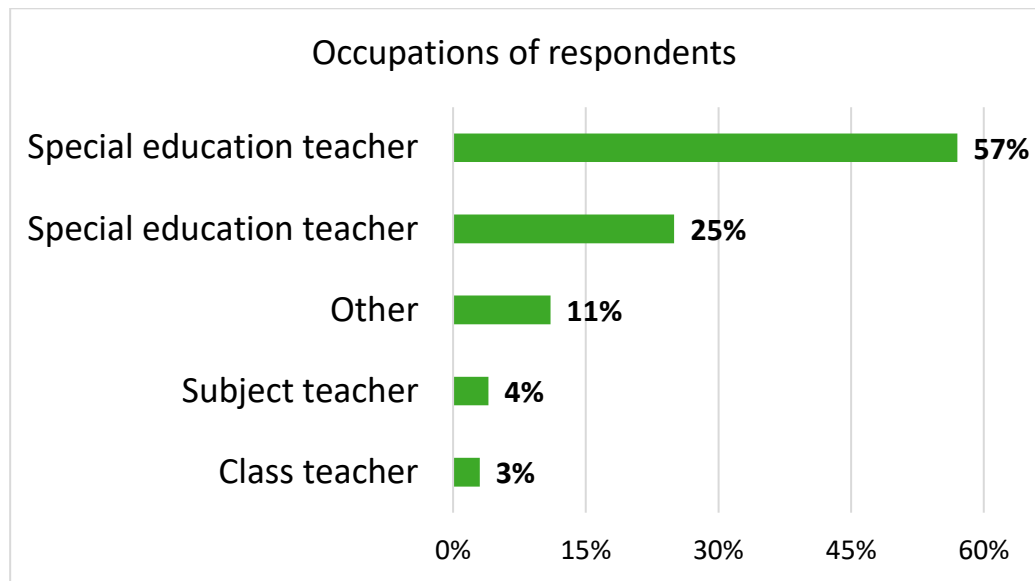
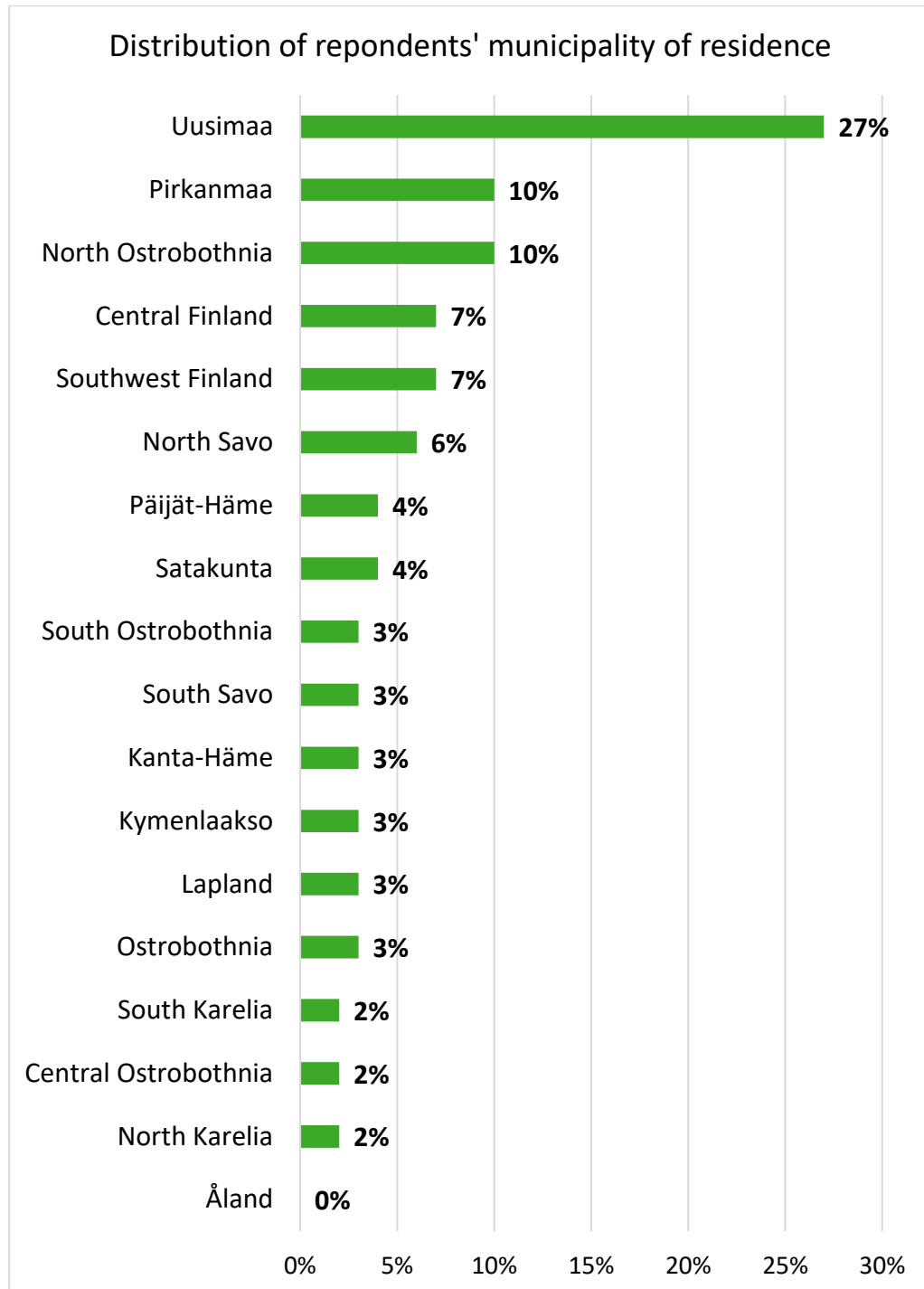


Figure 2



Survey methodology

The questions in the survey are based on the information needs of Celia's experts and on an investigation of the most commonly used reading aids. Most of the questions were multiple-choice questions. The purpose of the open-ended questions was to give teachers the opportunity to describe in their own words their experiences, such as which reading aids they find most effective, as well as what



problems they have encountered while using reading aids. The survey form can be found in the appendices to this report.

The survey was conducted electronically. Teachers' contact information was obtained from Celia's customer register. A link to the survey was sent to the respondents using the email address provided to Celia. The survey link directed to the form, and the answers were stored directly in the database on the server of the company conducting the survey, Innolink. A link to the survey was also shared on Celia's Twitter and Facebook accounts.

3.2 Interviews

Interviews with children and young people in need of reading support were chosen as a data collection method in order to obtain information about pupils' own experiences. The experiences of reading support of children and young people with reading difficulties have not previously been extensively investigated through interviews.

The interviews were preceded by lessons, during which the interview subjects explored Celia's books and did word art exercises inspired by the books. Celia's books were in this way familiar to the pupils, at least in the case of books covered in the lesson.

Survey group

Celia's newsletter for schools announced the possibility of getting Celia's experts to visit the school, hold lessons for pupils and information sessions for teachers, and interview pupils for the study. The schools where Celia conducted lessons and interviews were selected based on contacts from the schools. Visits were made to 17 schools across Finland in the order in which invitations from the schools arrived. All of the schools that contacted Celia were Finnish-speaking. The interviews were conducted in Finnish.

A total of 35 pupils were interviewed, of whom 29 were in primary school and six in lower secondary school. The number of interviewees was based on an assessment that the data would be sufficient for a qualitative analysis. There was also no intention to compare age groups (see Hyvärinen et al. 2018). A comparison was not made because the age of pupils in the area of special support does not necessarily



tell much about the pupil's reading habits or skills. Fewer lower secondary school pupils were reached than primary school pupils, because primary schools were much more active in inviting Celia's experts for a school visit.

The interviewees were selected on the basis of the teacher's suggestions and the pupil's own motivation to participate. At the request of Celia's working group, teachers selected pupils who were willing to participate and whose guardians gave permission to participate in the interview. Teachers were instructed to select pupils who are Celia's customers for the interview. However, not all of the interviewed pupils were Celia's customers, because there are so few active users of Celia's services in schools. The interviewed pupils shared a need for special or intensified support in studying and difficulties in reading. Teachers select pupils based on how they could benefit from reading aids provided by Celia. Pupils' support needs or diagnoses were not asked. Instead, interviewees were selected based on the teacher's assessment on the need for support in reading.

No identifying information about the pupils was collected during or before the interview. Pupils attended the interview with a pseudonym made up with the interviewer. Pupils were not asked for any information related to health or privacy. Participation in the interview was voluntary, and this was communicated to the pupils before the interview began. Pupils were also told that the interview could be stopped at the pupil's request, and one pupils decided to end the interview early.

Permission for the interview was asked verbally from pupils themselves and from the guardian using a paper form and the teacher by email. The principals of schools had been informed of Celia's visit to the school and the content of the visit.

Municipality-specific research permits were requested from those municipalities that required a permit.

Interview questions and course of the interview

When interviewing children, their developing language skills and memory should be taken into account (Raittila et al. 2017). The interview questions were prepared so that children who may have language challenges could understand and answer the questions.

The interviews were conducted as thematic interviews with pre-determined thematic modules. The questions were refined during the interview in cooperation between the interviewer and the pupil (see Hirsjärvi & Hurme 2008). The interview



framework was designed to be very accommodating, because the children would most likely need various situational clarifying questions in order to be able to describe their experiences of using reading aids. The questions in the interview framework were short questions on concrete topics. During the interviews, the interviewers were sensitive to pupils' answers and ready to ask follow-up questions (see Helavirta 2007). Each interview became an individual session with the pupil, as the interviewers tried to give as much space as possible to what pupils were saying.

The age and linguistic profile of the pupils varied. Because of this, not all questions were asked from all pupils, while certain questions were modified by giving only some of the options to choose from. Pupils could also choose not to answer a question. However, all pupils were asked the following five questions, worded in way appropriate given the pupil's age and linguistic profile:

1. How do you feel about reading? / Is reading enjoyable or not enjoyable?
2. Is reading easy or difficult?
3. Is it easy or difficult for you to concentrate when reading?
4. What helps when reading feels difficult?
5. Which of the different reading methods would you prefer? (reading, listening, or a combination of reading and listening)
6. Which of the different book formats would you prefer? (paper book, digital book, audiobook, or a combination of digital and audiobook)

The interview questions were prepared in cooperation with Celia's departments in order to obtain relevant data for Celia's services and production.

In addition, pupils were shown Celia's mobile app, Pratsam Reader, to see whether the application contained books they might enjoy. The pupils tested borrowing and listening to a book in the app. Pupils were instructed on how to find and listen to books as needed. The application was mostly used to search for DaisyTrio audio-assisted illustrated books that can be listened to and read at the same time, but some pupils also found audiobooks they were interested in. After using the app, pupils were asked what their experience of reading and listening to Celia's book had been and whether they would be likely or unlikely to read Celia's books again.

According to Brinkmann and Kvale (2018), getting to know the interviewee's environment increases the interviewer's understanding of the subject's sphere of life and the phenomena discussed in the interview. The interviews were preceded



by word art sessions held for the entire group, where Celia's selection was explored through games and play. In this way, the researchers wanted to get to know the pupils and their daily school environment by engaging in activities with the pupils.

4 Data analysis

4.1 Analysis of survey data

The quantitative data of the survey was analysed using statistical graphs, such as frequency distributions, averages and cross-tabulations. Innolink conducted the quantitative analysis.

At Celia, pedagogical specialist Veera Kivijärvi and planner Sami Määtä analysed the open-ended answers of the survey using a data-driven content analysis method (Tuomi & Sarajärvi 2009). First, the material was read through carefully. After this, the data was grouped so that identical or similar expressions were grouped into their own units or clusters. Next, the data was abstracted by considering which concepts described the clusters. (Emt. 110.) The concepts were formulated and combined on the principle that it was possible to abstract from the data the concepts, phenomena and reading aids that best described the teachers' experiences.

4.2 Analysis of interview data

The interview material was transcribed and submitted to Innolink for analysis. The final data, including questions and answers, were first grouped between lower secondary and primary school pupils and sorted alphabetically, after which the transcriptions were read systematically one interview at a time. At the same time, summaries of the interviews were compiled, which gathered the main points of the interviews and made it possible to review the material at a glance. In connection with the review and compilation of summaries, significant and interesting themes were identified from the material based on the research questions. Content analysis was the primary method used for analysing the data, but content breakdown analysis was also used for key topics (Kallinen & Kinnunen, 2023).



5 Results

5.1 Reading support and aids as described by teachers

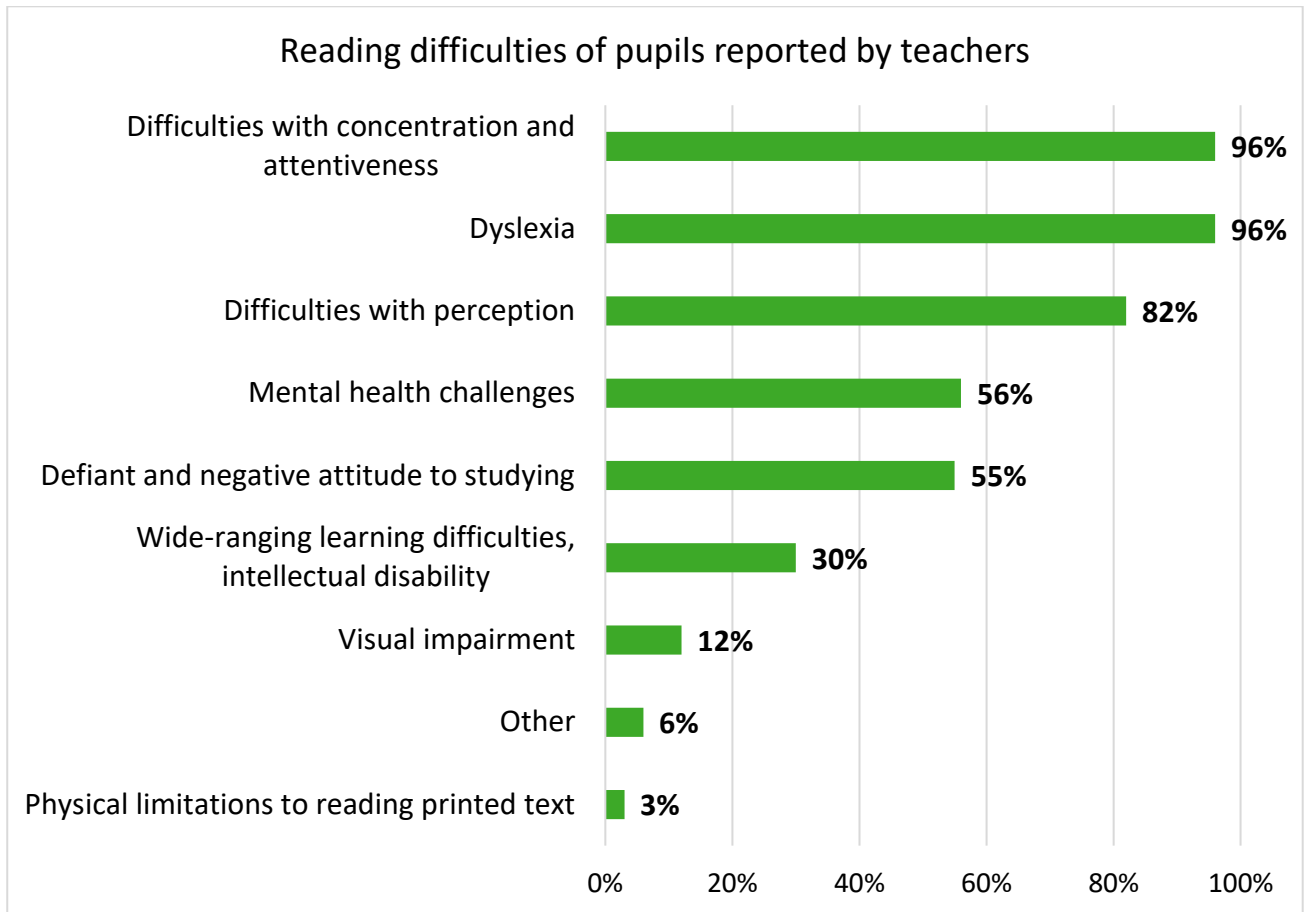
A survey of teachers was conducted to find out what kind of reading difficulties their pupils experience and what are the most commonly used reading aids in teaching. In addition, the survey asked for teachers' opinions on which reading aids are the most effective and what issues they have encountered related to reading aids.

Reading difficulties

According to teachers, pupils' reading difficulties are cumulated to the same pupils, and it is not always possible to indicate which of the difficulties is primary. Almost all respondents reported that pupils have both difficulties in concentration and attention as well as learning difficulties. Perceptual difficulties were also mentioned by the majority of respondents. Half of the pupils were reported to have mental health challenges as well as a defiant and negative attitude towards studying. One in three teachers reported that their pupils have extensive learning difficulties or intellectual disabilities. One in ten pupils had a visual impairment, and about one in ten had other reading difficulties or physical limitations that prevented reading. Visually impaired pupils are overrepresented in this study, likely because Celia has a background as a library for the visually impaired and many teachers of these pupils have been familiar with Celia's selection for a longer time.



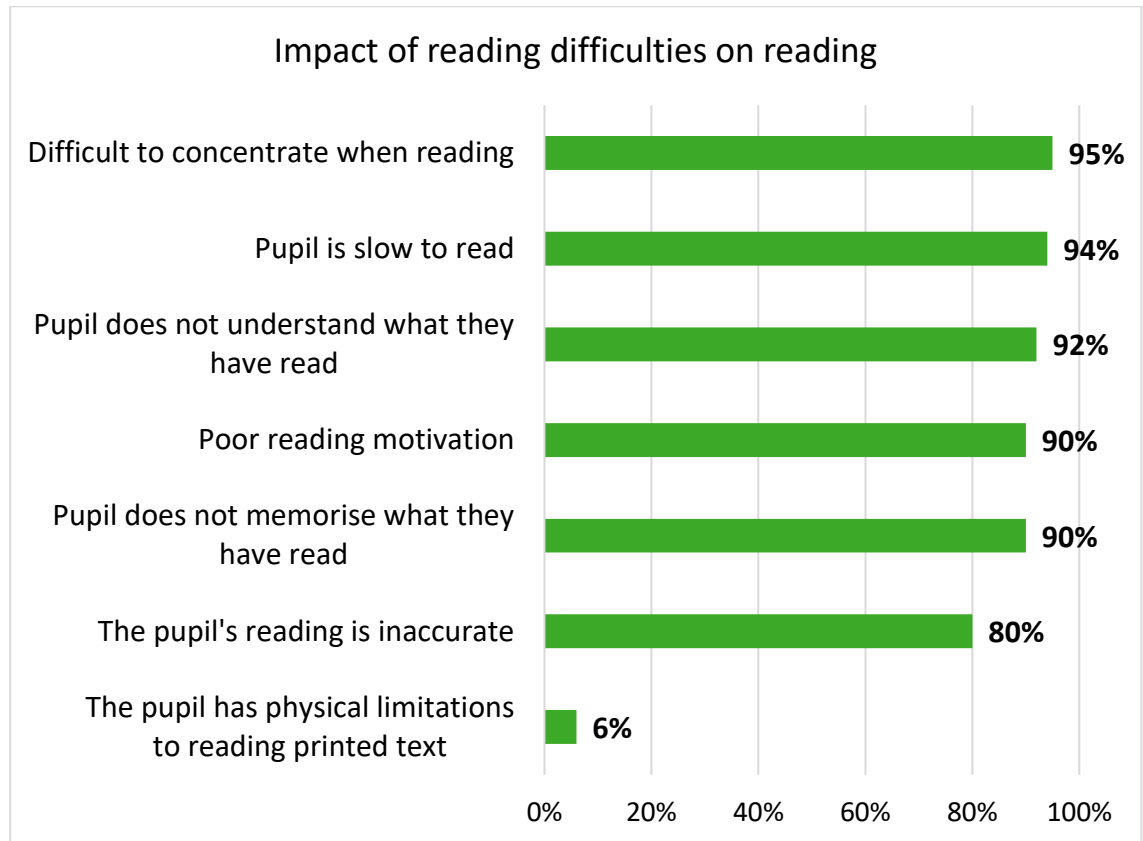
Figure 3



Teachers were asked a multiple-choice question on which areas of reading were affected by pupils' reading difficulties. Nearly all teachers report that cumulated reading difficulties affect all aspects of reading, such as reading speed and fluency, concentration, reading comprehension and memorization and reading motivation. Four out of five teachers also said that reading difficulties affect reading accuracy. Six per cent of respondents said that a pupil's physical print disability affects reading performance.



Figure 4



One teacher described the impact of reading difficulties as follows:

"When reading is difficult, it is not pleasant. This results in doing only the absolutely minimum to practice reading. This of course means that reading is both difficult for the pupil and the pupil practices very little to improve their reading fluency and comprehension, build up their vocabulary and so on."

In other words, reading difficulties seem to be multifaceted and to impact reading and literacy in many interconnected ways. As the teacher described in the previous quote, reading difficulties and their impacts manifest as a web of issues that is difficult to untangle.

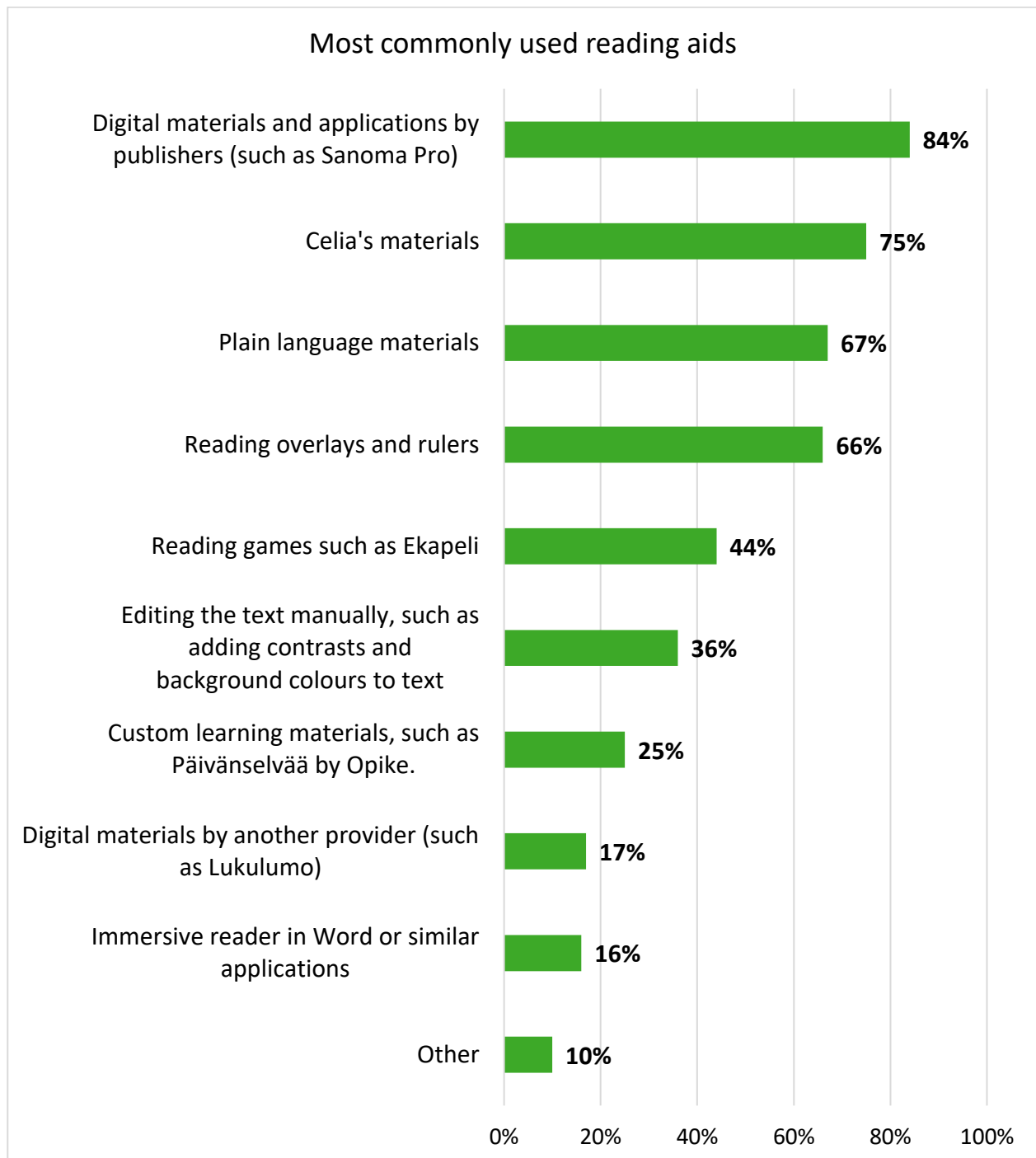
Reading aids most used by teachers

Teachers were asked a multiple-choice question about which reading aids they use in teaching. Most teachers said they used digital materials and applications by publishers. Celia's books were the second most commonly used resource, and plain language texts the third most used. Reading overlays and rulers, as well as reading games such as Ekapeli, were also used extensively. Manual editing of texts, such as



adding background colours, was done to some degree. In addition, learning materials by other providers and organisations, such as Opike by the Finnish Association on Intellectual and Developmental Disabilities, were used according to the survey.

Figure 5



The most commonly used reading aids, publishers' digital materials and applications, are available to teachers through learning materials purchased by



schools. It is therefore natural that they are reported to be used the most. The majority of teachers who responded to the survey said that they use Celia's materials as a reading aid. It should be noted that the survey was sent to teachers who use Celia's registration option, so they are already familiar with Celia's services. The use of plain language texts was often mentioned, although there are as of yet relatively few books and learning materials available in plain Finnish. In the open-ended answers on which reading aids are the most effective, many teachers said that they produce learning materials in plain Finnish for pupils to use.

Which reading aids are the best?

Teachers were asked an open-ended question on which reading aids and materials they felt are the best and why. Based on the responses, the best reading aids audiobooks, plain language texts and digital learning materials and apps.

Audiobooks received the most mentions from teachers who responded to the survey. They are used for reading both learning materials and fiction. Audio material was seen as compensating reading difficulties and to be an effective way to read when reading printed text is slow or difficult:

"If reading is really challenging, it's OK to learn to use audiobooks (everyone listens to them these days). This way, you are able to keep up with studies, grow your vocabulary and general knowledge, and can even discover audiobooks as a pleasant pastime outside school."

However, according to teachers, audiobooks alone are not enough to support the development of reading literacy, and that audiobooks used alongside either printed books or e-books produce the desired results when teaching reading. Teachers felt that a good way to support reading is to provide pupils with reading material in a multichannel format, in other words reading with both eyes and ears.

"Audiobooks reduce the time needed to cover a topic with pupils who are slow to read large amounts of text. They also add an auditory channel, which is good. Audiobooks also allow pupils to practice reading by following the text alongside the audiobook."

According to teachers, multichannel reading improves the development of pupils' reading skills and concentration. Celia's DaisyTrio audio-assisted illustrated book was used to support the above skills:



"The accompanying pictures and text make it easier to learn reading and support the reading process. In particular, pupils who struggle with attentiveness problems are better able to follow what they read or listen to when they also have something to watch."

Teachers felt that with the help of an audiobook, pupils have better opportunities to understand the content of the text. This is because not all energy is spent on struggling with basic literacy and listening to a book at the same time makes the reading performance easier.

Plain language material received the second most mentions when asked which reading aids are the best. Teachers describe plain language material as facilitating reading comprehension and supporting learning. They also improve the pupil's motivation to read by making the task of reading seem less laborious: "It is easier to motivate a weak reader to read when the texts are short and easy to follow." Teachers also said that it is possible to perceive the main points of the learning content from plain language texts, which gives the pupil better opportunities for learning: "Plain language texts explain the subject matter in a concise way that helps both mechanical reading and reading comprehension." In addition to learning materials, plain language books were mentioned as a way to encourage pupils to read fiction. The teachers felt that for pupils in need of support, plain language fiction is the gateway to enjoying reading: "Discovering the plot of a story in plain language inspires children to read, even if they may find reading difficult."

In connection with plain language materials and audiobooks, teachers pointed out that these aids work for many pupils, regardless of their degree of reading difficulty: "They help a large number of readers who may have difficulties for a variety of reasons". If reading difficulties and their effects on reading skills form a web that is difficult to untangle, plain language and audiobooks are seen by teachers as a way by which many pupils can be helped in this regard.

According to teachers, the third most effective type of reading aid were the learning applications and e-learning materials offered by publishers. It should be noted that although publishers' learning applications and e-learning materials were mentioned as good tools, teachers who did so did not offer much reasons as to why they considered them to be the best. Some respondents pointed out that in many printed textbooks, it is possible to listen to the textbook in the publisher's app. A



few teachers also mentioned the gamification of digital tasks, which was felt to improve pupils' motivation to practice reading.

In addition to the above, teachers found reading rulers and sticks to be useful reading aids. They were reported to support pupils' technical reading performance by making it easier to follow the text and stay on the correct row. Reading games such as Ekapeli also received a lot of positive mentions. Ekapeli was highly praised for its benefits in making reading smoother, but it was also seen as a way to motivate pupils to practice various areas of reading.

Many teachers said that they produce their own learning materials because they cannot find suitable materials to meet pupils' individual needs. Among others, teachers said that they edit existing materials into plain language, find visual aids to support the texts and produce simplified tasks for pupils. In addition, teachers modify the materials they have produced by enlarging the font and increasing the line spacing, for example.

In addition to the above tools and materials considered the best reading aids, teachers described their experiences of using reading aids. Teachers felt that even the best reading aids do not make sense to use if they are too difficult to use independently and guardians are not committed to using them. It was noted repeatedly in the responses that the best aids are those which pupils are willing and able to use. Teachers also mentioned that the best aids are those which are free to use or as affordable as possible.

Issues experienced by teachers related to the use of reading aids and learning materials

Teachers experienced many issues related to the use of reading aids and learning materials. The most significant issues mentioned were the lack of plain language books and texts and the uneven availability of audiobooks or materials. Teachers also pointed out that not all textbooks and materials are suitable for teaching those most in need of reading support because their language is too complex. In addition, the user interfaces of digital learning materials were considered too complicated.

The lack of plain language books and plain language content in textbooks received the most mentions from teachers. The lack of supply makes such books difficult to find. Plain language books are mainly available for children, and finding books suitable for young people is difficult. Regular textbooks and learning materials



were found to be too challenging for pupils in need of support. By language that is too complicated, teachers meant difficult sentence structures, difficult vocabulary, difficult or complex text, and text that is separate from the pupil's world of experience. Many teachers specifically mentioned ABC books and described them as too difficult for pupils. The lack of learning materials for pupils in need of support was clearly visible in primary and lower secondary schools, but respondents also mentioned issues with materials used in vocational and general upper secondary education.

Another major issue was the lack of opportunities to listen to audiobooks and text-to-speech. Teachers hoped that it would be possible to listen to all of the visible text in the learning materials. In cases where it was possible to listen to the learning material, teachers brought up the issue that only parts of the material could be listened to. Teachers also wished for the option to adjust the reading speed or pause the recording. Audiobooks and audio materials also received criticism for a monotonous or machine-like reading voice. Some respondents wished that all learning materials would be read by a human.

Teachers hoped that more support methods would be used in the learning materials to help pupils comprehend and follow the text. Below are two lists about support methods that teachers said they would like to see included in the books and materials used for teaching pupils in need of support.

Features requested by teachers for learning materials for pupils in need of support:

- Blacked-out words
- Plain language
- Audio-assisted reading
- Customisable material in terms of font size and background colour, for example
- Hyphenation
- Upper case letters
- Visual aids
- Summaries of important topics in the text

For electronic materials:



- In foreign language books, it should be possible to click on a word to show its meaning.
- Speech-to-text application.
- Option to add comments.
- Option to save important pages.
- Text-to-speech feature for image captions.

Teachers said that while learning materials and services may be available, they are difficult to find or implement from the teacher's and pupil's perspective.

"Too tricky to use. An audiobook app must be so simple to use that anyone can learn it quickly. Using the service should be smooth and straightforward. Otherwise, it will not be used. In audiobook services, you often only hear the audio and cannot follow the text at the same time. Children and young people need an audiobook app where they can follow the text while listening."

There were major issues in the cognitive accessibility of e-learning materials: "E-learning materials and assignments are too difficult for them. There is too much to surf and scroll, the read text does not form a whole." According to teachers, the features of e-learning platforms are not suitable for pupils who have multiple challenges in reading, perception and concentration: "For some young people, digital materials make schoolwork more difficult. Textbooks should not require pupils to scroll back and forth as this makes it harder to understand the text."

Due to the lack of suitable learning materials, teachers need to assemble the materials used in class from many services, which takes time. In addition, the user interfaces of services were found to be difficult because they differ from each other. This was also seen as an obstacle that prevents pupils from learning to use the services. For example, Celia's online service and application were considered too complicated to use, which is why pupils do not use them independently.

Teachers who participated in the survey also reported that one of the obstacles to using learning materials is the lack of available funds. Funding is either insufficient or not used to purchase the necessary learning materials. While not related to the availability of learning materials or services, funding or lack thereof is an essential part of teachers' experience of reading aids and their availability.



The survey material also described pupils' attitudes towards reading. Teachers said that the topics of the books do not interest pupils or motivate them to read. Teachers hoped that works of fiction are both easy to read as well as connected to pupils' experiences of the world and interesting. Gamified methods were seen as motivating pupils, but after the first few years of primary school, there are not enough of such games available for pupils in need of support.

5.2 Pupils' experiences of reading and support for reading

The interviews with pupils highlighted pupils' experiences of reading, its joys and challenges. Pupils' experiences were mainly positive, even as all those interviewed had been identified as in need of support in reading. The pupils were open towards and interested in reading aids. Pupils also mentioned several methods that they felt would support reading.

Pupils varied in their opinions of the types of activity they perceived as reading. For example, some pupils understood scanning the text as reading, while others only considered long-term focus on the text as reading. Some interviewed pupils were very specific about the fact that listening is not actually reading, and some thought that reading a printed book is the best way to learn reading despite the fact that it is more challenging than listening.

How is reading experienced?

Two-thirds of primary school pupils interviewed found reading enjoyable. Only one in ten primary school pupils found reading unpleasant, and the rest did not give an opinion. One in two lower secondary school pupils said they enjoyed reading, while the rest did not give an opinion one way or the other. Half of the pupils in both lower secondary and primary school found reading easy. One in five considered reading difficult, and the rest said that circumstances affect whether reading is easy or difficult.

Pupils who described circumstances as affecting the enjoyability and ease of reading listed as factors their own alertness, environmental factors and the text being read. Although a large share of pupils found reading easy, new or difficult words were mentioned as making reading harder.



The interviewed pupils mentioned several different ways by which they explore books. Among other ways, they listed reading books themselves, having books read aloud to them, and listening to audiobooks alone and with others. When asked in what situations they read books, pupils said that they read during school days and sometimes in their free time. Some interviewed pupils said that reading together is more enjoyable than reading alone. Reading together was understood as the equivalent of listening to a book, with either an adult reading aloud or by listening to an audiobook with an adult. In the evenings, reading books, either alone or with a guardian reading aloud, was mentioned as a nice way to spend time together and calm down. Nearly all interviewed pupils said that their parents read or had read to them when they were little.

Older primary school pupils as well as lower secondary school pupils noted that they have relatively little time for reading in their daily life and that they read if there is nothing else to do. One pupil mentioned going to the library and borrowing books as a way to spend time with friends: "I've gone to the library with my friends to borrow books and I'm going to return them once we've read the books." On the other hand, some pupils said that they only like to read by themselves and do not find reading in class enjoyable, for example.

The pupils were able to accurately identify their reading difficulties and their impact on reading performance. According to the pupils, reading difficulties manifested themselves as problems with reading comprehension, among other issues: "Sometimes it's easy and sometimes I can understand some things but not others. It comes and goes." The difficulties manifested as slowness and lack of fluency in reading, misunderstanding of individual words or sentences, reading errors, occasionally skipping over text, difficulties keeping on the line, and jumbling or changing letters.

"So it's mostly dyslexia, where I can sort of see the letters as kind of jumping back and forth and so on. The problem is mostly in my eyes I think. I think that's the only problem, that to me the letters seem as though they're jumping around."

The pupils felt that they coped fairly well with reading difficulties. Most of the interviewed pupils felt that they understood what they read. The pupils felt that they had the opportunity to ask for support and help with reading difficulties from the teacher or guardians if necessary.



Some pupils reported that they occasionally have low motivation to read and do not want to read in their free time or read textbooks because it does not interest them. However, the lack of interest in reading was not common. On the contrary, pupils seemed to be trying to come up with at least some ways of reading that interested them. One pupil described practicing reading as follows:

"It's a bit annoying, but I want to learn so that I don't have regrets when I'm older."

In other words, pupils seemed to place value on practicing reading, even if they found it challenging. A few pupils said they liked reading very much: "I sometimes lose myself reading a book for a long time until I'm told to come for dinner."

Interviewed pupils said they found exciting stories, adventures and interesting themes particularly enjoyable when reading. The content of the book seemed to have a great influence on pupils' motivation to read.

Best forms of support for reading according to pupils

In addition to accurately self-reflecting on their reading difficulties, pupils were good at identifying things that could help them read or learn. Listening to the text and the theme being studied was brought up repeatedly as a factor that pupils found to be helpful when reading. For example, one pupil felt that she was a strongly auditory learner: "I've tested with my mother whether I learn by reading or by listening. Since I was little, I've learned by listening, I've listened to quite a lot of books and I am good at listening." Thus, listening to the text seems to be both enjoyable for pupils and also support their learning.

The image below shows all of the techniques, aids and methods mentioned by the interviewed children to make reading easier.

Reading aids mentioned by interviewed pupils

- sufficient and appropriate font size, not too small or too large
- reading ruler or pointing the section to be read with a finger
- parent reading aloud at first, after which the child can continue reading
- checking difficult words with a parent or teacher
- asking for help from a parent or teacher in general
- persistent practicing of reading
- listening to audiobooks
- listening and reading at the same time



- following the highlighted text in DaisyTrio
- hyphenation
- short texts or books
- books for children
- familiar and enjoyable themes
- plain-language text

Based on the pupils' responses, reading seems to be facilitated by many of the same techniques that teachers listed as the best reading aids.

Pupils' experiences of Celia's multichannel books

During the interview, pupils were given the chance to try Celia's Pratsam Reader application. They experimented with searching for books and learned about the DaisyTrio audio-assisted illustrated books. Most of the interviewed pupils would not have chosen a printed book if Celia's DaisyTrio audio-assisted illustrated book was also available. One pupil gave the following reasons for their choice:

"Maybe this one, because you don't get stuck so easily and can keep up with the pace and always see where you are. But if you don't want to read the text at all, you can listen to the story in bed or on the couch."

The pupils had positive things to say about listening to audio-assisted books: "I feel that it's easier to listen and read a little at the same time compared to just reading." Pupils mentioned that listening at the same time made reading easier and helped them stay in the rhythm of reading and avoid errors, as hearing corrects reading errors. Interviewed pupils were interested in Celia's books and could find interesting material to read in them, and many would have liked to continue listening and/or watching longer than was possible during the interviews. During the interviews, pupils were told about the possibility of using Celia's app at school and on their own phones, which the pupils found interesting.

Interviewed pupils were able to intuitively use the app quickly or after using other somewhat similar apps. The pupils were instructed in the use of the app, but only to a moderate extent. For some pupils, listening and reading at the same time was a completely new experience. Despite this, pupils were interested in the audio-assisted book as it was the most popular of four options when asked about pupils' preferred book format (paper book, digital book, audiobook, or a combination of



digital and audiobook). According to the interviewed pupils, listening and reading at the same time facilitate both reading and learning in general.

When listening to and reading DaisyTrio on a tablet at the same time, almost all pupils paid attention to the highlight colour of the text moving at the same pace with the audiobook. Only a few interviewed pupils focused only on listening and reading. Nearly all pupils found the highlighting to be useful for following the text and continuing reading: "I like that it shows where you are in the text. If I do something else for a while, at least I know where I need to continue." Only a few pupils thought that the yellow highlight colour was neither helpful nor distracting, and only a few would have preferred to just listen to the book.

What pupils found positive about Celia's books was that after selecting the book, the reader gains access to everything: audio, text and pictures. Especially younger pupils enjoyed the pictures in the books, but some also said that they do not necessarily need to see the pictures. For example, when listening to a bedtime story, there is no need to look at pictures. On the other hand, some pupils thought it was good that paper books and digital books have identical content.

Summary of results: Teacher survey

- Pupils' reading difficulties are cumulated. A diverse selection of reading aids is needed to meet different individual needs
- The most commonly used aids are digital materials by publishers, Celia's materials and plain language materials
- Audiobooks, plain language materials and publishers' digital materials were considered to be the best tools to support reading
- Teachers are feeling a shortage of effective reading aids. Not all learning materials include audio content that could be used simultaneously with a printed book. There is little material available in plain language, and teachers must produce the materials themselves. Publishers' learning platforms are also difficult for some pupils to understand.

Summary of results: Interviews with pupils

- Pupils mostly found reading enjoyable and easy, despite the difficulties in reading
- Many pupils found listening to be the most enjoyable way to read. Pupils mentioned bedtime stories read aloud by a guardian as enjoyable, and nearly



all interviewed pupils had been read bedtime stories. In addition, the importance of listening to the text was emphasised in connection with learning and when trying out the DaisyTrio book. In both cases, pupils felt that the option to also listen to the text made reading easier.

- The recognised their own reading difficulties and were able to describe how they impact reading
- The pupils found Celia's audio-assisted book to be an interesting and supportive way to read. The Pratsam Reader app was considered easy to use, and almost all pupils found something they liked to read in the app.

6 Discussion

Three key themes emerged from the results of the study: issues in the cognitive accessibility of learning materials, the importance of plain language books and audiobooks in supporting reading, and the importance of finding ways to motivate pupils on the importance of reading and literacy.

6.1 On learning materials

There is a lot of discussion in Finnish society about reading skills and the decline in reading performance scores. Until now, the discussion has not included the importance of learning materials on learning and the development of reading skills. Public discourse on reading skills and reading must increasingly consider the accessibility and suitability of learning materials for pupils who find reading difficult.

In this study, both teachers and pupils felt that combining reading and listening, as well the use of plain language, make reading easier for pupils who struggle with reading difficulties. Recent research results on the decline in learning outcomes of Finnish children (Ukkola & Metsämuuronen 2023) and reading literacy (Leino et al. 2023) show that measures to support learning and reading are desperately needed. Learning materials that are too challenging for pupils do not promote learning or reading skills. Celia's study on reading aids shows that the learning materials used in schools must be developed to better meet the needs of pupils who require support in reading. Pupils need plain language learning materials and materials that can be listened to and read at the same time.



Celia's report on reading aids reinforces the view that in the future, more attention must be paid to cognitive accessibility, especially in the development of learning materials. Teachers' experiences show that cognitive accessibility is not yet realised in digital or printed learning materials. Both digital and printed learning materials were found challenging for pupils in need of support in terms of layout, language, illustrations and user interfaces. On the other hand, digital learning materials were praised as motivating pupils, and their gamification was especially appreciated. Digital learning environments have considerable potential in motivating pupils to read and to enable learning, as long as their accessibility is ensured.

Teachers felt that many e-book services are too difficult to use, causing pupils to miss out from the benefits they offer. However, in the interviews, pupils seemed to find it easy to use Celia's Pratsam Reader app. Pupils were able to search for books in the app and begin listening to the book effortlessly with very little guidance. Teachers' experiences of the difficulty of use may be related to the installation of the services, such as the processes of acquiring user IDs and reviewing licences. In addition, teachers would need to familiarise themselves with the use and content of the services in order to guide pupils to use them effectively. The processes mentioned above can cause a great deal of work for teachers. Because of this, e-platforms that support reading should be designed to be easier to install, so that pupils could be given simple instructions on how to get started with reading on the platform or app.

International standards for cognitive accessibility are currently being developed, and measurable criteria are needed especially for the education sector and in the context of special education. The equality and cost-effectiveness of education would be improved by giving a wider group of pupils access the same learning materials (Funka 2023). The European Accessibility Act will enter into force in 2025. The Act mainly concerns technical accessibility, and addresses cognitive accessibility only briefly. The future accessibility requirements introduced by the Act will only apply to e-books, so e-learning materials and various web-based learning platforms will remain outside the scope of EU regulation. (Ministry of Social Affairs and Health 2023.) However, municipalities in charge of purchases of learning materials must comply with the accessibility requirements and may require the accessibility of learning materials and learning platforms in their purchases. Accessibility is an important aspect in the purchases of learning materials to ensure



that all learners have access to the materials. From the perspective of equality, municipalities should require better accessibility from learning materials and learning platforms used in schools.

Barely any studies have been published in Finland on the impact of learning materials on reading literacy or learning outcomes. In future studies, it would be important to investigate, for example, whether learning is different when audio-assisted and printed books written in plain language are used. This type of research data would be highly useful for the development of learning materials.

6.2 On reading

Despite the fact that the interviewed pupils experienced considerable reading difficulties, half of them found reading easy. Thus, reading difficulties have not greatly weakened pupils' own perception of themselves as readers. In a study by Peura (2021), it was found that a positive reading self-efficacy, or belief in one's own reading skills, among children correlates with more fluent reading skills. In future studies, it would be interesting to find out how pupils who have been diagnosed with reading difficulties differ in their reading self-efficacy and how self-efficacy affects the later development of reading skills. It would also be interesting to find out how reading different texts, such as plain language or digital texts, affects pupils' reading self-efficacy.

One of the most important results of the study was that even when pupils have significant difficulties with reading, reading is still mainly seen as an enjoyable activity. The pupils' experiences of reading were positive, especially in primary school. The experience of meaningfulness is linked to good reading outcomes (Leino et al. 2023), so those working with teaching reading should recognise the importance of this factor. How can we offer pupils more holistic experiences with literature in order to maintain and reinforce the joy of reading? Based on the interviews, Celia's DaisyTrio audio-assisted illustrated books were very much liked by pupils. Multichannel content can lower the threshold for reading and help motivate pupils. In the future, Celia's goal is to further increase the awareness of teachers, authors of learning materials, publishers and other stakeholders about different book formats and their benefits in supporting reading.



The interviewed pupils reported that they find it difficult to find the time to read between other activities. While primary school pupils told that they spent time reading together with a guardian, older pupils said that they only read rarely outside school. According to a recent PIRLS study, 30 minutes of reading a day seems to be enough to maintain and reinforce reading skills among students in year four. According to the PIRLS study, the less pupils read in their free time, the weaker their reading skills were. (Leino et al. 2023.) It would be very important for guardians and other adults in the pupil's life to support reading and set a positive example to help develop reading into an activity that the child also does in their free time. Reading can take many forms even at home, including listening to an audiobook or reading an audio-assisted book together.

The study found that children enjoy listening to stories and have fond memories of reading bedtime stories with a parent, for example. Although reading aloud by a guardian or teacher decreases as the child gets older, an audiobook can potentially convey at least some of the joy of listening to literature that young children experience in shared reading sessions. Nash (2023) equates listening to an audiobook with the age-old tradition of oral storytelling. Although listening to an audiobook without an accompanying printed text does not have the effect of reinforcing decoding skills, an audiobook is a good way to get acquainted with written language and literature when reading printed text is difficult. Reading habits should not be belittled if the end result is an enthusiastic reader who finds the stories enjoyable.

The pupils were able to name many different methods that support their reading. For example, plain language books were mentioned as one solution to reading difficulties. It is important that students find suitable and interesting reading. Plain language books for children and young people are making their way onto the book market, but there is still a shortage of them in schools. In this study, teachers felt that the use of plain language helps pupils comprehend, memorize and learn what they have read and improves their motivation to read. It would be important for everyone to have access to literature written in a register that helps them to better understand the content of the text. Hopefully, the selection of plain language books will continue to grow and awareness of the potential of plain language books to support reading increases. The writing and publishing of plain language books should also receive more financial support, as the need for them is great.



7 Recommendations for the development of reading aids

Improving the accessibility of reading aids requires efforts from everyone who orders, designs, funds and uses reading aids or tools that facilitate reading in the context of teaching. Below are recommendations derived from the results of this study on how to improve future reading aids.

1. Authors of learning materials should also take the needs of pupils with reading difficulties better into account. In Finland, 21% of pupils received special or intensified support in 2022 (Statistics Finland 2022). For many pupils in need of support in their learning, supporting reading is of essential importance. Learning materials must also be designed to better serve the needs of these pupils.
2. Municipalities and schools should take accessibility into account when tendering out purchases of learning materials. Both technical and cognitive accessibility must be taken into account when assessing accessibility, which is why municipalities need more information on the different areas of accessibility.
3. Accessibility Library Celia should develop its own learning materials and books to better meet the needs of children and young people who need support in reading. Celia's special task as an accessibility library is to prepare, distribute and lend out accessible reading materials to people with reading difficulties. This study has provided information on the genuine needs in schools and enables us to develop materials that better meet the diverse reading support needs. This task will be carried out in active cooperation with the education sector, the publishing industry and other stakeholders.
4. Libraries, literary organisations and various projects do invaluable work in reaching out to children and young people and inspiring them to engage with texts and linguistic expression. Promoting reading in groups where only little reading is done or where reading is perceived as unpleasant requires familiarisation with the group and adoption of the right books and methods. Hopefully, this report will provide tools for promoting reading among these people and communities too.



8 Ethics of the study

The authors of the study are familiar with the ethical principles of the Finnish National Board on Research Integrity TENK on research with human participants. The authors have ensured that the autonomy and freedom of each research subject is respected, and that the study does not cause any harm to the research subjects.

The ethical implementation of the survey was ensured with care, in particular as the study interviewed underage children with special support needs. In interviews with people in a vulnerable position, consent must be verified with particular care and repeatedly during the study (Kainulainen & Honkatukia 2021). The pupils were offered several opportunities to agree or refuse to participate in the interview. Consent was verified at several stages, first by the teacher asking the pupil, followed by the researcher before the interview and once more before starting the recorder. Guardians had the opportunity to prohibit their child from participating in the study using a form provided by Celia and sent to pupils' homes via the teacher.

When consenting to a study, research participants must understand why the study is being conducted and what it aims to achieve (Finnish National Board on Research Integrity TENK 2023). We told the pupils we interviewed that we were studying their experiences with reading. We told the pupils that our intention was to make better books based on their answers. We also told the pupils that we would write about their experiences in such a way that other interested people could read them, but without the pupil being identified in any way. We strived to adapt our explanation of the study based on the listener's presumed linguistic competence. However, it is necessary to recognise the possibility that not all interviewed pupils necessarily understood what a research study or interview means, and that the context of the conversation may have remained unclear to some pupils.

The material recorded using the dictating device was stored in a closed Teams environment according to the instructions of Celia's information security specialist. Only the members of the working group Veera Kivijärvi (research director, pedagogical specialist), Sami Määttä (planner), Minna Katela (pedagogical information specialist) and Marjo Kauttonen (planner) as well as Innolink's researchers who conducted the analyses, had access to the material. The identities of the interviewed pupils are known to their teachers. In the results section of this



report, it is not possible to identify pupils' responses or link the responses to individual pupils.

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10 Appendices

Appendix 1. Teacher questionnaire

Celia - Survey of special education teachers on pupils' reading challenges 2023

1 Answer by selecting the appropriate option or entering it in the field for open-ended answers.

In this survey, reading refers to all text-based work, for example reading printed text or an e-book or listening to audiobooks. Reading includes studying educational content and exploring works of fiction and non-fiction.

2 BACKGROUND INFORMATION

3 Place of teaching

Province

Municipality

▼ Åland ... Southwest Finland - Vehmaa

4 In what role do you work in your teaching group?

- as a special class teacher
- as a special education teacher
- as a class teacher
- as a subject teacher
- Other, what? _____

5 TEACHING PUPILS WITH PRINT DISABILITIES

6 What kind of reading challenges do your pupils face? You can choose from several options.

1. dyslexia
2. difficulties with perception
3. difficulties with concentration and attentiveness



4. defiant and negative attitude to studying
5. mental health challenges
6. wide-ranging learning difficulties, intellectual disability
7. visual impairment
8. physical limitations to reading printed text
9. other, what? _____

7 How do the pupil's challenges affect reading? You can choose from several options.

1. difficult to concentrate when reading
2. poor reading motivation
3. pupil does not understand what they have read
4. pupil's reading is inaccurate
5. pupil is slow to read
6. pupil does not memorise what they have read
7. pupil has physical limitations to reading printed text

8 If you wish, describe the challenges to reading and their impact on studying in more detail.

9 AIDS AND MATERIALS

Reading aids refer to tools and materials designed to facilitate reading performance.

10 What aids do you use to teach reading? You can choose from several options.

1. Digital materials and applications by publishers (such as Sanoma Pro)
2. Digital materials by another provider (such as Lukulumo)
3. Celia's materials
4. Plain language materials:



- 5. Reading overlays and rulers
- 6. Editing the text manually, such as adding contrasts and background colours to text
- 7. Immersive reader in Word or similar applications
- 8. Reading games such as Ekapeli
- 9. Custom learning materials, such as Päiväselvää by Opike
- 10. other, what? _____

11A. In your opinion, what are the best tools or materials to support reading?

12 B. Why do you think these are the best?

13 What issues have you experienced related to learning materials or services currently offered for children and young people with print disabilities?



14 USE OF CELIA'S SERVICES

15 Which of Celia's materials have you used to support your teaching or offered to a pupil? You can choose from several options.

1. Audio learning materials
2. Audio fiction books
3. Daisytrio learning materials (books combining audio, text and pictures)
4. Daisytrio fiction (books combining audio, text and pictures)
5. e-books
6. Braille books
7. tactile books
8. *Luen itse* books
9. I have not used Celia's materials

16 What kind of support have you received when using Celia's services? You can choose from several options.

1. I have received advice over the phone
2. I have received advice by email
3. I have participated in a training or info event
4. I have received guidance at the library
5. our school's staff has received guidance related to Celia at the school
6. I have received advice over chat
7. I have read instructions on Celianet
8. I have received advice from a coworker
9. I have not received support, please specify?

-
10. I have not needed support

17 Have you been able to find the materials you need from Celia?

- always
- most of the time
- occasionally
- seldom



- never

18 What material have you searched for but failed to find?

19 How could we develop our services to better meet your and your pupils' needs?

20 How likely are you to recommend Celia's services to a coworker? Give your answer on a scale of 0 to 10, where 0 = very unlikely and 10 = very likely.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10



21 PRIZE DRAW AND CONTACT REQUEST

22 If you wish to participate in the prize draw, please leave your contact information. We will give out five sets of movie tickets for two to randomly selected respondents. The information will only be used for the prize draw and will not be linked to your answers.

- Name: _____
- Email: _____
- Phone: _____

23 Would you like to be contacted about Celia's services? If so, please leave your contact information. Please also tell us a little bit what kind of information you need so that the request is directed to the right specialist.

- yes
- no

24 Contact information

- Name: _____
- Email: _____
- Phone: _____

25 What kind of additional information would you like to receive?



Appendix 2. Tables

Table for figure 1: Occupations of respondents.

Occupation	Percentage
Special education teacher	57%
Special education teacher	25%
Other	11%
Subject teacher	4%
Class teacher	3%



Table for figure 2: Distribution of respondents' municipality of residence.

Municipality of residence	Percentage
Uusimaa	27%
North Ostrobothnia	10%
Pirkanmaa	10%
Southwest Finland	7%
Central Finland	7%
North Savo	6%
Satakunta	4%
Päijät-Häme	4%
Ostrobothnia	3%
Lapland	3%
Kymenlaakso	3%
Kanta-Häme	3%
South Savo	3%
South Ostrobothnia	3%
North Karelia	2%
Central Ostrobothnia	2%
South Karelia	2%
Åland	0%



Table for figure 3: Reading difficulties of pupils as reported by teachers.

Reading difficulty	Percentage
Difficulties with concentration and attentiveness	96%
Dyslexia	96%
Difficulties with perception	82%
Mental health challenges	56%
Defiant and negative attitude to studying	55%
Wide-ranging learning difficulties, intellectual disability	30%
Visual impairment	12%
Other	6%
Physical limitations to reading printed text	3%



Table for figure 4: Impact of reading difficulties on reading.

Impact of reading difficulties on reading	Percentage
Difficult to concentrate when reading	95%
Pupil is slow to read	94%
Pupil does not understand what they have read	92%
Pupil does not memorise what they have read	90%
Poor reading motivation	90%
The pupil's reading is inaccurate	80%
The pupil has physical limitations to reading printed text	6%



Table for figure 5: Most commonly used reading aids.

Reading aids	Percentage
Digital materials and applications by publishers (such as Sanoma Pro)	84%
Celia's materials	75%
Plain language materials	67%
Reading overlays and rulers	66%
Reading games such as Ekapeli	44%
Editing the text manually, such as adding contrasts and background colours to text	36%
Custom learning materials, such as Päiväselvää by Opik.	25%
Digital materials by another provider (such as Lukulumo)	17%
Immersive reader in Word or similar applications	16%
Other	10%

