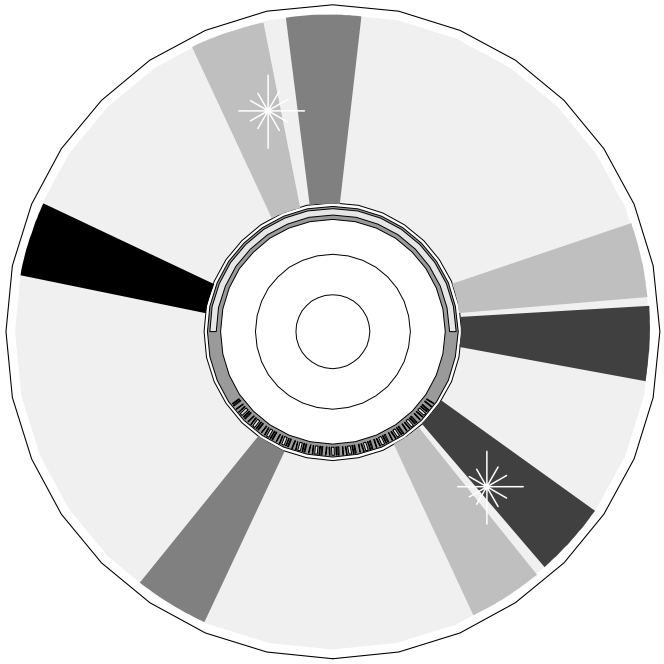
The Educational Material of the Future

for Persons with Difficulties in Reading and Writing/Dyslexia



The Swedish Handicap Institute

The Swedish Association for Persons with Difficulties
in Reading and Writing/Dyslexia, FMLS

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Photo: Torjörn Lundgren
URN:NBN:se-2003-39
Order no. 03326-pdf

The Educational Material of the Future

Specification of requirements and underlying needs inventory

by author Torbjörn Lundgren

Appendix:
Dyslexia: terms, official regulations and approach

by certified speech and language therapist Bodil Andersson

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Foreword

With new information technology and the right knowledge, people with reading and writing difficulties can be helped to overcome many of the problems they face in reading and writing situations. This specification of requirements for educational material and teaching, along with the underlying needs inventory, constitutes an initial attempt to bring together experiences from different projects focusing on developing and testing various forms of reading and writing devices for people with reading and writing difficulties.

The projects have primarily been conducted by the Swedish Association for Persons with Difficulties in Reading and Writing/Dyslexia, FMLS, in collaboration with the Swedish Handicap Institute between 1989 and 2001.

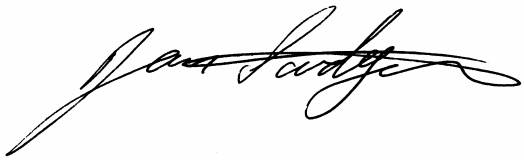
Although the title may be *The Educational Material of the Future for Persons with Difficulties in Reading and Writing/Dyslexia*, the specification of requirements is in fact so fundamental in nature that it is relevant to everyone who produces written text. The document has been produced by FMLS within the framework of the Swedish Handicap Institute project called *Ungaifocus* (Young People in Focus), supported by the Swedish Inheritance Fund.

Stockholm, November 2002

The Swedish Handicap Institute

Håkan Ceder
Director

Swedish Association for Persons with Difficulties in Reading and Writing/Dyslexia



Jan Sundqvist
Association Chairman

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Foreword by the author

As far as I know, there has never before been a compilation of the demands that ought to be placed on texts for persons with reading and writing difficulties. This specification of requirements and the accompanying needs inventory therefore constitute a first attempt. It has been written by myself, Torbjörn Lundgren, by order of the Swedish Association for Persons with Difficulties in Reading and Writing/Dyslexia (FMLS), and enabled through the Swedish Handicap Institute project entitled *Ungaifocus* (Young People in Focus), which is financed with funds from the Swedish Inheritance Fund.

During the work I have been supported by a small working group made up of Hans Hammarlund, Swedish Handicap Institute (HI), Anne Stigell and Thomas Johansson of the Swedish Library of Talking Books and Braille (TPB), as well as Björn Nyqvist and Lars Karlsson of the Swedish Institute for Special Needs Education (SIT). Anders Frankenberg, Jan Lindholm and Diana Hjort from the company Labyrinten AB have taken part in constructive discussions about how a purpose-built screen-reader should be designed, and the technical potential available to realise such a device. Thomas Rendahl of Inläsningstjänst AB, the reading-recording company, has provided additional information about the current situation as regards recorded educational material. Karin Taube, one of the researchers behind the PISA study, like Eva Svärdemo Åberg, who conducted the study entitled *Datorbaserad undervisning* (Computer-Based Teaching), was kind enough to comment on the relevant summaries. A first draft of the specification of requirements and needs inventory has been presented and discussed with the Board of FMLS, the majority of whom have reading and writing difficulties themselves. Social worker Inger Rålenius, who herself has great difficulties, and special needs teacher Eva Wiklander, both of whom work on the FMLS advisory council *Skriv-Knuten*, along with Malin Skoglund of the FMLS secretariat, who also has dyslexia, then took the time to go through the document with me point by point. Dir. Bror Tronbacke and editor Lisbeth Rosenschöld, of the Centre for Easy-to-Read, LL Foundation, were kind enough to contribute opinions during the summer, which I have considered in the final revision. Special needs teacher Karin Ohlis of The Knowledge Foundation, senior lecturer Lars Melin of the Department of Scandinavian Languages at Stockholm University, professor Mats Myrberg of the Stockholm Institute of Education, Christer Jacobson Ph.D. of Läsutveckling Kronoberg in Växjö, speech and language therapist Ulla Föhrer, author Sven Löfveberg and FMLS administrative director Sven Eklöf have helped out with comments, and Elisabeth Otterstadh has proofread the document.

In the final section, my closest colleague in the *Språka loss* (Accessing the Printed Word) project, speech and language therapist Bodil Andersson, who has worked with reading and writing difficulties in various areas – language pre-school, health care, occupational rehabilitation, computer centres for children, FMLS and dyslexia associations – clarifies terms and regulation systems within the field of dyslexia, and proposes an approach to reading and writing difficulties. Other people who have contributed their knowledge and opinions in this final section are special needs educationalist Merete Herrström of Malmö University, speech and language therapist Birgitta Johnsen of Gävle-Sandviken district hospital, professor Ingvar Lundberg of Göteborg University, Ian Smythe Ph.D. and speech and language therapist EA Draffan from the UK, special needs educationalist and doctoral candidate Ulrika Wolff of Göteborg University, disability co-ordinator Christel Berg of Lund University, professor Stefan Samuelsson of the Centre for Reading Research at Stavanger University College, Norway, registered psychologist Gunnel Ingesson of SKED (the Skåne knowledge centre for pupils with dyslexia) in Lund, Krister Åslin, Af Rehab Stadshagen in Stockholm, and various people at the National Board of Health and Welfare.

We would hereby like to thank all those mentioned above, and invite other people to comment further and suggest any changes to the specification of requirements. This is after all a dynamic document.

Torbjörn Lundgren

1. Specification of requirements

regarding educational material and teaching for pupils with reading and writing difficulties not primarily due to developmental disorders, sight/hearing impairment or specific language disorders such as aphasia.

General

Text and layout which in terms of experience and occupation are good for the ordinary reader, is the point of departure for good text and layout for sighted people of average intelligence with difficulties in reading and writing/dyslexia. Unaccustomed readers can often follow verbal reasoning but find it difficult to deal with the structure and construction of the written language – prefixes and suffixes, compound words, main clauses and sub-clauses, and so on. Because habit is a significant factor in how advanced the texts can be for a reader to understand them, it is difficult in a specification of requirements to define each and every aspect with any great degree of precision. Each aspect must be weighted in relation to the intended reader group. However, one fundamental factor is that for this group it is not primarily about intellectual level, but about levels of written language. The basic principles are that:

Deviations from good text and layout which constitute no great deterioration in intelligibility for an experienced reader, can lead to insurmountable obstacles for the group in focus in this document.

All text-based information should also be available in some digital form or other, such as CD-ROM, Internet or computer-based text files, for instance.

Alternative reading opportunities must follow international standards. At present DAISY is the preferred format.
The individual reader should be able to decide for himself which medium he uses to access a text. He/she should be able to switch between reading a printed text by conventional methods, listening to it on a personal stereo, or working with it on a computer. (MP3 is the current format, and 3G mobile telephony may present opportunities in the future.)

When using educational material which requires the production of text, the individual student should have access to computer-based tools that compensate for the writing difficulty and enable a good result.

Printed educational material – text

For people who have no reading difficulties, the conventional book offers many benefits.

So the text book is here to stay. However, not only books are based on the written word. Film, theatre, the Internet, lectures and other forms of presentation are usually also based on a written original of some kind, which means that here too the written language affects the way things are expressed. Therefore, the structure of the text and the clarity of the written content is no less significant when the product is then produced in other media, such as talking books and multimedia productions.

Readers may have specific functional problems, and they may be unused to reading and analysing the texts they come into contact with – often both. However, in this context the cause is less important. A pupil in school year seven (i.e. aged around 13) with an intellectual level on a par with other pupils of his/her age, may have reading skills equivalent to a pupil in, say, year three (aged around 9). A professional educational text also has to reach these readers. The author therefore has to take account of the following:

- The readers' primary difficulty is not in understanding abstract concepts, but they will probably have encountered them less often and may therefore require contextual clues and synonyms.

- Generally speaking, the group has difficulty with non-frequent words because they do not read as much. Such words should therefore be clarified with contextual clues and/or explanation (e.g. …nominations, suggestions to the Board, should be handed in…).

- Synonyms help, as the reader can then work out from one word what the other word means (e.g. The atmosphere rose and Smith started singing a hymn. The song of praise got louder and louder, so that it could even be heard in the churchyard…).

- Names of people, places and products etc. can pose a problem. A lot of characters in a story, or terms in a list, can complicate matters, especially if they begin with the same letters, or if the word is visually similar to another in some other way. (Four words that can be hard to distinguish between, not intellectually but in terms of appearance and memory, are Mohammed, Mecca, Muslim and Medina. The situation can be made easier by using the oral tradition for names and adding an epithet. For instance, the prophet Mohammed, the city of Mecca, the Muslim faith etc.)

- Short words (such as to, too, of, off, for, by, buy, an, any, and) which are similar in appearance and are 'vague' in import, often pose problems. A sentence like 'He and she saw her from a long way off…' is not automatically easy to read. Therefore, avoid using several short words after each other.

- Longer words which look similar or can be confused in terms of sound can also be a problem (e.g. referee, referred, reflected, reasoned). The context is therefore important:
  The concise sentence "John referred to the newspaper…" is more difficult than the longer formulation, "To explain, John referred to an article in the newspaper…".

- Low reading speed is an apparent and frequent problem among these readers. It is not unusual for a pupil to have a reading speed five or six times lower than others the same age. Furthermore, the group appears to be divided into two in this respect.

- Some, probably the majority, prefer contextual clarifications, even if they make the text longer. Others have accustomed themselves to not reading captions of more than one line in length. Instead they glean the information from pictures, diagrams and fact boxes. This calls for a clear interplay between text, structure and layout, to make reading suitable for both strategies.

- Abbreviations can also cause problems and uncertainty, mainly due to lack of reading practice, and should therefore be explained (e.g. "TB, tuberculosis, was rife in the country…" and "the company ICI issued…", rather than simply "ICI issued…"). Even common abbreviations in the written language, such as e.g., i.e., etc., et al. and P.S. can cause problems. Therefore, carefully consider whether the abbreviation should perhaps be written out in full. Also, avoid using several abbreviations in the same sentence or paragraph.

- Words written in lower case are easier to read than words all in UPPER CASE, as capital letters have no upstrokes (as in h) or downstrokes (p). Graphical irregularities make it easier for the reader to distinguish the words from each other.

- Sequencing also often poses a problem. Long combinations of figures place an onus on the short-term memory, and should therefore be split into groups of two, three or four. If the number series are longer than this, problems occur.

- Punctuation marks (e.g. full stops, commas, colons, semicolons, hyphens, question marks and exclamation marks) are often problematic. The problem may be in the perceptual difficulty of distinguishing between different marks, even though the reader may be aware of what the difference is. It may also be down to too little experience with the written language, so that the reader has not understood that a full stop or comma signifies a brief pause, for instance. At the same time, readers who are familiar with full stops and commas will find well-considered punctuation helpful, although they may have problems with other punctuation marks. Therefore, some basic principles should be observed:

  1. Writing in main clauses only does not in itself make reading simpler (see point 3 on causality).

  2. Reading is simplified if the punctuation allows relatively frequent pauses.

  3. The rhythm of the language, causal connections (causality) and contextual clues are probably of greater significance to understanding the text than sentence length.

  4. Interjected sub-clauses may help clarify the reasoning and may therefore be warranted, although several interjected sub-clauses in the same sentence place too high demands on the memory functions. Therefore, consider whether sentences with more than one interjected sub-clause can be broken up into several sentences.

  5. For the unaccustomed reader, an excess of different punctuation marks in the same sentence or paragraph can be confusing, and should therefore be avoided.

- The less information there is in a text, the duller it is, and there is therefore less motivation to read it. On the other hand, information that is too compact is hard to read.

  Consequently, neither diluting the information nor writing short, compact texts helps people with reading difficulties. Instead, the intelligibility and readability of a text is dependent on the interplay between its form and its content – between the length of the text and the density of the information. This can be divided into the following principles:

  1. The more difficult or abstract the content is, the greater the demands on the linguistic form. A text may be easier to understand, even for people with reading difficulties, if it is slightly longer.

2. Many unaccustomed readers find inferences[1] difficult, i.e. what is written between the lines. The difficulty is not primarily in understanding the implications in a verbal reasoning, but an 'over-reliance' on the text and a passive attitude to reading create comprehension problems when reading. Reading between the lines is something that can be learnt, but to make sure that the content of a factual text hits home, the author should consider what demands he/she is placing on the reader in this respect.

3. Causal connection (causality)[2] (e.g. "…*therefore* he took the next step", "*because of that*, she was forced to…") increases understanding for people with reading difficulties too, even though it makes the text longer and increases the number of sub-clauses.

4. A text which is mainly comprised of main clauses can have a natural rhythm. Having said that, the rhythm of the language is largely dependent on the subject and the skill of the author. A natural linguistic rhythm that harmonises with the textual content makes reading easier.

5. Reading is easier if the text interests the reader[3]. Experience shows that one way of increasing the reader's interest is to give the text a personal, narrative feel (e.g. "As you probably know…", "As we mentioned in Chapter 2…" etc.).

6. A text that starts out simply and gradually increases in difficulty is easier to follow than vice versa.

- Ambiguity is a natural element of language[4]. (E.g. "…the fat Mr. Jones weighed…". While we expect a figure followed by 'kilos', we get 'the flour' instead. We are forced to think closer: OK, "weighed" related to the flour, not to fat Mr. Jones. This activates us as readers.) Having said that, ambiguities should obviously be avoided if they completely mislead the reader.

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1) Franzén (2001), *Hur läsförståelse grundläggs* [The foundation of reading comprehension] Språka loss (www).
Taken from <http://www.fmls.nu/sprakaloss/franzen.htm>. Published August 2001

2) Reichenberg, *Varför är det inte längre ett äventyr att läsa läroböcker?* [Why is reading text books no longer an adventure?] (www).
Taken from <http://www.fmls.nu/sprakaloss/Reichenberg%20-larobocker.htm>.

3) Melin, *Bregrips!* [Got that!] (www). Taken from <http://www.fmls.nu/sprakaloss/melin_begripligt!.htm>.

4 Melin, *Bregrips!* [Got that!] (www). Taken from <http://www.fmls.nu/sprakaloss/melin_begripligt!.htm>.

- Imagery can serve to enhance the understanding of textual content. (E.g. "He sat there feeling like he imagined the birch tree feels when the frosty nights make its leaves turn yellow. And like the birch feels when it's waiting for the autumn storm to undress it completely."[5]) This kind of enhancement of the factual content can be crucial to whether or not the reader remembers the text he/she has read, as it increases the number of potential associations. It also develops the reader's language.

- Pre-understanding, whereby the author makes use of the reader's existing knowledge, is a great aid in reading speed and comprehension. The less accustomed a reader is, the greater the need for this kind of support.

- However, reading also requires resistance and surprises. Cleverly used, unpredictable comparisons can also help simplify the reading process. (E.g.: "…when he turned in his sleep and the moonlight hit him from a different angle, he looked just like a 27-piece silver service, complete with salad bowl and soup terrine."[6])

Printed educational material – layout

The aim of layout is to guide a reader to and through the text. The first impression is important in deciding the attitude of the reader as he/she takes on the task of reading the text. Layout is particularly important to people with difficulties in reading. A negative impression, one that arouses a feeling that this is a compact, difficult text, can prevent the reader from taking in the content, even though the text may turn out to be entertaining, simply written and even a little funny.

- Tolerance for poor or careless layout is considerably lower among unaccustomed readers with reading difficulties, than among accustomed readers.

- A spacious layout with many points of entry, in the shape of well thought-out introductory texts, headings and illustrations, supports the reading process[7].

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5) Stig Claesson (2001), Freely translated from *Varsel om kommande tilldragelser* [Notice of coming attractions], page. 12. A. Bonnier.
6) Woody Allen (1989), *Side Effects*, page 17. Norstedts.
7) Melin, *Lättläst och layout* [Easy reading and layout] (www). Taken from <http://www.fmls.nu/sprakaloss/melinlattlastochlayout.htm>.
Hallberg, *Läsbarhet ur grafisk synvinkel* [Readability from a graphical point of view] (www). Taken from <http://www.fmls.nu/sprakaloss/hallberg_laslighet.htm>.

- A layout that the reader recognises is also more important to the unaccustomed than the accustomed reader. (E.g. a particular colour box always contains the same kind of information, the TV listings are always on the same page in the newspaper, etc.)

- Pictures can serve two purposes: they can soften the impression of a page of text, and make it more appealing; and they can also support the reader's understanding and memory of the textual content. Clear and simple pictures can be useful, but just as often complex pictures with various impressions can stimulate the reader to do some "figuring out", thereby helping to commit the content to memory[8]. It is not unusual for people with reading difficulties to have a strong pictorial perception.

- Phrase-bound typography, whereby the text moves to a new line where it feels natural, and always after a full stop, can help people who are very unaccustomed readers. However, generally speaking this is not much help for people with more reading behind them, as it may serve to counteract the flow of the text instead.

- Printed texts are fully left and right justified as standard, with even margins, which makes the pages more uniform and therefore cleaner. However, dyslexics often find it difficult to distinguish words and graphical presentations that look similar, which is why many dyslexic persons prefer an uneven alignment in the right margin. The reading process also involves the visual appearance of words. The reader picks up on the visual impression of the word, and therefore does not have to read it. A justified right-hand margin sometimes stretches words out or pushes them together (most commonly in newspaper columns). This means that a person with reading difficulties may find it harder to recognise the words.

- It is quite common for readers to have a hard time landing on the right line when reading from left to right. They may either start the same line again, or start one line too high or too low. This can be compensated for by increasing the line spacing slightly.

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8) Svärdemo Åberg (1999), *Datorstödd undervisning för elever med läs- och skrivsvårigheter/Dyslexi* [Computer-aided teaching for pupils with reading and writing difficulties/Dyslexia]. HLS.

- There are a lot of opinions on fonts and typefaces in printed text[9]. Some believe that one is easier to read than another, while there is in fact no research which conclusively proves the theory. In all likelihood it is a subjective factor. If a particular person thinks one typeface is better than another, he or she will find it easier to read. The font we are most used to is generally the one we prefer, and the most common font in running text is Times or something similar, a 'serif' font (serifs being small protrusions on the ends of the up and downstrokes).

- When it comes to point size, the case is very much the same as with fonts. If a person thinks a slightly larger character size is easier, then it probably is, within certain limitations. Point size should always be in proportion to the length of the line. Many people with reading difficulties prefer newspaper text in 12-point, rather than the standard 8-10. If the text expands more than this, problems arise with syllabification and typesetting. Some prefer 14-point on A4 pages, where the lines are longer, but anything bigger makes the text hard to deal with.

- Syllabification is often a problem for people unaccustomed to reading (e.g. ma-ypole, ever-ywhere, som-etimes). Reading broken words correctly demands a lot of intellectual capacity. On the other hand, syllabification that follows the morphological meaning is very helpful (may-pole, every-where, some-times).

Digital educational material – text and content

Educational material in all subjects and at all levels of schooling must be available in printed and digital formats. This is a fundamental requirement if education is to be considered accessible to everyone, including pupils with reading and writing difficulties/dyslexia, different kinds of concentration difficulty, DAMP and ADHD, as well as people with other disabilities, such as visual and mobility impairment.

- Materials available in printed form should also contain the text in digital form. The text, structure and page numbering of the digital book should match that of the printed material, so that the user can use the digital version together with his/her classmates.

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9) Språka loss, *Typsnitt - Teckensnitt* [Fonts - Typefaces] (www). Taken from <http://www.fmls.nu/sprakaloss/typsnitt.htm>.
Hallberg, *Läsbarhet ur grafisk synvinkel* [Readability from a graphical point of view] (www). Taken from <http://www.fmls.nu/sprakaloss/hallberg_laslighet.htm>.
Hallberg, *Typografin och läsprocessen* [Typography and the reading process] (www). Taken from <http://www.sih.se/pdf/typografi_2.pdf>.
Melin, *Lättläst och layout* [Easy reading and layout] (www). Taken from <http://www.fmls.nu/sprakaloss/melinlattlastochlayout.htm>.

- Digital educational material should be produced so that the user him or herself can choose the reading medium – whether it be a CD-ROM or a computer with a screen-reader adapted to the impairment in question.

- Digital material should be in line with the standards that apply for accessible web productions[10]. This means for example that there should be 'alt.-texts' so the reader can choose to have pictures and diagrams described in words.

Digital educational material – technology

The principles for digital educational material and screen-readers are:

- The text must be readable on the screen. The line, word or paragraph being read out should be highlighted, and the cursor should follow the text while it is being read.

- The reading speed must be adjustable to both faster or slower than normal. The speed should be able to be adjusted without altering the pitch of the read-out.

- The screen-reader must be navigable both using the mouse and the keyboard.

- Users should be able to navigate by chapter (regardless of level), page and sentence, and be able to move forwards and backwards synchronously in text and sound.

- It must be possible to search for a word in the entire text, including the table of contents. Searching must work both forwards and backwards from the current position. Once the word has been found, it must be possible to search for the next occurrence.

- There must be a simple way of accessing a particular page in the book.

- It must be easy to navigate to footnotes and margin notes.

- It must be possible to add any number of bookmarks, which are marked both graphically on the screen and in the sound file.

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10) Språka loss (2001), *Webb-utformning,* [Web design] (www). Taken from http://www.fmls.nu/sprakaloss/webbartiklar.htm>.

- It must be possible to edit the bookmarks. Set bookmarks should be able to be deleted.

- It must be possible to add bookmarks either in writing as text notes or verbally as voice notes.

- It must be possible to export text and voice notes to another computer (e.g. the teacher's). In the same way, it must be possible to import notes from another unit. This enables the pupil to carry out his/her work and present the answers to the teacher in the form best suited to him or her.

- It must be possible to set background colour, text colour, bold/italics, typeface and point size, as well as margins, according to individual requirements.

- Glossaries should be included, or be able to be integrated with the screen-reader, to make it easy to access answers to what different words in the text mean.

- The solution must include, or be able to integrate easily with the screen-reader, a well-developed spellchecker that takes into account the types of error dyslexics often make.

- The solution must include, or be able to integrate easily, a dictionary enabling the user to find the right word in the search function, even if the word is misspelt.

- It must be possible to integrate a voice synthesiser into the reader, or use existing SAM and SAPI-compatible voice synthesisers already on the user's computer.

- The screen-reader should be platform-independent, i.e. it should work with any operating system.

- The screen-reader must be compatible with the educational material, whether it is downloaded as a file from the Internet, or supplied on CD-ROM.

- The screen-reader must also be able to handle filmed sequences.

For *non computer-based players*, such as personal stereos, they should not only be able to read ordinary CDs, but primarily CD-ROMs which have the capacity for an entire book. They must also be able to play back DAISY format. It must be possible to move chapter by chapter, forwards and backwards. It must be possible to add bookmarks so it is possible to stop and resume from the same point. It should preferably also be possible to navigate to individual pages.

Educational material/assistive technology for writing and knowledge-gathering purposes

Because educational material sometimes also requires something in return, such as production of a written answer and/or a longer analytical response, we view the writing tools as educational material as well.

- Access to a word-processing program, with a built-in dictionary and thesaurus, is a fundamental requirement to allow these pupils to produce texts on different subjects.

- Special glossaries, complementary dictionaries and spellcheckers should be available where required by the pupil.

- Voice synthesis – a technical voice which reads out what the pupil has written, should be able to be connected to the word-processing software. This support function should be available when the pupil has a need and would benefit from it.

- Other assistive devices that considerably facilitate text production and knowledge gathering for these pupils should be prioritised when teaching is being planned (e.g. translation pens, cache memory, calculators, whiteboard support).

Teaching

To ensure that teaching works without discriminating against pupils with special needs, especially in the active-pupil approach, certain measures are called for. An action plan must be available from the organiser, based on the pupils being given the right conditions from an early stage.

- Child welfare centres should ask for any information relating to possible reading and writing difficulties in the family, as there is every reason to take these signs seriously early on if they exist.

- Systematic phonological awareness should be introduced in all pre-schools. This can be done in the form of word-play, following schedules that train the various aspects of language. The Bornholm model has shown that this kind of play training can significantly limit the number of children who develop reading and writing difficulties.

- The Swedish Education Act defines the education organiser's obligation to draw up programmes of measures for pupils with special needs, and stipulates that these programmes should be formulated in consultation with school staff, the pupil and the pupil's parents. This obligation must be realised locally and continually evaluated to ensure that working methods are rationalised.

- The aim of programmes of measures is to provide the pupil with the right conditions to be able to carry out his/her work and keep up with the teaching. They should therefore cover the pupil's linguistic development, as well as adaptation of the overall education situation to the pupil's specific needs.

- Following up the pupil's linguistic development requires that:

  1. Any signs of reading and writing difficulties are taken seriously at an early stage.

  2. The teacher has the competence to assess the pupil's reading development, both generally and in terms of specific problems with word decoding and/or reading comprehension.

  3. The pupil's development as regards the written language at a higher level is observed, i.e. insight into inferences and text interpretation, so that pupils with difficulties have an insight into these.

  4. The pupil's reading speed and other skills required to follow teaching are observed and compensated for.

  5. The school has a well-developed network of contacts with broader professional areas of expertise, so that pupils with extensive difficulties can be identified at an early stage and be given the support they need to keep up.

- Ensuring that the overall education situation can be deemed democratic, which is to say that it takes account of pupils with special needs, requires that:

  1. The teacher body has a basic understanding of the fact that these pupils have special needs, and that it is just as natural that their needs are met, as it is that pupils who do not have 20/20 vision are given spectacles.

  2. The teachers have the competence to request specially adapted educational material and assistive technology when planning their teaching, and that they ensure that the pupils have access to it.

3. The education organiser prioritises costs for complementary educational material and assistive technology in the budget.

4. The individual pupil's needs for adapted educational material and assistive technology are discussed in the development session, and that those needs are met in the pupil's overall programme of measures.

5. The teachers in their teaching make it possible and natural for pupils to use adapted educational material and assistive technology in all education.

An education that gives pupils the right conditions should not be seen as a cost. It is an investment that gives these pupils the possibility to make progress that strengthens self-confidence, increases interest and thereby gives the pupil greater motivation and stamina. Compensating educational material and assistive technology therefore not only provides these pupils with a way around their difficulties; at the same time it strengthens the pupil's skills. Because nothing breeds success like success itself. Quite simply, the pupil is given the democratic opportunities required to get through school successfully.

Conclusions in summary

Enabling pupils with special needs to study on equal terms requires a holistic approach encompassing teaching, educational material and assistive technology. This overall approach affects the entire education system, from government ministries, authorities, producers of educational material and education organisers, to the individual teacher and pupil. Therefore, educational publishing companies must therefore in their planning consider the linguistic and technical aspects, ensuring that pupils with special needs can benefit from the finished product.

Today, the technical opportunities exist to produce printed educational material whereby each copy is accompanied by a CD-ROM version in DAISY format, so that the individual pupil can personally decide how he/she wants to access the content. For this to be economically viable, demand is required from education organisers, so that publishing companies can spread the costs of CD-ROM production across the entire material. It would therefore be appropriate to make a point in the Education Act equivalent to the one regarding the obligation to draw up programmes of measures. A clause regarding the obligation to offer pupils educational material adapted to the need and impairment of the individual pupil.

Therefore, expertise 'in the field' also needs to be strengthened. This would require additional central funds for a number of years. Teachers and pupils must be given the opportunity jointly to identify appropriate

working forms, which prevent pupils with reading and writing difficulties from being left out in the increasingly reading and writing intensive modern education. The principles for applying for such funds should be that the education organiser and pupil have agreed on a programme of measures encompassing the entire study situation, that the application includes an undertaking by both parties to assess the results, and that the education organiser undertakes to acquire adapted educational material and assistive technology and provide information on acquired experience. Finally, researchers should be engaged in order to monitor and evaluate the investment[11].

11) An investment like this should be MSEK 30-50 per year for 3-5 years. See also *IT-satsningar på området läs- och skrivsvårigheter/dyslexi* [IT investments in the area of reading and writing difficulties/dyslexia] (2001). The Swedish ICT Commission. (www).
Taken from
<http://www.itkommissionen.se/extra/news/?module_instance=2&id=27>.

2. Needs inventory

regarding educational material and teaching for pupils with reading and writing difficulties not primarily due to developmental disorders, sight/hearing impairment or specific language disorders such as aphasia.

Literacy among 15-year-olds in Sweden

In December 2001, the Swedish National Agency for Education reported the results of an international survey called the Program for International Student Assessment, PISA[12]. The programme studied the competence of 15-year-olds as regards reading comprehension, mathematics and science in 32 countries. In Sweden 4,416 pupils took part from 152 secondary and two upper secondary schools.

Reading comprehension

The term literacy, which has been used in previous studies, is defined in this survey as "the ability to understand, use and reflect over texts for achieving personal goals, developing knowledge and opportunities, and taking part in society."[13] The pupils were asked to read running and non-running text, including tasks they would be likely to encounter in real life. They had to gain a general understanding, search for information, make an interpretation, reflect over the content and the form of the text. Three scales were established based on the parameters: information seeking, interpretation and reflection. Each scale was divided into five levels, based on the kind of knowledge and ability the pupils should be able to command on each level. The tasks were then each divided into a graded scale of 1-5. The pupils below level one were unable to display the most fundamental knowledge and ability that PISA was attempting to gauge. They were not without reading ability, but they had severe difficulties using their reading ability to make effective progress and increase their knowledge.

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12) Swedish National Agency for Education report no. 209 (2001), *PISA Svenska femtonåringars läsförmåga och kunnande i matematik och naturvetenskap i ett internationellt perspektiv* [PISA, Literacy among 15-year-olds in Sweden and their knowledge of mathematics and science in an international perspective] (www). The report looks into the results of the OECD's study of 15-year-old pupils' knowledge of and attitude towards the specified subjects.
Taken from
<http://www2.skolverket.se/BASIS/skolbok/webext/trycksak/DDD/904.pdf>

13) Swedish National Agency for Education report no. 209 (2001). Page 27.

Compared to other countries, Sweden performed well. However, this is not that revealing as performance has to be put in relation to the demands which society places, and in Sweden the demands are among the highest. Sweden's results[14] on the scale of 1-5:

Level	Girls, %	Boys, %
Below 1	1.8	4.6
Achieving 1	6.0	12.3
Achieving 2	17.1	23.2
Achieving 3	31.2	29.8
Achieving 4	28.7	22.7
Achieving 5	15.1	7.4

It is evident from the results that 16.9 per cent of the Swedish boys and 7.8 per cent of the Swedish girls were at or below the lowest level. The researchers note that these pupils could cope with only the least complex reading tasks, such as finding an individual factual detail or identifying the main theme. As many as 24.9 per cent of the girls and 40.1 per cent of the boys did not achieve level 3. This revealed a difficulty in drawing conclusions encompassing one or more parts of the text, and in relating information from a text to knowledge taken from other sources. Moreover, they are unable to evaluate the quality and relevance of the text.

Optional reading

In the countries taking part in the study, pupils with an interest in reading performed better than those with less interest in reading. 45 per cent of the Swedish boys and 27 per cent of the girls reported that they never read in their spare time.

Mathematics

When it came to mathematics, the pupils were asked to transpose a problem into mathematical terms, and then structure and formulate the problem in order to solve it. The mathematical knowledge was evaluated with tasks similar to problems the pupils may encounter in their private lives, at school, at work and at play, as well as in scientific contexts.

14) Swedish National Agency for Education report no. 209 (2001).

The results showed that Sweden is an average country in terms of pupils with strong and weak results. They were good at statistics and spatial perception, but worse at problems relating to algebra, functions and geometry.

Science

Scientific knowledge in Sweden was above the average result in the OECD countries, which can be seen as a sign that the Swedish education system gives more pupils a better foundation for dealing with problems with a scientific content. However, they found it harder to say whether science can help explain different phenomena.

Social background

There was little difference *between* schools in Sweden, but Sweden is one of the countries with the greatest difference between pupil performance *within* schools. Pupils with Swedish as their mother tongue performed best in all three areas (reading comprehension, mathematics and science). These are followed by pupils who have Swedish and another language as their mother tongues. The lowest results on average were shown by pupils with a mother tongue other than Swedish.

There is a clear link between the number of books in the home and performance at school. It is not the number of books itself that leads to better performance, but it has long been a well-known fact that easy access to books in the home, and therefore the adults' example as readers, makes it more natural for the young people in the home to read. In line with this, the researchers behind the PISA study note that 50-60 per cent of those who achieved poor results have very few books in the home.

Word decoding

Word-chain tests were also carried out in Sweden to gauge the speed and accuracy of word recognition. The tests confirmed that an automatic word recognition ability is a fundamental requirement for higher level reading comprehension. "It would therefore seem that a poor ability to recognise words is an important obstacle to reading comprehension. There may of course be many other obstacles such as vocabulary, poor pre-understanding, a passive attitude, uncertainty as to sentence structure, difficulty in drawing conclusions, etc."[15]

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15) Swedish National Agency for Education report no. 209 (2001). Page 51.

High demands on literacy

The PISA study also makes it possible to assess to what extent the pupils' literacy affects their performance in maths and scientific subjects. The authors write:
"The texts in mathematical tasks are often short yet dense with information, and they often contain abstract concepts that not all the pupils are familiar with. In cases where they do not understand the words or simply read them wrongly, the task becomes incomprehensible. If the pupils had heard the task being described and the words had been explained, more of them would probably have answered correctly. Scientific texts are also rich in information and usually contain abstract words and formulations. Fiction and general factual prose, on the other hand, are usually more redundant, i.e. the same fact is expressed several times in several different ways. If the pupil has not understood a fact the first time around, he or she has further opportunities to understand as its turns up again in a slightly different guise in a fictional text."[16]

According to the report, some quite old pupils have become accustomed to a kind of 'gist' reading, which is devastating when it comes to reading scientific texts and texts that contain mathematical terms and tasks. The PISA report also reveals that 22 per cent of the variance in the reading comprehension test, 16 per cent in the maths test and 15 per cent in the scientific tests can be put down to poor word recognition. Add reading comprehension, and as much as 76 per cent of the variance in scientific subjects and 70 per cent in the maths test is related to reading comprehension. The authors note:

The fact that the 15-year-olds have developed an ability to decode words quickly and correctly is therefore of some significance in maths and science tests. Add to this the pupils' results in the reading comprehension test, and the explanatory variance increases dramatically, both for the maths and science test. This shows that good literacy can be crucial to how well a pupil does in a test in maths and scientific subjects."[17]

16) Swedish National Agency for Education report no. 209 (2001). Page 83.
17) Swedish National Agency for Education report no. 209 (2001). Page 84.

Reading and writing difficulties/dyslexia

The Swedish national curriculum adopted in 1994 (Lpo-94) talked about 'pupils *with* need for special support', and the Education Act made it clear that programmes of measures were to be drawn up for these pupils. The formulation was later altered to read 'pupils *in* need of special support', in accordance with the government study entitled *Att lämna skolan med rak rygg*[18]. The motivation given for this was that the focus would be more on the school's working forms, and less on the difficulties experienced by the individual.

At the same time as the new curriculum was adopted, the term 'reading and writing difficulties/dyslexia' was introduced by the disabled organisation FMLS, the Swedish Dyslexia Foundation, which organises researchers in the field, and the Swedish Dyslexia Association, an organisational body for various professional categories which work with the issue. This was done in the national action plan entitled *Satsning inför framtiden.*[19]

For 10 years, the national action plan Satsning inför framtiden has acted as a guideline for the work of the non-profit organisations in the field of reading and writing difficulties. Local authorities and schools have also based their action plans around it.

Of the pupils in need of special support, those with reading and writing difficulties are one of the largest groups. Their difficulties may have a number of causes. The term 'reading and writing difficulties/dyslexia', which is now also used in official government ministry, authority and other organisations' documents, should be interpreted in accordance with the 'pupils in need of special support' stated in the national curriculum. When it comes to the fundamental skills of compulsory

18) SOU (1997), *Att lämna skolan med rak rygg* [Leaving school proudly]. Page 108.
19) FMLS (1994), *Satsning inför framtiden* [Initiatives for the future] (www). Taken from <http://www.fmls.nu/handplan.html>.

education – reading and writing – it is the difficulties, rather than their causes, which should form the basis of entitlement to support. Only in the second stage, identifying forms for that support, do the causes become relevant. Because to be able to adapt education successfully, one must be familiar with the problem, and one common type of reading and writing difficulty, well founded in interdisciplinary research, is dyslexia. However, dyslexia is a diffuse diagnosis in much the same way as obesity. The word dyslexia in itself does not provide the guidance required. Adapting the teaching to the needs of the individual calls for a more detailed analysis of the specific difficulties. (Read more about this in the appendix by speech and language therapist Bodil Andersson.)

The needs of people with learning difficulties as regards text design and presentation have previously been defined by the Centre for Easy-to-Read, LL Foundation, among others. The same applies to the needs of blind and visually impaired persons, who have defined guidelines for adapting literature through the Swedish Library of Talking Books and Braille (TPB). There are also representatives for the deaf and hearing impaired, and language disorders like aphasia are covered by expertise in the health care system and the Swedish Institute for Special Needs Education. The situation is worse when it comes to charting the specific needs of different immigrant groups as regards language accessibility. However, the group encompassed by this document – persons with difficulty in reading and writing/dyslexia – excludes the above-mentioned groups.

Most people with reading and writing difficulties/dyslexia can read to some extent. However, their reading ability is not in line with the demands placed on them. They may have a very low reading speed, often read incorrectly, have difficulty concentrating, and so on. Unlike blind people, they can browse through a printed book and orientate themselves through the content with the aid of pictures and headings. Although they often find it hard to structure their own reading activities, they can assimilate the structure of a book, which should not be underestimated in terms of knowledge gathering. Many dyslexic people say that they have developed this ability to compensate for reduced literacy, and that in combination with social skills, i.e. the ability to ask questions and discuss their way to knowledge, they have managed to come a long way in spite of the difficulties.

Many people, though by no means all, find auditory support helpful, either separately by listening only, or by listening and following the printed text with their eye. The latter approach has been used for educational purposes in the book-and-tape method. This is a kind of reading practice whereby the pupil listens to a recording which is so slow, that he/she has time to follow the text in print as well. He or she can then ‘read’ the book again with a faster recording, and can eventually read the text without auditory support.

Some people are unable to do two things at the same time.

These people expend too much energy visually following a text while at the same time concentrating on the sound recording. However, it is also possible to listen and follow the text by page and by chapter, i.e. not at word and sentence level. In this way the pupil can follow the structure of the book. He/she finds support in the pictures, and the headings provide guidelines for what is being read out. Moreover, the same pupil may not wish to use the same method all the time, but may prefer to vary from one occasion to the next.

It is also common that people with reading and writing difficulties have problems remembering sequencing and directions. Consequently, they may find it hard to look up words and names in encyclopaedias or telephone directories, or to find a particular name in a running text. Skimming texts is also often a problem.

Spelling problems are common, as is uncertainty when it comes to sentence structure. However, not all people with difficulties in reading and writing necessarily have both problems. This does of course have an effect as regards writing down answers and performing various writing tasks.

A not uncommon problem among dyslexic people is known as 'word retrieval' by experts. The problem lies in quickly being able to give the name of a person or phenomenon: Who's the Prime Minister of Sweden? The respondent sees an image of the Prime Minister. They know it begins with P, and start searching their memory. Per? No. Göransson? There was a minister called that anyway… If the person asking the question then provides a number of options, including Göran Persson, the respondent can usually give the right answer and be one hundred per cent certain of it. This is because he/she knows the name he/she is looking for, but the letters cause confusion, and this contributes to often misleading results in writing.

Limited experience of the written language

The reading and writing difficulties/dyslexia symptoms outlined above primarily occur on the functional level. They, and occasionally other problems, lead to further obstacles to knowledge gathering. Difficulties in distinguishing between upper and lower case, full stop and comma, and other punctuation marks, may be down to functional causes, but they could also be due to a limited contact with and experience of written language in general.

An inexperienced reader finds it harder to read grammatically complex texts than an experienced one. A text with several consecutive sub-clauses or interjected clauses requires greater effort and concentration of an inexperienced reader. Nevertheless it is important to realise that in a situation like this, the dyslexic person does not primarily have difficulties with the intellectual complexity, but with the actual

structure of the written language. And the only way of learning to read is to read (and/or listen to) different texts and thereby gather experience of the rhythm and structure of the written language.

Furthermore, inexperienced readers generally have a poor vocabulary, and therefore often experience problems when they come across non-frequent words. However, here too it is important to distinguish between cause and effect. Dyslexic people do not have specific problems understanding synonyms or abstract concepts. They have simply not encountered the words before, and vocabulary is primarily expanded by reading (and/or listening to) many different texts.

Pre-understanding – an advance knowledge of what words represent – is also something that is largely gained through previously read texts. Reading between the lines; locating several pieces of information; combining different parts of the text and relating them to familiar everyday knowledge; understanding a text as regards linguistic nuances and being able to evaluate it critically; drawing conclusions about which information is relevant to a task; formulating hypotheses; utilising special knowledge and dealing with concepts that may be contrary to expectations… These are all parameters measured by the PISA study, and they are other skills that must be learnt in contact with the written language. Cultural poverty can therefore in itself constitute a disability for the individual as the demands from the surrounding world grow. But as PISA showed, there is also a connection between these higher linguistic levels and the primary problem of dyslexia – word decoding. If a pupil has to expend too much energy and concentration just getting the letters in the right order, he/she will not have enough left for the linguistically more advanced balancing acts, and this gives rise to problems which may not have occurred if the same task could have been performed verbally.

Passive attitude

It is a well-known fact that the self-confidence of pupils who do not manage to develop their written language skills at the same rate as their contemporaries (not necessarily due to dyslexia) gradually worsens, and this in turn leads to greater and greater dejection and a more passive attitude to writing activities. The person becomes less interested in reading and knowledge gathering, instead distancing him/herself from everything to do with 'studying'. Motivation is reduced because their reading ability is not in line with the demands placed on them. As the PISA study shows, the pupils therefore not only perform less well in the subject of Swedish, but also in knowledge gathering in general.

Finally, a lot of what has been said in 'Limited experience of the written language' and 'Passive attitude' also applies to immigrants and pupils with Swedish as their second language. However, analysing the

differences and similarities between them and the group relevant to this document requires a separate study, and will therefore not be covered here.

A starting point

If we are to draw any conclusions thus far as to how specially adapted educational material should be designed, a number of detours are required. We must:

- Highlight existing knowledge about how the text itself complicates or simplifies reading.

- Define words such as knowledge, educational material, assistive technology and thereby the teaching environment.

- Make an inventory of what has been done to date by authorities whose task includes adapting literature for persons with various disabilities.

- Make an inventory of what is available on the market at present, and what can be achieved with current technology.

- Summarise and draw conclusions from the above.

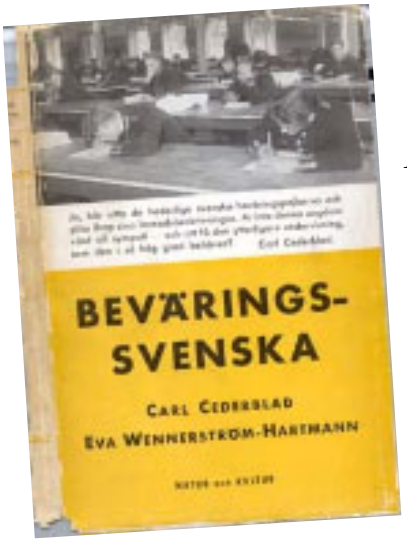
The written language

The written language is pivotal to all education, and it differs from the spoken language in several ways. Research is being conducted into what text should look like and how it should be presented visually in order to attract readers. However, this research has generally been based on a typical reader with no difficulties. In other words, not much research has been conducted which compares how experienced readers receive a text, and how a group of readers with difficulties assimilate the same text.

Therefore, in 2000 the Swedish Association for Persons with Difficulties in Reading and Writing/Dyslexia, FMLS, with funds from the Swedish Inheritance Fund, initiated the three-year *Språka loss* project. The project is called 'Accessing the Printed Word' in English, and it aims to highlight and disseminate knowledge in this field. Information is conveyed via the Internet at www.fmls.nu/sprakaloss. As a result, interest in these aspects has increased among text producers – journalists, educational publishers and authors, and PR/communication workers – and text distributors, such as librarians and teachers. The project has also helped broaden the debate on reading and writing difficulties/dyslexia.

Writing and the mechanisms of reading

Under the collective title of "Writing and the mechanisms of reading" *(Skriften och läsningens mekanismer)* the project has summarised different reader studies from the 1920s and onward, and noted that reading and writing difficulties are no new phenomena[20]. Moreover, reading skills have not deteriorated over the years, rather the demands of society have increased considerably. The observation is also made that good reading and writing ability is about democracy and accessibility.



Reading and writing skills have been studied on many occasions, and the Språka loss project describes the most common, including the Cederblad/Wennerström-Hartmann 1920s study into Swedish among conscripts, pictured above. The skills appear not to have deteriorated over the years, but the demands on good reading skills have increased dramatically.

The difference between verbal and written memory strategies is described[21]. What reading comprehension is and how problems in that area can manifest themselves[22], as well as differences between different languages[23]. Interdisciplinary research into dyslexia is highlighted[24], and finally the concept of 'easy to read' is discussed[25].

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20) Språka loss, *Läsarundersökningar* [Reader studies] (www). Taken from <http://www.fmls.nu/sprakaloss/Lasarundersokningar.htm>.
21) Hägg, *Vad är muntlig dikt?* [What is verbal poetry?] (www). Taken from <http://www.fmls.nu/sprakaloss/Haggtva.htm>.
Hägg, *Muntligt och skriftligt* [Verbal and written] (www). Taken from <http://www.fmls.nu/sprakaloss/Haggett.htm>.
22) Reynolds, *Att förstå läsförståelse* [Understanding the Nature of Reading Comprehension] (www). Taken from <http://www.fmls.nu/sprakaloss/reinolds_svensk.htm>.
23) Miles, *Dyslexi på olika språk* [Dyslexia in different languages] (www). Taken from <http://www.fmls.nu/sprakaloss/Dysolikasprak.htm>.
24) Språka loss, *Dyslexiforskning* [Research into dyslexia] (www). Taken from <http://www.fmls.nu/sprakaloss/dyslexiart.htm>.
25) Språka loss, *Lättläst?* [Easy to read?] (www). Taken from <http://www.fmls.nu/sprakaloss/lattlastartiklar.htm>.

Senior lecturer Lars Melin observes that: "A good text will interest me. It will serve the information at the right dosage, and go from easy to difficult[26]." Senior university lecturer Monica Reichenberg has asked herself the question: "Why is reading text books no longer an adventure?"[27] She has based her research on an existing educational text, which has a relatively dense informational content, and has added two components: a personal narrative style of address (e.g. 'as you probably know') and causality (e.g. transitions of the type 'for this reason, it is', 'due to this, that happened'). Pupils learn more if the text has these components, and Reichenberg observes that: "Giving the text a voice and an increased degree of causality is not about simplifying the textual content. It's about clarifying complex contexts."

Second Language Learning and Numeracy

Many people with difficulties in reading and writing also have problems with other languages. They may originate from the same causes as the problems with Swedish, but they can have other causes. This and ways of counteracting it are highlighted[28], along with problems with mathematics, primarily day-to-day economics. *Språka loss* also looks into research on dyscalculia – specific difficulties with mathematics – and its relationship with dyslexia[29].

In print vs. on screen

Under the collective title 'In Print vs. On Screen' *(På dator och i tryck)*, the need for international standardisation for websites is looked into[30]. The various rules are presented, as well as the development of the FMLS website www.fmls.nu, which has been developed based on the rules of the Swedish Handicap Institute. There is also a report on the assessment of the FMLS website's readability[31].

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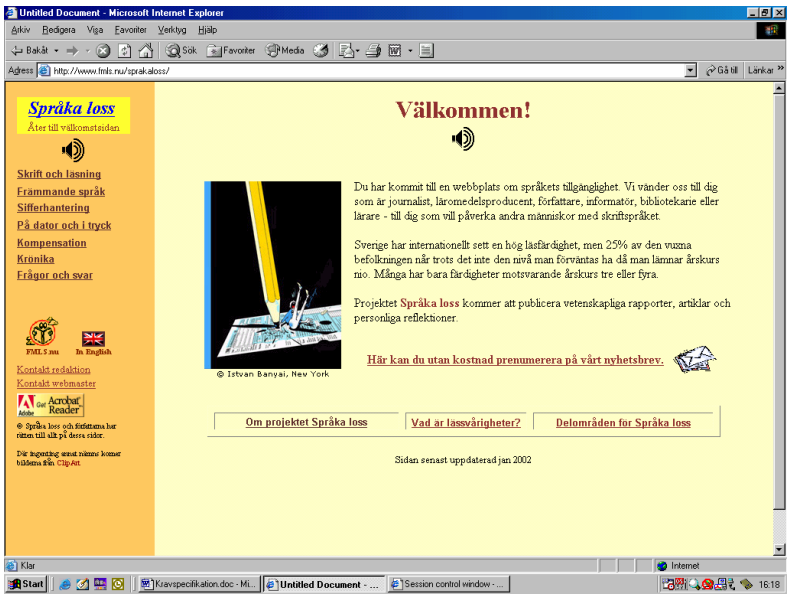
26) Melin, *Bregrips!* [Got that!] (www). Taken from <http://www.fmls.nu/sprakaloss/melin_begripligt!.htm>.
27) Reichenberg, *Varför är det inte längre ett äventyr att läsa läroböcker?* [Why is reading text books no longer an adventure?] (www). Taken from <http://www.fmls.nu/sprakaloss/Reichenberg%20-larobocker.htm>.
28) Språka loss, *Främmande språk* [Second Language Learning] (www). Taken from <http://www.fmls.nu/sprakaloss/frammandesprak.htm>.
29) Språka loss, *Sifferhantering* [Numeracy] (www). Taken from <http://www.fmls.nu/sprakaloss/sifferhantering.htm>.
30) Språka loss, *Webbutformning* [Web design] (www). Taken from <http://www.fmls.nu/sprakaloss/webbartiklar.htm>.
31) Språka loss, *Bättre webbplatser…* [Better websites…] (www). Taken from <http://www.fmls.nu/sprakaloss/Battrewebbplutv.htm>.

The website fmls.nu/sprakaloss presents articles on how text should be written and edited to ensure readers can access the content.



There is quite extensive knowledge available regarding how the role of a text changes when translated from printed to IT-based form[32]. Graphic standards are broken down, and the usual A4 format and corresponding proportions used in books no longer apply, as they don't always fit on the screen. Should content headers be replaced by icons, or supplemented with icons? This and many other fields of research will be presented on the *Språka loss* website. One of the issues discussed is whether words and brief headings in a table of contents (equivalent to the left column on the *Språka loss* website) has the same function for a returning reader as an icon, provided that the word/heading is not too similar to a nearby word/heading, and that they do not change places between visits. The graphic positioning and design – the overall visual appearance of the word – quite simply mean that the word does not have to be read out.

It is considered harder to read on screen than on paper, and it is common that a reader starts to print texts out as soon as the need to 'scroll' arises. But does the same apply to people with difficulties in reading? Can concentration difficulties be counteracted because the reader has to scroll on the screen, or activate him/herself in some other way? These are questions that have yet to be researched.

One new development in recent years is that visitors to www.fmls.nu and some other websites can have the text read out. Many people with reading difficulties have found this development positive, although as yet no assessment has been made as to how the reader/listener prefers to have the information presented. A lot is happening in this area which could prove valuable experience to educational material production in the future.

32) Språka loss, *På dator och i tryck* [In Print vs. On Screen] (www). Taken from <http://www.fmls.nu/sprakaloss/tryckt%20och%20IT2.htm>.

When it comes to layout, a good deal has been written about guidelines for readers in general. However, unlike in Norway for example, in Sweden there has been no concentrated research into the reading process itself, according to Åke Hallberg[33]. One project he was involved in was however conducted by order of the Swedish Association of the Visually Impaired in 1993. One of the study's findings was that the boldness of a text was extremely important, especially for those with some kind of visual impairment. The test subjects deemed gloss paper to be worse than matt paper, which could be of significance when producing educational material, for example. However, this particular study did not primarily refer to people with reading and writing difficulties/dyslexia.

There is therefore no absolute proof that a high contrast between the letters and the background is a good thing for people with dyslexia. There is research that would in fact suggest the opposite, that too high a contrast is 'dazzling' and makes the text harder to read. As Hallberg writes: "The concept of typography represents good graphic design and functional layout, and is largely built on tradition and basic rules. For many years man has been able to see, read and appreciate good typography thanks to the professional skill of the typographer. Therefore, don't go thinking you can radically change this tradition[34]."

There is also a fair amount of opinion, often put across 'weightily' as if indisputable, though in fact not proven, on 'the best typeface', and it being easier to read slightly larger print, for example. However, several writers of scientific authority agree with *Språka loss* and believe rather that subjective perception is probably of greater importance than objectively quantifiable parameters. If a reader thinks that a particular font of a particular size is easiest to read, a text in that font and size will favour that reader.

Compensation

Finally, *Språka loss* describes how problems can be circumvented by compensation. Speech and language therapist Ulla Föhrer defines the concept of compensation by listing a number of synonyms: replacement, equalisation, recompense and counterbalance, and observes that "compensation can be both educational and technical[35]." Educational

33) Hallberg, *Läsbarhet ur grafisk synvinkel* [Readability from a graphical point of view] (www). Taken from <http://www.fmls.nu/sprakaloss/hallberg_laslighet.htm>.
34) Hallberg, *Läsbarhet ur grafisk synvinkel* [Readability from a graphical point of view] (www). Taken from <http://www.fmls.nu/sprakaloss/hallberg_laslighet.htm>.
35) Föhrer, *Läs- och skrivsvårigheter kan förebyggas* [Reading and writing difficulties can be avoided] (www). Taken from <http://www.fmls.nu/sprakaloss/fohrer-loskan.htm>.

compensation can be "everything from the pupil's seating in the classroom, close to the teacher, to the individual's study technique. How do I learn, and how can I make the most of my strong sides?" Christer Jacobson Ph.D. also emphasises the interplay between internal and external compensation – on the one hand coping strategies, an acceptance of one's own situation, and on the other hand technical assistive devices.[36]. Föhrer and Jacobson agree that in order to utilise assistive technology, the pupil needs an internal awareness of his or her own needs and conditions. Referring to his own and other people's research, Jacobson stresses that there is no conflict between training and compensation. On the contrary, compensation can strengthen the self-image (I can manage) and motivation (this is fun). This in turn is the foundation for effectively (in an inquisitive, attentive way) being able to focus on reading and writing. This gives the pupil the practice needed to ensure improvement.

Professor Richard Olson notes that dyslexic people's literacy can be greatly improved through intensive, individualised teaching, which focuses both on phonological skills and precision in reading texts, but that such one-on-one teaching is costly and is therefore rarely available to the people who need it.

He has therefore asked the question whether computer-based support teaching may be an option, and the results he lists would suggest it is. There is a lot to indicate that teaching like this counteracts poor word decoding and strengthens phonological skills, spelling ability and reading comprehension[37].

The teaching environment

Knowledge

One of schooling's most important tasks – apart from teaching pupils to read and write – is to convey knowledge. This in itself brings the problem of knowledge into focus, as the modern view of knowledge says that knowledge is not something that can be conveyed. What is conveyed is information, which only becomes knowledge once the individual recipient has integrated the new facts with his or her previous knowledge and experience. It is therefore in this digestion, the

36) Jacobson, *Kompensatoriska åtgärder…* [Compensatory measures…] (www). Taken from <http://www.fmls.nu/sprakaloss/Kompjacob.htm>.

37) Olson, *Dyslexi och IT* [Dyslexia and IT] (www). Taken from <http://www.fmls.nu/sprakaloss/olsondyslexiochit.htm>.
Olson, *Dyslexi och biologi* [Dyslexia and biology] (www). Taken from <http://www.fmls.nu/sprakaloss/Olsonbiologi.htm>.

internal process, that the information becomes knowledge. There are however other facets to the knowledge-building process: the recipient's attitude towards the conveyor of the knowledge; how the individual assesses the significance of what is being conveyed; whether there is any connection to the individual's personal experience; and whether the individual has the opportunity to consider and reflect upon the information being conveyed. Reflection in turn presupposes a faith in one's own thoughts and thinking ability.

Professor Sven-Eric Liedman has studied the phenomenon in the book entitled *Ett oändligt äventyr*[38] and says that "knowledge only becomes knowledge when it can be put into context and made into an object for critical examination". Therefore according to Liedman, knowledge presumes a kind of mobility that can gradually be stepped up to become creativity. So knowledge is closely linked to memory, interest and attention. The complexity of the issue is made even clearer in professor Bo Göranzon's book *Spelregler*[39]: "It is probably the case that what is quickest to learn is that which is structured, but also that which one forgets most easily. What remains in the mind for longer periods is that which is unstructured."

The logical conclusion of this is that only man, and not machines, can possess knowledge. However, in order to achieve this knowledge we have to learn, and every learning process entails some kind of resistance. The crucial point then becomes: When does the attraction of resistance (will-power) stop stimulating interest and attention, and start making the individual want to distance him/herself in order to avoid failure? Quite simply: Can we increase accessibility and still retain complexity?

Computers in schools have presented great opportunities for pupils to assimilate information, but pupils still have to learn how to relate to the information they can access with just a few pushes of a button. It is therefore logical that the PISA study focuses on reading comprehension and the pupils' ability to process the texts critically. 'Active-pupil teaching', whereby the pupil him/herself actively seeks information and has to turn it into knowledge, imposes new demands on teaching and brings literacy into focus. Without functional reading skills, or access to alternative methods of assimilating information, a pupil has very little chance of developing knowledge, regardless of intellectual ability. This is because knowledge cannot exist without information, in the same way as a fire goes out unless it has fuel.

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38) Liedman (2001), *Ett oändligt äventyr - om människans kunskaper* [An infinite adventure – on human knowledge]. A. Bonnier.

39) Göranzon (2001), *Spelregler – om gränsöverskridande* [Rules of the Game – on crossing boundaries]. Dialoger publishing.

Educational material

Say educational material or teaching aids, and many people will immediately think of the conventional text book. The '*main book*' on a subject, beginning with, say, Stone Age Man's struggle to create fire and ending with the international space race. *Additional reading, a workbook* with exercises to fill in, a maths book with designated figures, and a home economics book containing recipes. Schooling has always been largely text-based. It still is, and will continue to be so in the future; because the written word has distinct advantages for people with good reading ability. Books are therefore very likely to survive, even in the face of modern technological innovation. However, there are and have long been supplementary materials.

Wall charts, maps, slide shows and videos (although often in a foreign language with Swedish subtitles) have been and still are used. More recently publishing companies have in some subjects produced *CD-ROMs*, which use sound, images and film to represent the content. However, teaching is very rarely based on this type of material.

Computers are useful in a wide range of areas in schools. *Word-processing* is probably the most commonly used application alongside surfing the Internet. Word-processing is directly comparable to using pen and paper, so in effect it does not really constitute a teaching aid.

Each year, educational publishers publish new catalogues containing their entire range. The printed book is overwhelmingly the predominant medium. Recorded books have been used for some time in language teaching, and in recent years a few multimedia productions have started appearing. However, recordings of conventional teaching aids are extremely under-represented.

Be that as it may, it has very much helped pupils with reading and writing difficulties to produce usable texts, despite their problems with writing and spelling. Most word-processing programs also include electronic *spell-checkers*, *thesauruses* and occasionally even *grammar-checkers*. So word-processing could in fact be counted as a teaching aid, or in any case certainly part of the teaching environment. To supplement word-processing there are also separate wordbooks, dictionaries (e.g. Swedish-English) and thesauruses, which are also considered educational material.

The Internet can be viewed as an equivalent to the library. Pupils can access websites containing information on the Internet, in the same way as they use books in the library. Most websites convey their message using text, and in accordance with the active-pupil approach pupils are expected to acquire knowledge over the 'Net'. The Internet can therefore also be considered educational material.

Distum, Sweden's *distance learning* authority, observes that: "Flexible distance learning enables students to choose the time, place, tempo and method for their studies" – something which ought to be perfectly suited to many people with disabilities. However, Anders Söderberg and Peter Anderberg, in the Distum document *Funktionshinder och distansutbildning*[40], say that it is easy to include thresholds that obstruct accessibility for individuals with disabilities, due to disinterest, irresponsibility and a lack of knowledge.

They say that it is "teachers and other staff the student comes into contact with who bear the practical responsibility for assuring a non-discriminatory study environment"[41], adding that it ought to go without saying that only suppliers that can fulfil these requirements should be used when procuring materials. They write that electronic text will become increasingly common, and that many people will want to be able to download texts to their computers, PDAs, or the special digital reading boards appearing on the market: "A good idea would be to offer texts in several different versions, e.g. with hyperlinks, running text without links and in the form of brief summaries"[42]; and "For more advanced production of longer texts or entire educational units, 'digital talking books', production should follow the existing standard – DAISY."[43]

The difficulty of upholding a boundary between teaching aids and assistive technology is clear if we look some way into the future. The arrival of 'thin clients' – a durable portable computer screen with keyboard and Internet connection, but without a hard drive – is imminent. Users store everything in their own folders on the server, and use the programs there. In Hong Kong these are already being used to teach all pupils at certain schools.

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40) Söderberg, Anderberg (2001), *Funktionshinder och distansutbildning* [Disability and distance learning] (www). Distum Report 2. Taken from http://www.distum.se/images/fileup/1006510245953.pdf
41) Distum Report 2 (2001). Page 34.
42) Distum Report 2 (2001). Page 47.
43) Distum Report 2 (2001). Page 47.

These digital 'reading boards' are the size of a sheet of A4, and act as a 'palmbook'. Pupils see their furnished room on the screen. When they click on the desk, it means they are in class. When they click on the notepad they see a sheet of paper which they can write on, either with a pen or using the keyboard. When they click on the drawer they can save what they've written and instead click on the clock to see how long there is left to break-time. Pupils can also take photographs using the school's digital camera and add the pictures to their working material.

This development means that accessibility depends on the range of the servers. It will be difficult to make individual adjustments on each unit, which even more clearly shows just how important Söderberg/Anderberg's statement is: that the education organiser should only procure materials from suppliers that can provide solutions that are also accessible to people with disabilities.

Assistive technology

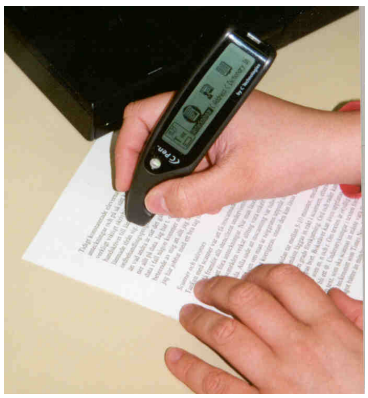
In the future, existing assistive devices will in all likelihood be integrated with each other, in the same way as dictionaries today are integrated in word-processing software, or different programs are combined in the reading boards from Hong Kong. The boundary between teaching aids and assistive technology will be erased to the point where it is no longer relevant to define which category the reading board fits into. However, this does not make it any less vital to describe the range of possibilities.

The digital reading and writing board from Hong Kong. The size of a sheet of A4, the board is a miniature computer in itself.
Image: Ian Smythe

- *Voice synthesisers* – A number of these are available. They make it possible to have a synthetic voice read the text out. The sound quality of the voice is improving all the time, and many pupils find great support in this sound feedback, both when reading and writing.

- *Scanners + OCR software* – It is possible to scan in a text as a picture, and convert it back into text using an OCR program. In this way users can scan in letters and other simple texts and have them read out with a voice synthesiser.

- *Scanner pens* – Miniature scanners that can be drawn across a word, sentence or paragraph in a book. The extract is then stored in the pen until it is transferred to the computer, where it can be inserted into a diary, word-processing file or other program.



- *Translation pens* – A pen, much like the scanner pen, which can be drawn over e.g. an English word to produce a translation into Swedish. This function is also available as a piece of computer software, so that users can quickly have a word on the Internet pronounced and translated.

- *Word prediction programs* – Programs that suggest words which the writer would be likely to use in the context.

- *Voice recognition* – Software that enables words to be read into the computer and reproduced as correctly spelt text on screen. These programs are also available in English and can be used in English teaching.

- *Separate spelling programs* – Dictionaries, wordbooks and reference books specially adapted to the user's requirements.

- *Register programs* – Programs that make it possible to search for information even if the user has difficulty spelling the words correctly.

- *Cache memory* – A small tape recorder which can be used to record spoken memos.

- *Whiteboard support* – Various ways of retaining the information written on a whiteboard so it can be stored on a computer or on paper.

The list is by no means exhaustive, but it does imply opportunities for integration: how the whiteboard scanner and scanner pen can be integrated with the word-processing program and the diary, how voice synthesis is used to hear what's being written, and so on. All due respect to technology, but it is of course useless if not put into context.

The teaching environment

When computers first began being used in the 1980s, there was understandable resistance. It was awkward using them in purely technical terms, the man/machine interface was poorly developed, and there was a lack of obvious standards. Moreover, there was no universal approach, no insight into the possibilities of the technology, its benefits and how it could be integrated into everyday life. Each teacher was forced to change perspective, and that required a willingness to reflect on established work forms – individual teaching methods. One example of how a shift in perspective like this takes place can be seen in the formation of an association for computers in teaching in 1984. The organisation eventually changed name ten years later, and it is now known in Sweden as the DUI (from the Swedish for 'Computers in education'). The aim of the body is to support teachers who use computers in their teaching. It is clear from this that it took a fair time to change the focus away from pure technology, to seeing the computer in the context of day-to-day teaching.

This slow rate of acceptance for computers is understandable when seen from the perspective of knowledge in the modern age. We must all individually, both in theory and in practice, convert new information into knowledge. The information we receive externally relating to technology and compensatory assistive devices has to be incorporated with our previous experience in a creative way, and this is not something that happens overnight.

The corresponding process when it comes to the rights of disabled people to specially adapted education will also take time. Today the preconditions exist to produce this kind of education with the aid of new technology. The interfaces have been adapted and standardised according to the users' needs. However, there is still no universal approach, either among the users themselves or in the world around them. Many pedagogic and financial initiatives will therefore be required alongside technological developments. The people with difficulties in reading and writing/dyslexia must themselves discover and learn to use technology and their compensatory strategies. This in turn requires that teachers and other people in an educational context also have a knowledge of this, so that they can adapt the teaching according to the needs of the individual pupil. The situation must progress to the stage where the question as to which assistive technology and educational materials are needed for the individual pupil, is asked as early on as the planning phase. This means that each teacher must also be given the time to reflect over his or her own working methods, in relation to the pupils' needs. For this to happen, they must receive clear signals from school principals – their employers – that a shift in perspective like this is necessary.

Teacher training colleges too must, as part of schooling's fundamental values, be obliged to train future teachers in a democratic approach as regards pupils with disabilities and specially adapted educational material and assistive technology. An approach based on modern knowledge and experience gained.

Materials for special needs education

Since the early 1990s, the Swedish institute for disabled issues in school, known by the Swedish abbreviation SIH, has been responsible for developing, producing and selling special needs educational material for children and young people with various disabilities. This has included adapting material produced by publishers, as well as its own development, production, communication and sales of teaching material. Development has taken place at the Institute's educational material units in Göteborg, Örebro, Solna (Stockholm) and Umeå. One of the units, called Datapedagogen, has provided user support for computer programs sold by the Institute, and an important task has been to provide production support for publishers and independent producers, and to inform about suitable educational material on the market.

The SIH had a particular responsibility for special needs education, and it produced material for pupils with visual impairment, global learning difficulties and physical disabilities, as well as for the deaf and hearing impaired. Recorded material on tape (talking books) was produced for blind/visually impaired people, including oral descriptions of pictures and clear instructions on changing tapes, for instance. Initially, the SIH was not responsible for pupils with difficulties in reading and writing/dyslexia, but towards the end of the 1990s it was temporarily commissioned to provide dyslexic persons with previously recorded material as well. Since then this temporary solution has been extended for want of a better alternative.

The SIH ceased to exist in July 2001, and was replaced by the Swedish Institute for Special Needs Education (SIT). The SIT was also given responsibility for pupils with difficulties in reading and writing/dyslexia. However, this expanded remit does not encompass production of educational material. Instead the issue was left unresolved until the specially appointed investigational committees on educational material and assistive technology had submitted their reports.

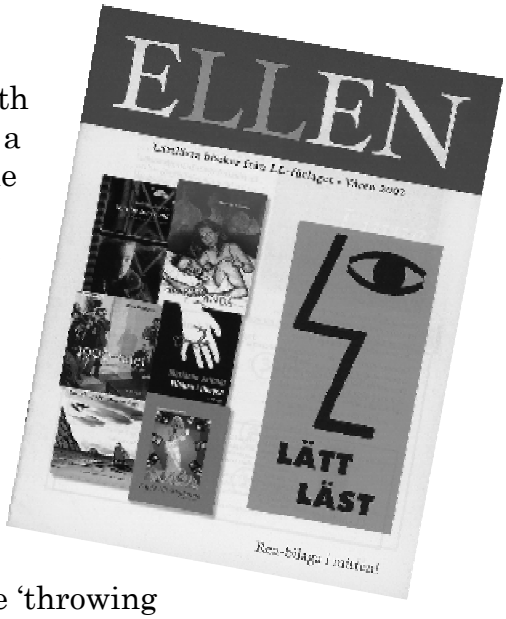
-The SIH in Sweden (now the SIT) and LS in Norway have jointly produced guidelines for educational material development, in order to make school accessible to everybody. These efforts have resulted in two documents: one about good educational material production in general, and the other (pictured) dealing with specifics for each user group.

During the transitional period the SIH was working on a joint project with its Norwegian counterpart, *Laeringssentret* (LS), relating to "guidelines for developing educational material for persons with disabilities"[44]. As part of this co-operation, expertise was sought among people linked to the FMLS with expertise in reading and writing difficulties/dyslexia.

Easy to read

In 1968 an experimentation programme was initiated by the *Skolöverstyrelsen* (SÖ), the old equivalent to Sweden's National Agency for Education. In co-operation with various book publishers, easy-to-read books were published. After the Swedish National Association for Persons with Intellectual Disability (FUB), among others, had indicated a need for easily comprehensible news, in 1984 the national talking newspaper committee was commissioned to look into conditions for news distribution to people with learning difficulties and certain other groups with reading problems. The first issue of *8 SIDOR* [8 PAGES] came out, and the publication was made a permanent arrangement three years later. The LL Foundation, which was responsible for publishing *8 SIDOR*, was formed, and publication of easy-to-read books was transferred from the SÖ. In spring 1991 the Foundation started its own publishing company called *LL-förlaget*, as well as mail-order book sales with book magazine *ELLEN*. In 1997 the LL Foundation began calling itself the Centre for Easy-to-Read, and its work is based on a concept for producing easy-to-read material.

44) *Läromedelsutveckling i en skola för alla* [Educational material development in a School for All] (2000). SIH and LS.



The Easy-to-Read concept is based on texts with concrete content and often a simple plot. Only a few characters and places are involved, and the course of action is usually described in chronological order, so there are no flashbacks or jumps forward. The text too should be concrete. Long, uncommon words should be avoided. For example, 'café' is used rather than 'refectory'. Abstract concepts are considered difficult for the target group, as are expressions that can be interpreted in more than one way. 'He is a big actor' can be interpreted to mean that the actor is physically big, and descriptive expressions like 'throwing money down the drain' may be interpreted literally. The active voice ('They employed two youngsters') is preferred to the passive ('Two youngsters were employed'), and synonyms should be avoided, the preference being to use the same word for the same thing throughout the text.

The *LL-förlaget* publishing house usually uses free typographical form, generally with an uneven right-hand margin, as many readers have difficulty distinguishing punctuation marks such as full stops and commas. Easy-to-read texts should contain as few sub-clauses as possible, and interjected sub-clauses should be avoided altogether. The emphasis is also on suitable, spacious layout, and using pictures in a way that consciously supports the textual content.

The Centre for Easy-to-Read is also responsible for producing books for other groups with reading difficulties, including people with dyslexia. It does this today based on the same basic concept, but with a higher degree of intellectual difficulty. However, the Centre does not produce educational material.

Talking books

The Swedish Library of Talking Books and Braille (TPB) is a result of political interest work undertaken by the blind in Sweden. In order to fulfil their needs, the blind people's association DBF started a library in the 1950s which produced talking books (books recorded on tape). The association became the Swedish Association of the Visually Impaired (SRF) in 1975, and when the TPB was formed in 1980 the library was incorporated into the national association. According to the Swedish Act on copyright infringement, URL § 17 Section 2[45], the TPB has: "the

45) The laws governing the TPB's operation can be seen (in Swedish) at: www.tpb.se/omtpb/tpb/lag.htm

right through sound recording by reading aloud or via transition from another sound recording, to produce copies of published literary works for lending to visually impaired persons and people with other disabilities who are unable to access the works in written form." The government issues licences for producing these books, which are called talking books. They can then be loaned out, but not purchased. In addition to the TPB, the Swedish Institute for Special Needs Education also has the right to produce talking books. The method of recording is in line with the needs of blind and visually impaired people. This means that the works are not dramatised, but read in a way that retains the nuances of the written language. Pictures and other illustrations are also explained in detail.

The SRF's successful efforts meant a lot not only to blind and visually impaired people, but also for other people with reading difficulties. In the early 1980s, the TPB library was issued a directive to expand the loaning out of talking books. Other people with reading difficulties were also granted the formal right to talking books at this time, but even into the mid-1990s the FMLS was working with the TPB to ensure that people with reading and writing difficulties could actually access the talking books, which not all of Sweden's librarians viewed as a clear-cut issue. Only since the nationwide Dyslexia Campaign in 1996/97 has the formulation "the needs of other people with reading difficulties" been accepted.

In the 1980s, the TPB started providing university and college students with recorded course literature, on a project basis. The results were very positive, the process was made into a permanent arrangement in the early 1990s, and dyslexics too were able to access the service.

Today the TPB is responsible for ensuring that students in higher education who have visual impairment, dyslexia and various disabilities can access their course literature in a medium suited to their needs. These days, students with dyslexia are by far the largest group to make use of this service.

Educational material on cassette

At the beginning of the 1990s, there were requests from many directions for the TPB to record educational material for compulsory schooling, upper secondary and adult education, in the same way as for students in higher education. Instead the Swedish government and parliament decided that adapted material on these levels should be produced commercially[46]. The government "…thought it important that pupils with reading and writing difficulties should have access to recorded

46) Government bill 1993/94:100. Government Offices.

educational material. It would be an aid to many pupils' reading education to listen to a recording of a text book while reading the book itself. However, access to books on cassette would not only be of value to pupils with reading and writing difficulties, but also to other groups that had not yet achieved a high level of literacy, such as visually impaired people and certain immigrants. There could therefore be quite a large target group, and the need for books on cassette – as with other educational material – should be able to be fulfilled on an open market."[47]

At the same time, the Swedish National Agency for Education was commissioned to run a three-year test project focusing on co-ordination, production and evaluation of educational material on cassette. The Department of Education at Uppsala University was responsible for the evaluation. The project management came to an agreement with the Swedish Association for Educational Writers (SFF) and the Swedish Association of Educational Publishers (FSL) on remuneration.

All the representatives of publishing houses were sceptical towards the idea of educational material on cassette. The technique was considered outdated. CD-ROM was discussed, but cassettes were used in the end. A reference group made up of representatives for the recording companies, the TPB and the FMLS were asked to establish technical and educational criteria, and the publishers received support in producing the cassettes. A few publishers did seek support. Others were prepared to bear the costs themselves provided there was a high enough level of production. In the end, 100 cassettes of 10 different titles were procured, and 24 schools took part in the scheme.

The report entitled *Dyslexi och dyskalkyli – utvärdering av läromedelskassetter för elever med läs- och skrivsvårigheter*, written by Elsy-May Gisterå, Kia Kimhag, Anna-Karin Magnusson, Staffan Selander and Eva Svärdemo Åberg, was published in 1995[48] and the Agency for Education published a summary in order to distribute the results.[49]

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47) Government bill 1993/94:100. Government Offices.

48) Gisteå, Kimhag, Magnusson, Selander, Svärdemo Åberg (1995), *Dyslexi och dyskalkyli – utvärdering av läromedelskassetter för elever med läs och skrivsvårigheter* [Dyslexia and dyscalculia – evaluation of educational material on cassette for pupils with difficulties in reading and writing]. Department of Education, Uppsala University. Educational research in Uppsala 123, September 1995.

49) Swedish National Agency for Education report no. 87 (1995), *Läromedelskassetter för dyslektiker* [Educational material on cassette for persons with dyslexia]. The report presents results from a project in which educational material on cassette for people with dyslexia was tested and evaluated.

In a *questionnaire survey*, teachers and special needs teachers at 300 randomly selected schools and at the 24 test schools responded to questions relating to dyslexia and the use of talking books and books on cassette. There were also *interviews* with teachers and pupils at eight selected test schools.

The questionnaire survey

One of the questions was: Which educational materials are used for pupils with reading and writing difficulties?

- 3 out of 4 teachers used *text books* always or quite often.
- 1 out of 5 teachers used *cassette books or books and tapes* always or quite often.
- Just under half used *computers in teaching* always or quite often.
- 3 out of 4 used *factual study books* always or quite often.

It is clear from these results that the printed text book and other factual study books were still the predominant media, and that even then, in 1994, computers were more commonly used in teaching than recorded material.

Another question was: What are your experiences of using talking books, cassette books, and books and tapes?

- 75% of all teachers had at some point used these media in teaching pupils with reading and writing difficulties/dyslexia.
- 55% had recorded text onto tape themselves for one or more pupils.
- 94% of the teachers taking part in the test planned to continue using recorded material in their teaching if it was better adapted to the specific difficulties of the individual pupil.

The interviews

Participants in the interviews were six form teachers and four special needs teachers from intermediate level education (aged around 10-12), and three form teachers and four special needs teachers from secondary level (aged around 13-15). Ten of these had used educational material on cassette in their teaching to some extent, while the other seven had only introduced cassette books to the pupils. Eleven pupils in intermediate and six in secondary education were also interviewed, all of whom had extensive reading and writing difficulties.

All the teachers said that the pupils had extreme difficulties in many school situations. Their greatest problem was in assimilating texts in text books and other factual material. "Many teachers indicated that an active-pupil approach, whereby the pupil seeks his/her own knowledge based on personal interest, is often too difficult for pupils with reading and writing difficulties, unless they are provided with sufficient help and support."[50]

In a full-class situation, the general experience was that the reading speed was too high for the pupils, who often had problems with rapid flows of information. They had a poorer vocabulary and conceptual perception, and therefore needed words and concepts explaining. When it came to group work, one teacher noted that pupils with reading and writing difficulties were often limited to the text book and accompanying cassette when seeking knowledge under their own direction. The teacher would therefore like to see more educational material and further reading recorded onto cassette. Comments from special needs teachers included the fact that pupils could hear accentuation, thereby gaining a better comprehension of textual content.

The seven teachers who had not used cassette books in their teaching requested pedagogic ideas and suggestions on how to use them. They also indicated a lack of group rooms where teaching could take place. Furthermore, cassette books did not fit in with the structure of the teachers' classes. At home there were problems when the cassette did not correspond to the text book, and parents usually had to help play the cassette and fast forward or rewind to the right page.

"Most pupils only listen to the cassettes. They don't follow along in the text book. They say that they listen several times, at least three, some of them say. I think that sounds incredibly ambitious. After all, you know that in the run-up to tests large sections of text have to be learnt, and listening to that two or three times would take hours."[51] (Comment by a participating special needs teacher.)

The teachers noted that the pupils, who often had difficulty with word decoding and/or understanding the import of words and concepts, also had problems with the recorded material. All the teachers commented that the texts in the educational material were often too difficult for the pupils, which naturally meant that the pupils had a hard time extracting essential facts from a text. Many of the teachers also pointed

50) Swedish National Agency for Education report no. 87 (1995). Page 18.
51) Swedish National Agency for Education report no. 87 (1995). Page 21.

to the severe shortcomings in how difficult words are explained in the text. This was such a major issue that several teachers gave it as a reason for not using cassette books in their teaching. "One teacher said that it's not really the amount of text that makes it difficult, but the compressed factual content that makes it more difficult to understand the text. The texts appear incoherent to the pupils, listing fact after fact without explaining the inherent contextual connections."[52]

However, not all pupils had difficulties with the language in the educational material. There were pupils who understood the texts in the material, pupils who had good linguistic abilities despite the problems with word decoding that made their reading more difficult. The primary problem was perceived as being difficulties with word decoding. "It is arduous for people with dyslexia to get through long, awkward words and then remember what they previously read in the text. They have to repeatedly go back in the text, and this makes it hard to put the words together to form a meaningful whole. Reading comprehension is not only about orthographic and phonological decoding, but contextual decoding is also relevant to semantic information."[53]

All the teachers had a positive attitude towards literature recorded onto tape, although they were neither consistently positive nor negative. They thought that assimilating knowledge with the aid of recorded text was an excellent idea. They also noted that learning increased the more senses could be used, and that the cassette book could therefore be a good supplement for pupils with reading difficulties. A common opinion was that fiction recorded onto cassettes was an excellent aid in strengthening the pupil's literacy and helping them to enjoy reading. Some also thought that recorded educational material could have a positive impact on literacy. That word comprehension and concept formation was probably stimulated by the listening process. They had also noticed that the pupils could manage to assimilate texts to a greater extent than before. Some pupils can assimilate the content only by listening. However, for many the recordings were read too quickly. They had not been sufficiently adapted for pupils with reading difficulties. It was also hard to find the right place on the tapes.

A few teachers commented that pupils with difficulties in concentrating could benefit from recorded educational material. They said that hearing and seeing the text at the same time made understanding easier and increased motivation for these pupils. By using personal stereos, distracting noises in the surrounding environment could be shut out. So many teachers thought that cassette books were an excellent complement for pupils with difficulties in decoding, although some thought this solution less beneficial for pupils with additional problems, such as general learning difficulties, linguistic problems and difficulties with memory.

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52) Swedish National Agency for Education report no. 87 (1995). Page 22.
53) Swedish National Agency for Education report no. 87 (1995). Page 22.

More character in the recordings was requested. One form teacher said, "My pupils reacted to the fact that the recording was too monotonous, there were no pauses and it was read too quickly. There's no character in the reading, several of them said. There should probably be a special book for these pupils, one with more pictures, fewer facts and more narrative text. That way there would be more experience for the people hearing it."[54]

There were suggestions that there should be recordings at different speeds, and that the educational material should be available in various levels of difficulty. However, another teacher was doubtful about the benefit of simplified material: "When pupils have their minds set on finding as much factual information as possible, they're disappointed when they discover there's not as much in the specially adapted text books as in the standard ones. The teacher says that it is a question of balance. If they use books with short texts, there's a high risk that they're too meagre and densely packed; if they use text books with more descriptive, narrative text, there's a risk that there's too much text for the pupils to get through. Several teachers also indicate that an important prerequisite for working with cassette books in teaching, and for ensuring that pupils can use them more independently at school and at home, is that it has to be easier to find the right place on the cassettes."[55]

The interviews with pupils demonstrated that the majority viewed educational material on cassette as something positive. Most pupils wanted to continue using cassettes both at school and at home. Several pupils said that cassettes facilitated learning, and thereby also knowledge gathering.

The report's conclusion reads as follows: "Pupils with reading and writing difficulties/dyslexia are described both by researchers and by teachers who took part in the evaluation as a heterogeneous group. Something common to all the pupils is that they do have great reading and writing difficulties, but that many also have other difficulties, memory problems, learning difficulties and dyscalculia, and some even have the additional disability MBD/DAMP. The pupils therefore have varying preconditions and opportunities for using and benefiting from educational material on cassette. It is clear from the teacher interviews that the educational cassettes are best suited to pupils who only have direct decoding difficulties."[56]

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54) Swedish National Agency for Education report no. 87 (1995). Page 25.
55) Swedish National Agency for Education report no. 87 (1995). Page 25.
56) Swedish National Agency for Education report no. 87 (1995). Page 28.

Several teachers brought up the issue of the opportunities computers will present in the future for text processing, particularly in the increasingly common active-pupil approach. “CD-ROM technology, whereby text, graphics and sound are stored on a compact disc, will enable pupils with reading difficulties to assimilate information and knowledge.”[57] The authors of the report were careful to take note of this: “As new technology develops, pedagogic work in schools develops as well. It is however important to emphasise that initiatives are needed in the field of development work if pupils with reading and writing difficulties/dyslexia are to benefit from the new computer technology.”[58]

‘Reading by ear’ has become increasingly common in the 1990s. However, far from all the pupils who have a need for this method of assimilating knowledge have access to it. Cassette players have their limitations too, especially when it comes to material that has to keep being rewound and fast-forwarded.

Computer-aided teaching

Eva Svärdemo Åberg, one of the authors of the study into recorded educational material, made a further study into the future opportunities of computers, also financed by the Swedish National Agency for Education. The study was carried out in 1997/98 and in 1999 resulted in a paper entitled *Datorstödd undervisning för elever med läs- och skrivsvårigheter/Dyslexi*[59].

57) Swedish National Agency for Education report no. 87 (1995). Page 25.
58) Swedish National Agency for Education report no. 87 (1995). Page 30.
59) Svärdemo Åberg (1999), *Datorstödd undervisning för elever med läs- och skrivsvårigheter/Dyslexi* [Computer-aided teaching for pupils with reading and writing difficulties/Dyslexia]. Stockholm library of Curriculum Studies 6. Another summary of the report is available in Swedish at the following Internet address: http://www.itis.gov.se/studiematerial/kopia/db/itp_grund/323.html.

Svärdemo Åberg adopts a socio-cultural perspective. She says that people create their knowledge in a social context. “Knowledge is not just something found inside a person’s psyche, rather it develops through interaction between people.” Using this as a basis, she has studied how teaching for pupils with difficulties in reading and writing/dyslexia manifests itself in various situations, in compulsory and upper secondary education.

After observing the teaching for a period, Svärdemo Åberg filmed lessons both where the pupils worked with computers and without computers, in classroom situations and in individual teaching groups. Teachers and pupils then had an opportunity to view sequences from the films in individual interviews. They were able to make comments, stop, fast-forward and rewind the film, and on occasion Svärdemo Åberg asked specific questions about aspects of the way computers were used.

General computer use

Nytörnskolan is a first/middle/secondary school in a medium-sized municipality, in a socio-economically affluent area. The school had just over 600 pupils and there were approximately 90 computers for pupils to use. Two classes were included in the study. Class 6c with 27 pupils, four of whom received support from the special needs teacher for their reading and writing difficulties. The study reports on the work of Jonas and Ellen.

Annika was the form teacher for 6c. She very rarely used conventional, teacher-centred instruction. Instead the focus was on an active-pupil approach with various themes and projects, worked on individually or in groups. A history lesson involving work with word-processing, the Internet and a multimedia production was filmed. On the film, Annika gave a briefing on the weekly timetable for history, after which the group broke up. There was also a computer in the classroom which was used extensively by the pupils. Jonas changed places several times during the remainder of the lesson. He went round with his notebook, pen and text book. He looked in on the smaller group room that had a computer, but did not stay long. The computers, both in the classroom and in the group rooms, were being used by pupils who generally took free advantage of the computer facilities. They also sat at the computers during breaks to surf the Internet, play games, work on websites or do word-processing.

Ellen went off to one of the parallel classes along the corridor, where she worked with her group. Their task was to finish a multimedia page. A boy, Klas, sat at the computer. Ellen and another boy, Tomas, sat either side of Klas who wrote in the texts, but then another classmate came by and started talking to Ellen and Tomas about something other than schoolwork.

In the interview, Annika thought that the majority of the pupils were familiar with the investigative approach, but that the pupils with difficulties in reading and writing had great problems working independently. Jonas found it difficult to participate in the discussion during the briefings and at the same time write the words down in the thoughts chart, even though he wanted to do the same as the others. According to Annika, both Jonas and Ellen found it difficult to assimilate text in the same volumes as their classmates, and therefore used only a few books, often the text books. They rarely used the Internet and they needed a lot of structure and guidance to process Swedish and English texts, and to find facts.

"Jonas can get stressed when he knows he has to perform, and it becomes so difficult."[60] (Annika)

Annika felt that Jonas and Ellen did not use the computers as often as the pupils who were good at reading and writing, because they felt uncertain of their classmates' reactions to their reading and writing at the computer. This despite the fact that all the pupils had received information about dyslexia.

Ellen and Jonas always handed in their projects after completing them on the computer at home. According to Annika, Jonas showed clear anxiety about writing in a group. He was distracted by other classmates and often became interested in what they were doing. He could not sit down and read and write. Instead he went off and talked to other pupils. Annika thought that the computers should be used more as a compensatory tool by both Ellen and Jonas. However this would require more computers, or a personal computer for each pupil. Their reluctance to use the computers at school was, according to Annika, the main obstacle to their being able to compensate for their difficulties. Jonas especially needed his own computer, as it would make the writing process considerably easier.

Ellen and Jonas, for their part, thought that it was very important to join in and feel involved in the planning of the teaching. They felt that they could determine for themselves how much time they needed, and in which room they should sit.

"It's so difficult at school. You get stressed. There's so much that has to be done in a lesson and it takes longer for me to sit and write.

Because I can't find things as quickly as I do at home. When I'm at home I can find the keys on the keyboard much better. It takes far longer… and it's quite hard. Otherwise it takes a really long time."[61] (Ellen)

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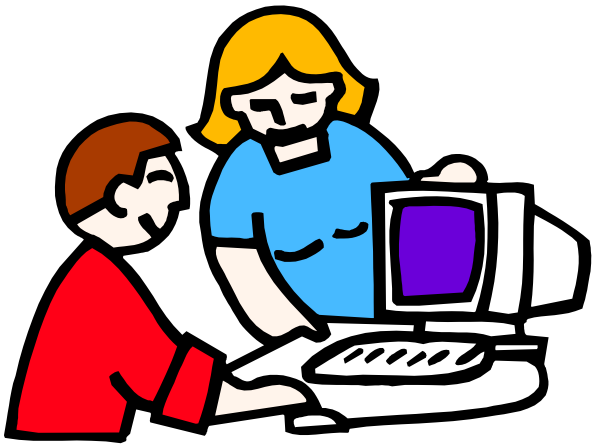
60) Svärdemo Åberg (1999). Page 49.
61) Svärdemo Åberg (1999). Page 55.

Jonas wished that there was more conventional teaching: “Before, the teacher used to take the start of the lesson, maybe half a lesson where we just sat and listened to the teacher. She showed pictures and things. You learn that way. I learn a lot when the teaching’s like that.”[62]
(Jonas)

Both Ellen and Jonas preferred working alone. Jonas felt that he was not very good at anything in particular, especially compared to his classmates. Ellen and Jonas’s opportunity to produce text was also limited by the fact that they had to write the rough draft by hand. They also said that they learnt by reading, writing and listening, and by preparing for tests and presentations. However, Jonas said that he needed more time for tests to be able to complete them. He also wanted oral exams so he could explain better, and he wanted to practise his handwriting. However, both Jonas and Ellen preferred writing on computers.

New software

Annika and Jonas were also interviewed after the class had discussed drugs and tobacco in social studies, using the science text book, the media archive on the Internet and the CD-ROM book entitled *Leva i samhället* (Living in Society).



Computers in schools are not used as extensively by pupils with difficulties in reading and writing as by pupils with no problems in dealing with the written language.

62) Svärdemo Åberg (1999). Page 56.

The film showed how Annika began by talking about the material, and writing up the Internet address for the media archive on the board. Then she told the pupils that running around wasn't allowed. She went on to say that the text in the CD-ROM book was more difficult than the texts they were used to. That it was more fact-intensive, but that it could be read out loud. Jonas put his hand up and asked if his group could go first, which Annika agreed to.

Jonas and Ellen were in the same group of six pupils. Jonas and another boy each sat on chairs right in front of the computer. Annika pointed out the program's functions which were presented with icons. The pupils tested starting, stopping, rewinding and fast forwarding the recorded text and changing the read-out speed, and browsed back and forth between the pages, as well as clicking on underlined words for explanation. They were given a page number by Annika, who then left. The group listened to the page in silence. When listening to the text a second time, Jonas and a classmate, Jimmy, discussed the content. After the discussion, Jonas resumed listening to the text. Jimmy played with the loud-speakers by turning the volume up and down, until a classmate snapped at him to stop. The girls stood in the background. Ellen occasionally looked towards the computer screen, which was too far away for her to see the text. A new group came in and Jonas stayed to show them what to do. Ellen went off to get a large sheet of paper and began writing headings for the group's work. Jonas started looking for information about drugs on the Internet at another computer.

Annika said that she had deliberately introduced the CD-ROM book for all the pupils. Each one could then decide whether this was a useful format for them. This was a way of preventing classmates from branding the book 'different' and solely intended for the pupils with reading and writing difficulties.

"The pupils who are good readers (…) may not feel that they get much out of it. If anything, it takes more time. After all, they have to go in, open the program and look through the text there. Pupils without difficulties can skim texts and locate facts in a completely different way."[63] (Annika)

Some functions which should enable the user to print out the text on the printer, make notes in a small notebook, and transfer the notes to a word-processing program, did not work. Moreover, the page numbering did not correspond to the pages in the book. In spite of this, Annika thought that the CD-ROM book was a form of assistance that all the pupils were now aware of. She said that Jonas and Ellen just listened, without reading the text at the same time, when the group worked together. However, she thought they would have acted differently had they been able to sit alone and try out different reading speeds until they found the one that suited them.

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63) Svärdemo Åberg (1999). Page 60.

Even so, Annika felt that the CD-ROM book enabled Jonas to read in school so that he did not have to take books home to have enough time to read and compile his work.

Annika was under the impression that Jonas's self-confidence was improving. "Not even a word or two comes easily for him. It's terrible having to show your friends that you've only managed a line or two when they've written four or five pages. It's very discouraging. Before, he would never do anything. He'd immediately find something else to do so he could do the writing at home instead. But now he tries a little."[64] (Annika)

Annika also commented that the text was not too difficult, even though the book was written for upper secondary pupils. There were however some difficult words that the pupils were not familiar with, and which were not explained in the book. One of the benefits of having the text read out was that it was easier for the pupils to understand the context of the textual content. When they read text, they used a lot of energy putting the letters together to form words, and the words to form sentences, and this extreme effort meant that they lost the understanding of the textual content. She also thought it was important to take notice of the way the pupils learn. Jonas learnt by Annika telling him things or reading to him. Ellen on the other hand learnt by looking at pictures and film. Ellen found it easy to memorise and relate things she had seen in pictures and on film. Educational material with a lot of detailed pictures would help her, thought Annika, who concluded by saying that the pupils used to use recorded educational material on cassette, but that she saw clear benefits with the CD-ROM book as it was far easier to find the right page and choose which section of text to have read out. All the pupils had to do to get to the right page was write in the page number and press Enter. However, she thought that some functions presented using icons were superfluous and not really of much benefit to the pupils.

Jonas himself felt that the group work was fun when they searched for facts about drugs. One of the reasons he took the initiative for his group to go first was that he had used the CD-ROM book once before, with special needs teacher Berit. He thought it easier to work with than conventional books and the Internet, as facts could be found more quickly. "When you go on the Internet it can take ages to find something… Some people are good at finding things, they know the special characters you have to use to find what you want. But I find it quite difficult to find things, so I used this instead, which was quite good. And it was quick."[65] (Jonas)

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64) Svärdemo Åberg (1999). Page 63.
65) Svärdemo Åberg (1999). Page 65.

He was very positive about the functions for changing reading speed and moving forward and back in the text, and he felt he was improving his vocabulary as new and difficult words could be explained. "It's good that you can change to slow because they read too fast (…) You can read along as they read."[66] (Jonas)

Special needs teaching with exercise programs

Class 7a at Nytörnskolan school had 24 pupils, three of whom had pronounced difficulties. Svärdemo Åberg monitored special needs Swedish lessons, in which Anton, David and Mats were working with exercise programs. On the film, the pupils came into her room and sat at the desktop computers. Berit went up to each of them and asked them to enter various exercise programs. Mats was to read a text and practise his reading comprehension. Berit helped him find one with the right readability index value. Anton worked on double-consonant spelling. On a few occasions he made mistakes, and Berit reminded him of the spelling rule he had previously learnt. David worked on a simpler exercise program which was actually intended for younger pupils, aged between 7 and 12. Mats read his text with his hands behind his head. On occasion he gave a big yawn and sat absently tipping his chair back and forth. Later on, Berit stopped the exercises and suggested that they work on parts of speech for the rest of the lesson. The lesson ended when the pupils told Berit that it was break time.

According to Berit, form teachers often gave these pupils too much homework. She also said that the secondary-level teachers were more hesitant to let the pupils use computers as a teaching aid, that the teachers had a great need to maintain control over how the various tools were used. She felt that teachers rarely had joint control with the pupils.

All three pupils thought that the exercise programs were good, and that they helped them improve their reading and writing. Anton said that exercise programs should be fun and easy to use, but that they shouldn't be too childish. He said that the programs were often boring and unstimulating. "You get to know it by heart. You learn the first ten words correctly… then you just keep going."[67] (Anton)

Mats thought the exercise programs were dull, and said he had limited influence over the teaching. "You just do whatever you're told to do on the computer. It's not up to me, it's up to the teacher."[68] (Mats)

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66) Svärdemo Åberg (1999). Page 66.
67) Svärdemo Åberg (1999). Page 76.
68) Svärdemo Åberg (1999). Page 77.

All three had more faith in the computer as an aid in improving writing and spelling skills, than as a tool for improving literacy. According to Svärdemo Åberg, this may be because the computers had no voice synthesiser. Mats and Anton felt that they learnt to spell and write better with word-processing than with exercise programs. They said that with word-processing, they learnt to write, cut and paste text, and correct spelling errors:

"When I write I sometimes make mistakes, but the computer underlines it so I learn that it was wrong. It's harder to read on the computer because there's more light, it kind of dazzles you. It makes my eyes tired."[69] (Mats)

David preferred to work with exercise programs, and he felt that his motivation and concentration increased at the computer. Anton maintained that other media were just as important, and that secondary teachers did not make flexible learning possible: "I learn ever such a lot just sitting and listening to something interesting. Watching TV, hearing, and watching pictures. It's the same when the social studies teacher talks. You don't want to miss that, he's done so many interesting things."[70] (Anton)

Special needs teaching with voice recognition

Anton, Mats and David in class 7a and Jonas in 6c, were given the opportunity to work with DragonDictate – a voice recognition program – in their special needs classes. In the film, Berit explained that the software would make it easier for the pupils to produce text, and improve their spelling; that all text production would be done by speaking the text into the word-processing program. She said that the program was advanced, and that it took a long time to learn. First of all they would read out around 500 words to improve the program's ability to recognise their individual voices. As they did this the program practised its voice recognition, and Berit sat next to each pupil and spoke in whispers. They generally had to say each word one to five times. Mats was more focused than normal, and did not look away from the screen at any point. David on the other hand became irritated on several occasions when the program asked him to read again.

Anton practised reading text into Microsoft Word. He dictated from a book: Party – is – anything – but –a – silly… DragonDictate interpreted the Swedish word for silly *(larvigt)* as *jävligt* ('damn/bloody'), and no correct word was shown among the alternative suggestions. He therefore started spelling out the word, and after four letters *larvigt* came up as the first suggestion.

69) Svärdemo Åberg (1999). Page 78.
70) Svärdemo Åberg (1999). Page 79.

Berit was not present when Jonas was speaking freely into the computer. He talked about a film he had seen, and DragonDictate interpreted his speech well, although it did correct the occasional mistake: The – film – is – about – youngsters – in – the – USA – who – get – murdered. The word 'murdered' has a plural ending in Swedish (*mörd<u>ade</u>*) but was interpreted as singular (*mörd<u>ad</u>*). However, the suggestions list gave the right word as the second alternative, and Jonas continued talking uninterruptedly for the whole lesson.

David also spoke freely. He chose to talk about himself, as did Mats. However Mats found it hard to think of what to say, and had great difficulty structuring the content of the text. After 20 minutes of intensive effort, he was so tired that he had to stop.

Berit thought the program would be too hard for the pupils, who had already encountered enough adversity and had therefore become uncertain of their own ability. On playing back the filmed scenes, there was therefore discussion into the role of the teacher, but she felt that the difficulties in reading and writing ability made her support necessary, both in building the voice profile and in reading dictated words in the word suggestion list.

On many occasions the pupils could not see that they were writing a word incorrectly, and Berit believes that this could be compensated for with the aid of voice synthesis. The pupils would then be able to hear their writing and spelling mistakes. She points out that all the pupils had great difficulty both with spelling and in expressing themselves, but that DragonDictate made text production easier and helped them express themselves. She described Jonas and Anton as verbal, saying that they found it easy to talk about something they thought meaningful, but that because of spelling difficulties they were unaccustomed to using their language in written form. DragonDictate gave them this possibility. Mats and David also predominantly had spelling problems, but at the same time they had considerably lower linguistic ability, both verbally and in writing, so the program did not support them to the same degree.

Berit was full of admiration for the fact that all four had managed to maintain their motivation and concentration when working with the program. She also thought that Jonas would probably start using DragonDictate for essays, tests and written work before Mats and David. She emphasised the fact that the program had both compensatory and training opportunities. While compensating for spelling problems, it also trained spelling, grammar and creativity skills. She went on to say that the pupils used more difficult words and concepts than they would normally have dared. The way she saw it, the program trained up their simultaneous ability, as the pupils had to dictate words, check that the computer wrote the right word, select words from the suggestions list, enter commands and start spelling the correct word: "It's a training program, but also a compensatory tool. But

they don't realise that. It is a good way of practising writing, reading and spelling, without it being so laborious, sitting in front of an exercise program (…). In this form the pupils have to think continuously, making sure they get the right word forms and choose the right endings. This sparks off a lot of discussion about linguistic constructions, which they would never bother with otherwise. The writing process is where the real training takes place."[71] (Berit)

Anton, Mats and David found the initial learning phase dull, difficult and irritating. Jonas, on the other hand, felt that he had worked through the reading lists without any major problems. However, all four found the second learning phase very positive.

Jonas had shown a tendency to guess when he read: "It's hard to have time to see the words. And sometimes you get it wrong. There's… sometimes it says snoring, snore and snored, and you just read the first one because you're in a bit of a rush"[72] (Jonas). He also said that because the program is only available in the special needs class, he cannot use it in his other schoolwork. He would like it to be more accessible: "Then I could take time in breaks and after school, and sit and practise. And besides, I'm not only practising Dragon, but spelling as well."[73] (Jonas). He had this request in common with the other pupils, although none of them thought that the program could be used in groups with other pupils, when they would have to take turns writing.

All four pupils gave the same reasons for wanting to carry on using the program: it compensated for their poor reading and writing ability, as they became more aware of the fact that they had to articulate their words more carefully, and the content had to be structured and the texts corrected and edited before they could produce an acceptable written form.

Svärdemo Åberg conducted similar studies at a further two schools. At Åbäcksskolan school, two upper secondary pupils were given the chance to work with DragonDictate. In the filmed sequence, Stefan and Jimmy sat together. It was clear that the pupils could direct attention away from their own inability, to the shortcomings in the software. The way they saw it, it was not they who were getting it wrong, but they were having to make corrections and teach the computer. Their teacher Gunilla said that the program opened up a new world for pupils with good linguistic skills who had serious difficulties in writing and spelling. Her colleague Agnes also said that it is a question of balance for a special needs teacher to decide the right amount of training for a pupil, and to know when functional compensation should become part of schoolwork.

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71) Svärdemo Åberg (1999). Page 89.
72) Svärdemo Åberg (1999). Page 93.
73) Svärdemo Åberg (1999). Page 94.

Finally, Peter and Sofia, both year 7 subject teachers at Stuveskolan, said that computer-aided teaching could have been implemented far more quickly and become more universal among teachers, if school managers had issued more strict directives on the structure of computer use in education. They also felt that general accessibility and interest in computer use at the school was counteracted by the fact that the person in charge of computers showed a distinct and considerable resistance towards innovative thinking when it came to using computers.

Svärdemo Åberg's study indicated distinctly positive effects when computers with specially adapted software were used for these pupils in a conscious manner. Since then Lars Naeslund, in his report entitled *Att organisera pedagogisk frihet*, has studied what happened at a school in which every pupil was equipped with a portable computer: "The successful pupils advance like 'racing drivers', or at least sometimes.

They use all the abilities and characteristics required by the task, and avoid having to 'wait for' their less fortunate classmates," he says, and goes on: "For pupils with reading difficulties, their vulnerability reasonably increases if they (1) are subjected to written information more often than before (2) which is harder than before (3) without special needs teaching which enables compensation and helps them make up for their difficulties."[74]

This observation was only a comment aside. The same applied for the report *IT i skolan – mellan vision och verklighet*[75] compiled by professor Ulla Riis, who has made many previous assessments of computer use in schools. Riis says that she first encountered teachers who were worried that pupils in need of special support risked falling behind, in 1999. These same pupils had previously been described as the great winners. Riis said that "a few negative reports [are enough] to show that a fundamental and pedagogic problem exists. Perhaps also a political one."[76]

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74) Naeslund (2001), *Att organisera pedagogisk frihet. Fallstudie av självständigt arbete med datorstöd vid grundskola.* [Organising educational freedom. Case study of computer-aided self-study in compulsory schooling.] The Eve Malmqvist Institute for Reading (EMIR), Report no. 5.

75) Riis (Red) (2000), *IT i skolan mellan vision och praktik – en forskningsöversikt* [IT in schools between vision and practice – a research overview] (www). Taken from <http://www.skolverket.se/publicerat/publikationer/it.shtml>.

76) The ELOIS group report, managed by professor Ulla Riis, Swedish National Agency for Education 2000.

Access to alternative educational material

So what is the current situation as regards access to alternative educational material? In 2000, the SIH had SEK 74,704,000 for material production, and a further SEK 17,698,000 in income from their production. For its services for students in higher education, the TPB library had a grant of SEK 26,588,000 at its disposal, and SEK 48,000 in income. Demand for recorded material in higher education increased explosively in the 1990s. Today dyslexic persons are by far the largest group who use this service, which reflects the need in the rest of the education system.

According to the Swedish National Agency for Education, in compulsory schooling parents and teachers alike think it is very difficult for alternative educational materials to make a proper breakthrough. This despite the fact that the Agency's efforts did not cease once the three-year recorded book project was over. In 2000 the Agency paid out a stimulus of SEK 723,000 for recording educational material, and SEK 1,500,000 the year after that.

Publishing houses have often outsourced production to specialised companies, which in turn have on occasion received a grant from the Agency for Education. Quite often the reading-recording company Inläsningstjänst AB has recorded the books, still recording them onto cassette. Where demand has existed they have also produced them in DAISY format. However, starting in 2002 they began to record all new educational material in DAISY format as well, but not older material. The publishing houses do not promote these books in their own catalogues, but rather as footnotes referring to the Inläsningstjänst AB catalogue.

Recorded books are three to five times more expensive than the conventional printed book. The high price can be explained by the fact that the output is so low, between one and ten copies. However, there are 40 or so titles that have been granted funds from the National Agency for Education. One of these is *Religion och sånt* [Religion etc.] published by A&W. The publisher's price for the printed book is SEK 206, and Inläsningstjänst AB takes SEK 160 for the cassette book. However, there is no higher demand for the cheaper books than for the expensive ones, which is certainly due to the fact that the buyer – the teacher or school – is governed by which book the rest of the class is reading. The buyer is therefore not free to buy the cheapest recorded book if the pupil is to be able to keep up with the teaching.

Because pupils who require alternative educational material need both the printed book and the recording, the cost is often considered to be beyond the school's budget. In turn the publishing houses interpret this to mean that there is no demand, and the 'market's' interest in developing the products remains low.

Access to teaching aids varies nationwide, though very few pupils have access to anything other than standard equipment such as word-processing and the Internet. Far from all special needs teachers have access to voice synthesisers. Following a number of bankruptcies and corporate acquisitions, DragonDictate is currently not available on the market. What has happened, however, is that a new standard for talking books has emerged.

A table of costs for various representative titles:

Title	Stage	Publisher	Printed book	Cassette	DAISY
Hälso- och Omsorgskunskap (health care)	Upper Sec.	B. Urb	SEK 174	SEK 850	SEK 900
Sesam – Historia 1 (history)	Ages 10-12	A&W	SEK 104	SEK 480	SEK 530
Räkneresan X2003 (maths)	Ages 10-12	A&W	SEK 136	SEK 480	SEK 530
Språket lever (Swedish language)	Ages 10-12	B. Utb	SEK 100	SEK 280	SEK 330

DAISY

Alongside its remit of producing talking books and Braille books, as well as running a library service, the TPB's task also includes actively contributing to research in and development of new media for people with reading difficulties. It has done this with great success, particularly during the 1990s. Talking books previously recorded onto cassette are now produced on CD-ROMs in the DAISY format. DAISY is an internationally standardised format, which has been developed in Sweden by the company Labyrinten AB at the TPB's request. Talking books are no longer produced on cassette, and old productions will be transferred to DAISY format.

A special DAISY player has been required to listen to a disc, a player with a host of carefully considered search functions and other finesses. These players primarily take account of the needs of blind and visually impaired people, and are therefore more awkward than necessary for sighted people with reading difficulties. They also cost quite a lot, which means that only very few pupils with reading and writing difficulties/dyslexia have been given the chance to use them in schools.

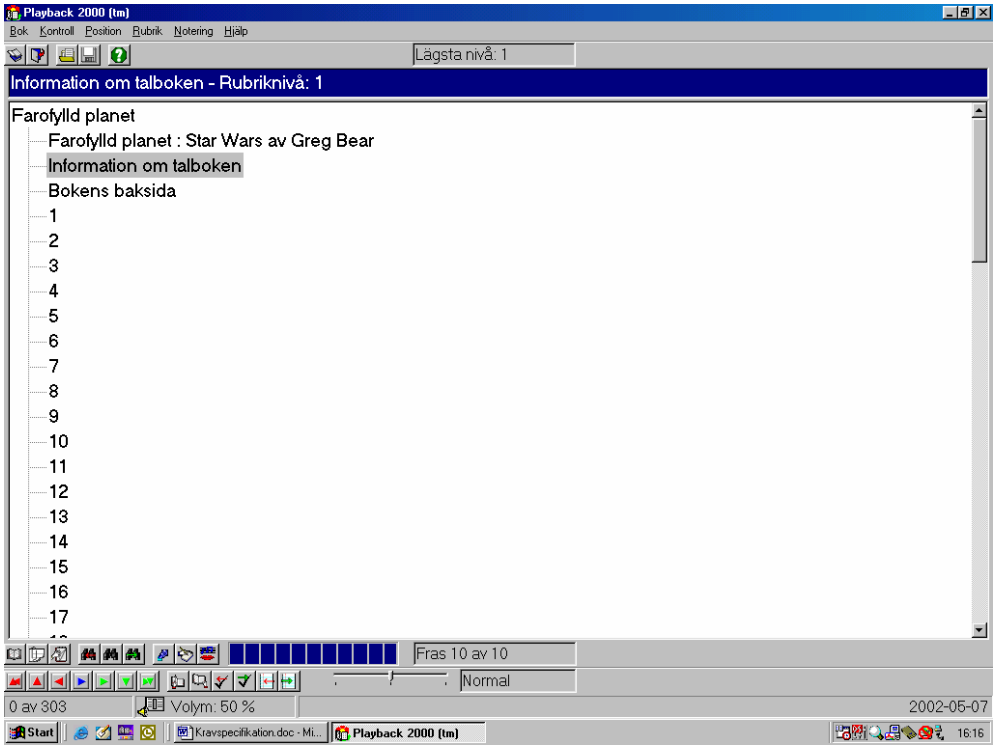
People without access to a DAISY player have been able to listen to the discs on their computer. The Playback 2000 program (a reader), which has been free to download from the TPB website, has managed to enable many of the finesses of the DAISY players. A list of contents and chapter numbers have been displayed on the screen, and the user has been able to move faster and more precisely than with the old cassette

versions. However, the user has not been able to search for text in the document, because the production of talking books is restricted by copyright law.

Summarising conclusions

The PISA study showed that many pupils in Swedish schools are unable to benefit from teaching in scientific subjects and mathematics (and therefore probably also in other subjects) and that this is largely due to poor reading comprehension. Immigrants and pupils with Swedish as their second language, as well as socially/culturally understimulated pupils, are vulnerable groups, as are those with poor reading comprehension, which is often due to difficulties with word decoding.

There has previously been no needs inventory of educational material based primarily on the group in question here. It has therefore been natural here to highlight the factors that may be of relevance to formulating such a specification of requirements. This examination should not be viewed as a criticism of work conducted to date: it has in all likelihood been relevant to known needs. However, by examining this work from a critical viewpoint we can now identify any gaps that need filling.



The computer screen shows a window in the program Playback 2000, indicating which chapter the reader is at. The voice reads, and the cursor follows, so the user knows which page is being played back. It is also possible to click on a chapter number so that the voice begins directly there.

Many of the conclusions in the specification of requirements are based on knowledge which has emerged within the FMLS and its various projects, including *Språka loss* [Accessing the Printed Word]. This knowledge has been generated in the forms of articles published on www.fmls.nu/sprakaloss, and in discussions with people researching and working in the field, within and outside the editorial team for the project. The conclusions are also based on the knowledge the FMLS possesses through its members, and through the information and advisory service the FMLS runs, called *Skriv-Knuten*. The service, which literally means 'The Writing Knot' in Swedish, has been compiling and distributing educational and technical innovations since 1986.

The government agency in Sweden responsible for adapting teaching to the needs of disabled persons has been the Swedish institute for disabled issues in school, now the Swedish Institute for Special Needs Education (SIT). However, their remit has not included developing educational material for this particular group. Nevertheless, while working on this specification of requirements, their expertise has been used, along with that of the TPB library, by conducting discussions with employees from the relevant agencies in a small reference group.

The Centre for Easy-to-Read, LL Foundation, has developed a style guide and working forms based on ability criteria, and today publishes a wide range of books, as well as the magazine *8 SIDOR* [8 PAGES]. It also trains writers in how to write easy-to-read texts. During the 1990s the Centre has been charged with expanding its target group to include dyslexic people, among others. Exactly what form this expansion takes depends in turn on how the target group is viewed, and how the knowledge generated through the FMLS is assimilated. The Centre for Easy-to-Read is therefore also involved in the editorial team and reference group for the *Språka loss* project. The Centre does not produce educational material, although part of their production is used for supplementary reading in schools.

The Swedish Agency for Education's trials with recorded educational material, and Eva Svärdemo Åberg's study into computer-aided teaching, support the idea that the primary aim for the group in question is not to simplify the intellectual level of the texts. The previously mentioned example of Jonas, a secondary pupil with severe reading and writing difficulties, could work with an educational material in social sciences designed for upper secondary pupils once he had the chance to listen to it. This and many similar cases indicate that the solution lies in offering different ways of assimilating information. The study also shows that access to alternative reading opportunities becomes more important the more 'pupil-active' the school's approach is.

When it comes to the language itself, there is much to indicate that the needs of this particular group differ from those of persons with global learning difficulties in some significant respects.

It is not a foregone conclusion to avoid abstract concepts, non-frequent words, synonyms or sentences with sub-clauses for this group. Rather it is about finding ways of using all this in such a way as to make it possible for the pupil to understand the meaning.

Using contextual parameters and varied language, while remaining observant as regards information density, inferences, causality and narrative style.

There is also a layout perspective which must not be neglected. The LL Foundation has gathered together a lot of expertise in this field, and it is relevant to this target group as well. However, here too needs can vary. Björn Wiman says in his piece *Skriv lättläst*: "Just as in language, our readers find it difficult to sort out foreground from background information, and distinguish what is important from what is unimportant."[77] Ellen – who in Svärdemo Åberg's study had serious reading and writing difficulties – on the other hand, learnt by looking at pictures and films. "Ellen found it easy to memorise and relate things she had seen in pictures and on film. Educational material with plenty of detailed pictures would help her."[78]

When it comes to text and layout, the same applies for normally gifted sighted people with reading difficulties as for all readers: a well-written text and good layout are fundamental. Experienced readers can tolerate more carelessness in this area, as they realise that the text and layout are poor. However, inexperienced readers, who often have low self-confidence, see it as a personal fault that they do not understand. Therefore the solution would seem to be not to write *simplified* text, but primarily to write *understandable* text.

Finally, the TPB's original target group – blind and visually impaired persons – especially in the 1990s have had to share a place with persons with reading and writing difficulties/dyslexia, whose needs are only to some degree similar to those of the blind and visually impaired. This has added a new aspect to the agency's remit: the DAISY format, which TPB was involved in developing, has a considerably greater potential than the TPB or the SIT are entitled to exploit, (due to the Swedish Act on copyright infringement URL § 17 Section 2). They are therefore unable to use the text in actual production, which would be a great step forward for our particular target group. Moreover, the TPB is structured around the book as a medium and the library as an institution, but the DAISY format can be used for all types of text, on CD-ROM, the Internet or intranets, and they can be used either for lending or the commercial market.

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77) Wiman, *Skriv lättläst* [Write easy-to-read].
78) Svärdemo Åberg (1999). Page 64.

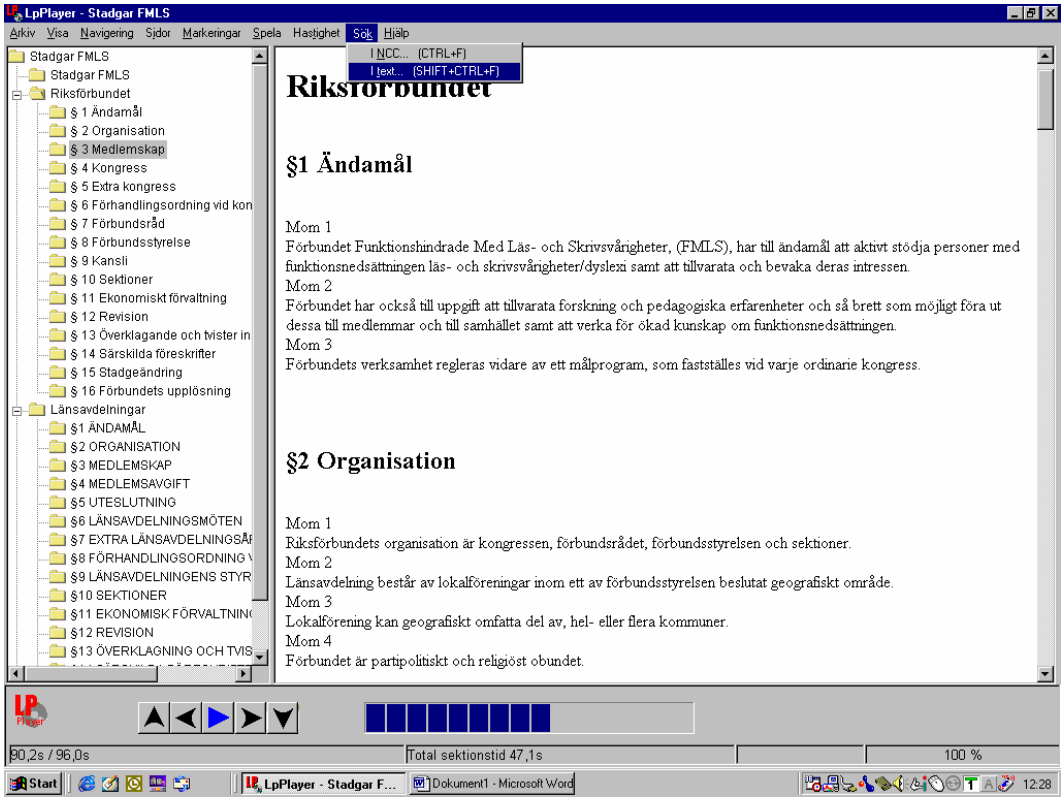
The resolution in the budget bill of 1993/94 – that alternative educational materials for pupils with reading and writing difficulties/dyslexia are to be produced by the relevant publishing houses – restricts the opportunities for the SIT and the TPB to fulfil the needs of users with reading and writing difficulties. The expertise and experience the TPB has built up in working with literature for higher education, particularly contact networks and distribution channels, has no counterpart in compulsory, upper secondary and adult education.

New technical possibilities

The institute which has adopted some degree of holistic perspective in the 1990s as regards technical development for pupils with reading and writing difficulties/dyslexia, is the Swedish Handicap Institute. In close collaboration with the Swedish Association for Persons with Difficulties in Reading and Writing/Dyslexia, FMLS, the Institute has supported various projects and inspired the co-ordination of interested parties. In the early 1990s, the Institute published a report entitled *Datorn och dyslexin* [Computers and Dyslexia]. The Swedish Handicap Institute then helped the FMLS to formulate a three-year Swedish Inheritance Fund project under the auspices of the FMLS. It aimed to inventory and disseminate knowledge about the consequences of computerisation in the workplace for people with dyslexia, and to spread knowledge of IT use within the Association. Further projects later followed to realise the use of IT within the organisation in practical terms. A website was set up in accordance with international accessibility regulations. It was evaluated by the company Nomos, both in the laboratory and via interviews, and the Association's central functions were computerised. This meant that the Association could contribute knowledge based on the group's needs as interest from other quarters grew.

The Swedish Handicap Institute and the FMLS realised the continued potential of the DAISY format. The FMLS had the company Roservo AB produce a DAISY book of the Association's charter, in which the text was also used. The production tool used was Lp-studio, which had been created by Labyrinten AB, the same company which established the DAISY standard, and the reading tool (the screen-reader) was called Lp-player. Lp-player was more advanced than Playback 2000, but it too was primarily designed for use by blind and visually impaired people.

The reader/listener has sound and text, along with a cursor that follows the text. It is easy to search for all the words used, add a bookmark and make one's own written or oral comments, even though these functions have distinct shortcomings relative to the needs of the target group.



The FMLS's charter in DAISY format. The left margin shows the statute's content under three main headers. Clicking on one of them opens the sub-header for each chapter. A cursor follows the text and shows which sentence or sub-clause is being read. Unlike the TPB's recordings and Playback 2000 reading software, here the user can search in the entire text.

The FMLS also produced a more advanced work together with the company MediaCuben: the training CD-ROM entitled *IT i föreningsarbetet* [IT in Association Work]. The study material also included pictures and films. The CD-ROM is based on the fact that there is after all a difference between written text and oral narration. Perhaps reading comprehension problems could be further compensated for using film clips, with different people talking about the content of the text in their own words. Therefore, the reading tool was set up to stop playing text at each film icon. The reader thereby had to make an active choice: watch the film or progress further in the text. Activating the reader in this way may help counteract concentration difficulties.

There is of course also the potential to use film in a more active way to portray phenomena and events when productions like this come onto the commercial market.

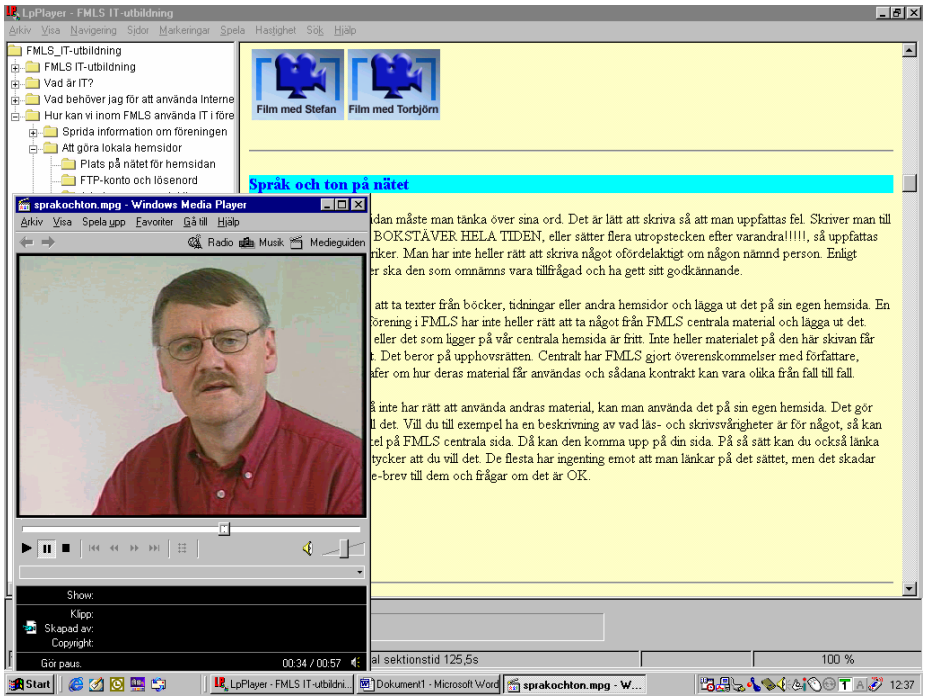
The market is emerging

The production and printing costs for the original Swedish version of the brochure you now have in your hand, The Educational Material of the Future, are in the region of SEK 145,000. For a further SEK 40,000 or so, we have been able to add a CD-ROM in DAISY format, containing

sound, text and pictures, as described above. This is a reasonable cost when spread out over the overall cost for the product. It is therefore fully possible to produce all educational material in this way, provided there is a clear demand, thereby assuring the economic viability.

Insert the disc into your computer and try it out. Ask yourself how much this would help you, if you had great difficulty reading in the conventional way. The disc also contains all the links to the articles mentioned. So the easiest way to access all the material is to use the CD-ROM.

In parallel with this, Labyrinten AB is also developing its production tools. The successor to Lp-studio is called Audio Publisher. In Audio Publisher, the text can be written directly in the program or imported from a text file (such as a Word document) or an HTML document. The material is automatically marked up in the specified way, after which the user is free to create the layout and adjust the automatic marking. The sound can be recorded directly by reading the text presented on the screen, or imported, or a technical sound file (voice synthesis) can quickly and easily be created from the text.



The FMLS IT training CD-ROM enables the user to listen to the text, have the sentence or clause being read out marked, and have the content narrated with film sequences.

At the same time the text is automatically adapted in accordance with the DAISY standard. Afterwards, the sound can also be edited to a varying degree of detail. Once production is finished it can be compressed into mp3 format, and everything is done on a standard computer, which means that the tool, launched in autumn 2002, will be able to be used by teachers and pupils in schools.

In the same way as the DBF blind people's association in the 1950s, the FMLS has initiated its own production in order to demonstrate the desired way ahead. The Association has received funds for evaluating and developing the products, and has applied for financing from the Swedish Inheritance Fund in order to further develop the reading tool, together with Labyrinten AB, so that it completely fulfils the needs of the target group, and so that it can be distributed very cheaply – or even free if possible.

However, as mentioned previously, DAISY is more than just a book or CD-ROM format. It is an international standard, which can already be used on the Internet. The educational material of the future will therefore be able to be distributed in different ways, and read in different ways too. For instance, a computer does not have to be used to listen to a DAISY book. Special DAISY players have been available, such as Victor, costing around SEK 8,000, meaning that very few pupils with reading and writing difficulties have had access to them. Philips, Samsung, Panasonic, Sony and others now sell personal stereos that can read CD-ROMs as well as ordinary audio CDs. They are special in that they can play back mp3 files. A book that may require *10 or 11* discs on an ordinary CD fits onto *a single* disc in DAISY format.

These personal stereos cost the same as other models of equivalent standard, in the region of SEK 2,000. They do not have all the finesses of a dedicated DAISY player, but the user can move backwards and forwards between chapters with simple button functions, and can add bookmarks. In autumn 2002 American company Telex is launching a player in the same price range, which is slightly larger than an ordinary personal CD player and twice as thick, but which has all the opportunities of the Victor, so that users can also move directly to a particular page number.

The conventional Victor DAISY player (left) alongside the Samsung personal stereo, which can play standard audio CDs and DAISY discs.

All of this opens up a new world of opportunities for pupils who have difficulties in reading, or who read slowly. They can listen to their schoolwork in the same machine as they listen to their music. If they then need to work with the book and use pictures and other graphic material, have words explained or search for a particular paragraph, they can insert the CD-ROM into their computer. This requires that the educational material is produced in DAISY format and that it follows international standards. However, a poorly written text is not improved

just because it can be played back in this way. Therefore, educational material must take account of the readers' needs as early on as the planning stage. The needs of this group of readers will also improve a text for experienced readers, and in this document's introductory section – the specification of requirements – we have described these needs in educational material and teaching.

APPENDIX

Dyslexia: terms, official regulations and approach

by Bodil Andersson, certified speech and language therapist

Does dyslexia exist?

In recent years there has been intensive discussion surrounding the term dyslexia. The debate focuses on how dyslexia should be defined, and as a consequence of this, who has the necessary expertise to examine and make diagnoses. The right to diagnose dyslexia is not regulated in the Swedish constitution. Examiners in the field currently encompass many different professions: educationalists, psychologists, speech and language therapists and doctors etc., each with their own specialist knowledge, terminology and professional frames of reference. More and more reading and writing professionals now recommend team examinations. A comprehensive assessment that can lead to effective measures calls for a wide range of different approaches.

However, perceptions diverge when it comes to the use of the term dyslexia in this context. Some examiners use the term liberally, while others are more restrictive. This difference is due to the fact that dyslexia refers to slightly different things for different people. The criteria differ between (and within) professional fields, and each person tests using different methods and varying materials. It is not unusual for parents with children who have difficulties in reading and writing to request a certificate of dyslexia, because they believe it will make it easier for their child to get help. Indeed this is sometimes the case, which explains why some examiners use the word dyslexia more readily.

Testers who use the word dyslexia more restrictively do so for different reasons. Either they regard dyslexia as a very rare phenomenon, or they do not like the fact that a certificate is sometimes required for a person with obvious reading and writing difficulties to get help. This may seem unjustified bearing in mind that there is no precise, universally accepted definition of dyslexia. These testers believe that it should be the person's impairment that governs the allocation of resources, rather than a specific term.

There are still those who question whether dyslexia (or specific reading and writing disabilities, translating Swedish terminology) exists at all, arguing that reading and writing development is primarily a matter of *maturity*. These same people are generally opposed to formal testing of people with reading and writing difficulties.

They believe that 'labels' have a stigmatising effect, and lead to self-fulfilling prophecies of failure. One of the strongest advocates of this view in Sweden is Bo Sundblad, who on his own website[79] writes the following:

A child who has difficulties in learning to read and write, is often termed dyslexic. Dyslexia is a biological explanation for a phenomenon which involves neurological damage in the child. The way I see it, the important thing is not whether the child has a problem, but how the child can be helped. Rather than wasting time and money on diagnosing the child, the school should instead initiate active efforts to develop the child's language. A doctor's certificate giving a diagnosis of dyslexia will not help the child's development towards becoming a good reader and writer one bit.

What does 'being able to read' mean?

The definition of dyslexia has long been a focus of debate on reading and writing in Sweden, yet still today there is no universally accepted definition. The term is hard to define, partly because it is hard to describe exactly what being able to read and write involves.

What does reading actually mean? A novice reader's faltering efforts – perhaps following each word with a finger – may be a kind of reading, but it is a far cry from the reading of a university student, who can speedily skim the back cover of a course book to assess whether or not it is necessary reading for an upcoming exam. The novice has a long way to go before he or she can use their reading skills in this way. The term reading encompasses word decoding, interpretation of content, and being able to progress in the tide of information. To date, most of the researchers into dyslexia who have studied reading have focused on the characteristic problems with word decoding. Most of the prevalent definitions include this problem.

The same reasoning can be applied to writing ability: we can either choose to limit the concept to spelling, or include the ability to *formulate oneself* in writing. Research in the field of dyslexia has so far primarily focused on spelling: far fewer studies have looked into the writing process on a higher level.

Moreover, it is not a given that the person with the most severe dysfunction in tests is the most handicapped in their daily life, as the consequences of having reading and writing difficulties depend on the demands placed on the individual. A person who can quite easily write personal letters and basic e-mail messages can become highly anxious

79) Internet address: http://www.bibo.se/dyslexi.html

when faced with the task of writing a formal letter, for example. There is a gap here between skills and demands, which may seem trivial but which can cause problems, for example if the person's job requires him or her to be able to compose formal documents.

I personally have met people who achieve very low results in tests, but who lead surprisingly well-functioning lives in any case. They have managed to develop their strengths and compensate for their reading and writing difficulties in various ways. At the other end of the scale, there are people who feel extremely bad because they find it hard to spell correctly all the time. This may for example be an academic considering resignation, because they find it terrible to subject themselves daily to situations where they may be 'discovered'.

Our ability to read and write is also linked to motivation, self-image, alertness, stress, the difficulty of the text, and so on.

Classic definitions of dyslexia

Classic definitions of dyslexia primarily put the focus on difficulties in connecting written symbols with sounds. Troublesome word decoding is viewed as a cardinal signal of dyslexia. The main cause of problems with word decoding is considered to be difficulties in understanding and analysing the sound structure of the spoken language, which is commonly referred to as 'poor phonological awareness'[80].

Professor Ingvar Lundberg at Göteborg University and his Norwegian colleague Torleiv Høien (1999), have formulated a well-known, widespread definition of dyslexia, which in essence is as follows:

Dyslexia is a persistent disorder of decoding the written language, caused by a weakness in the phonological system.

Another, oft-quoted definition is the following one, which in 1994 was adopted by the Research Committee of the International Dyslexia Association (IDA) and the National Institute of Health in the USA[81].

80) Phoneme = a perceptually distinct unit of sound that distinguishes one word from another in spoken language. The word 'ten' consists of three letters and three phonemes, while 'the' consists of three letters but only two phonemes: the 'th' sound and the 'e' sound.

81) Taken from <http://www.interdys.org/servlet/compose?section_id=5>.

Dyslexia is one of several distinct learning disabilities. It is a specific language-based disorder of constitutional origin characterised by difficulties in single word decoding, usually reflecting insufficient phonological abilities. These difficulties in single word decoding are often unexpected in relation to age and other cognitive and academic abilities; they are not the result of generalised developmental disability or sensory impairment. Dyslexia is manifest by variable difficulty with different forms of language, often including, in addition to problems reading, a conspicuous problem with acquiring proficiency in writing and spelling.

Both of these definitions describe an innate language problem, of which difficulties in word decoding are a cardinal symptom. This view is prevalent nowadays, but is not undisputed. Intensive research is under way, and dyslexia is a complicated subject, as reading and writing can be approached from many different perspectives.

Some researchers do not regard dyslexia as fundamentally a language problem, and therefore choose a broader or different definition. The discussion concerns what is part of the primary problem, and what should be viewed as secondary effects. Modern research has highlighted such problems as word retrieval and automation ('fluency') and wants to include this kind of area in its definition of dyslexia. Which aspects the term dyslexia covers varies, and it is therefore hard to make comparisons between studies.

Moreover, recent research indicates that different orthographies *in themselves* would appear to place varying demands on the reader's cognitive functions. English researcher Ian Smythe (2002) has recently written a doctoral thesis on the subject, following several years of study into reading and writing difficulties in such differing languages as Welsh, Chinese, Hungarian and Portuguese. He defines dyslexia as follows:

Dyslexia is a difficulty with the acquisition of reading, writing and spelling which may be caused by a combination of phonological, visual and auditory processing deficits. Word retrieval and speed of processing difficulties may also be present.
The manifestation of dyslexia in any individual will depend upon not only individual cognitive differences, but also the language used.

Definitions serve different purposes, and exist on different levels. It is important to distinguish between legal, scientific, clinical and educational definitions. The options reproduced here can be viewed as scientific definitions.

Relative consensus

Despite a certain amount of divergence, there is a relative consensus in the world of reading research when it comes to the core issues. It is agreed that there are characteristic writing difficulties which are due to genuine function impairments, and not to delayed maturity or environmental factors. Certain types of reading and writing difficulty may have a biological basis. People with reading difficulties have different brain activity when reading than readers without difficulties (Pugh et al, 2001). A genetic component is also involved (Olson & Gayan, 2001). Troublesome word decoding is the main characteristic of what most mean by dyslexia. The cause of word decoding problems is considered to be impaired phonological awareness (Høien & Lundberg, 1999; Snowling, 2000). The hypothesis that phonological awareness is also a *prerequisite* for good reading and writing development, especially in alphabetic languages, is hard to dispute since a host of studies have shown this (see e.g. Lundberg, Frost & Jörgensen, 1988).

A comprehensive evaluation of reading practice methods recently conducted in the USA[82], shows that weak readers who experience problems with phonological perception and word decoding require a specific type of training. Unlike other children, who appear to be able to learn to read and write regardless of the method, not just any method will do for these children.

It is therefore clear that difficulties with the written language could be founded in functional weaknesses; this cannot seriously be denied. However, how different functional factors affect each other during reading and writing is a complex issue. For example, there is a weaker link between word decoding and listening comprehension, than between word decoding and reading comprehension, since word decoding difficulties partly hinder reading comprehension[83]. One may have problems understanding text due to a difficulty in decoding single words in purely technical terms, or due to a failing working memory which is unable to process what is being decoded. The cause may also be a poor general linguistic comprehension – i.e. for the spoken language as well.

While there may be relative consensus on the core issues, there is no definition of *dyslexia* which is accepted or used universally. The boundaries are drawn in slightly different ways, so figures relating to the occurrence of dyslexia can vary from 2 to 10 per cent. Because there is also variation in how the term dyslexia is used *in different countries*, it is difficult to make international comparisons of occurrence figures. In Russia, for example, the term dyslexia is used to refer only to reading difficulties. Writing difficulties – including spelling as well as motor skills – are instead called dysgraphia. In Italy the term dysgraphia is only used in connection with motor writing difficulties, while spelling difficulties are called dysorthographia (Smythe & Everatt, 2000).

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82) Taken from <http://www.nichd.nih.gov/new/releases/nrp.htm>.
83) Lecture by professor Stefan Samuelsson, 9 August 2002.

It is difficult to generalise on research results from different countries and languages. Culture and the school system must also be taken into account, as well as factors such as when reading education begins. It seems untenable to claim simply that "reading and writing difficulties are due to the following…" without putting the statement in a linguistic context. A statement such as "Reading problems generally occur before the age of 7", which I have seen on an American mental health website[84], falls flat in Sweden, where formal reading practice does not *begin* before the age of seven. Who in Sweden would talk about reading difficulties in a 6-year-old? No one, because society does not expect literacy before the age of seven. This illustrates just how awkward it is to make global comparisons.

Who owns the issue?

The term dyslexia sometimes refers to a medical diagnosis (although we will soon see how unclear the health care sector's classification systems can be), and sometimes the result of a pedagogic assessment. The word diagnosis originates from the medical paradigm. It is therefore no wonder that many educationalists and others outside the medical sphere shy away from speaking of diagnostics, preferring to talk about assessments or charting analysis.

While other educationalists do use the term diagnosis, they use it to refer to something other than would, say, a clinical psychologist. Different professions use different test materials, and of course answers are only found to the questions asked. This makes it difficult to compare statements.

The world is a varied mosaic when it comes to dyslexia-related issues according to one of the editors of *The International Book of Dyslexia*[85], published in early 2003 and describing the current situation in over 40 countries. This variety not only illustrates the differences between different cultures and their view of disablement, but also reflects how professional education can vary in different countries. In Sweden, studies into reading and writing difficulties are conducted at speech-language clinics, reading and writing centres, and in schools. In the United Kingdom, for example, such studies of school pupils are usually

84) Taken from <http://www.mental-health-matters.com/disorders/dis_details.php?disID=56>.
85) The International Book of Dyslexia (2nd edition), ed. Smythe I, Everatt J & Salter S. London: Wiley publishing. Published in early 2003.

done by educational psychologists[86] (an occupational group not found in Sweden) in schools, and more rarely at hospitals. France and Italy have more of a medical perspective[87]. In France, any child suspected of having reading and writing difficulties has to be examined by a speech and language therapist.

In the United States, the term "Specific learning disability" (SpLD) is often used in dyslexia contexts, which is virtually a legal term as it is in practice linked to special needs education rights. According to the US's IDEA, the Individuals with Disabilities Education Act from 1997[88], SpLD is defined as a disorder in one or more of the basic psychological processes involved in understanding or using spoken or written language, "including conditions such as (...) dyslexia."[89]

Here in Sweden, the National Board of Health and Welfare is the supervising authority in the health care and treatment sector. It is the job of the Board to ensure consistently high levels of quality, safety and lawfulness throughout the health care system. However, the right to diagnose dyslexia is not regulated by the National Board of Health and Welfare, nor does it intend to enter the debate as to whose expertise is most appropriate for that purpose[90]. The Board maintains that diagnosis must not be decisive in the issue of whether or not measures are taken. Anyone with a disability and thereby needing remedial measures should be offered whatever he or she needs – rehabilitation,

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86) In England there are two ways of becoming an educational psychologist. To begin with one is either a qualified teacher with experience, or a Bachelor of Science in psychology. One then studies educational psychology for 1-2 years. However, those with a psychology degree must first take a Post Graduate Certificate of Education (PGCE) and work as a teacher for two years. In Scotland other backgrounds are acceptable, such as social work or speech and language therapy. (Sources: Dr Chris Singleton, Hull University and Dr Gavin Reid, University of Edinburgh)

87) Taken from "The rights of children with dyslexia in Europe", a study conducted by the EDA (European Dyslexia Association), reported by its President Alan Sayles at a lecture in Uppsala on 15 August 2002.

88) Taken from <http://www.ideapractices.org/law/regulations/regs/definitions.php#sec300.7c10>.

89) The full version reads: "Specific learning disability is defined as follows:
(i) General. The term means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia.
(ii) Disorders not included. The term does not include learning problems that are primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage."

90) Telephone contact with an employee of the Swedish National Board of Health and Welfare, 6 August 2002.

assistive technology or interpreter services – within the Swedish Act on health care and medical treatment. To a query from Uppsala University in 2000 on diagnosing dyslexia, the authority replied:

"(...) Dyslexia is a disability which can lead to varying degrees of handicap. Dyslexia can result from specific illnesses or various brain development disorders. Assessment of a dyslexic person requires expertise from the school system and the field of health and medical care, with a varying degree of specialist knowledge depending on the severity of the dyslexia, and on whether there are signs of illness.
The right to make diagnoses in health care and treatment is not regulated in the Swedish constitution. In general, diagnoses of this type are made by a registered doctor or psychologist, although in practice anyone with sufficient knowledge of such an illness or disability can make a diagnosis.
Moreover, there is no strict recommendation as to which diagnosis classification and therefore diagnosis criteria should be used. The competence to make a diagnosis should therefore be deemed sufficient also to consciously choose the diagnosis classification. (...)". (Translated from the Swedish original.)

"Sufficient knowledge" is of course a formulation that leaves plenty of room for interpretation in the field of reading and writing. What exactly is "sufficient knowledge" in this context? That of the psychologist? The speech and language therapist? The teacher? Who should decide this? Some people would consider that they have sufficient knowledge after a two-day training course, while others would maintain the complexity of the issue and hesitate to make a diagnosis, despite several years of experience and academic study in the subject. This is the flipside of a formulation based in all likelihood solely on common sense – the National Board of Health and Welfare does not regulate the right to diagnose appendicitis either.

It is also important in the context of this debate to point out that not all representatives of a particular profession have the same expertise. Specialisation does exist. There are, for instance, speech and language therapists who work exclusively with reading and writing issues; others who spend their days with patients who have swallowing problems or a child stutter; some psychologists have in-depth knowledge of the reading and writing process, while others work with juvenile violence or counselling. With this in mind, the sounder option would seem to discuss expertise rather than profession. It is also worth noting that in its answer to Uppsala University, the Board of Health and Welfare explicitly demands interdisciplinary collaboration for assessing dyslexia.

On occasion, people with difficulties in reading and writing are referred to an optician for vision correction. However, in Sweden opticians can only prepare, supply or deliver optical visual devices to children under eight and people with reading and writing difficulties/dyslexia following

instructions from or under the management of a doctor. This is regulated by the National Board of Health and Welfare[91].

International diagnosis systems

All types of diagnosis register must be considered dynamic documents. New knowledge is being added faster than comprehensive classification systems can be revised. Today there are two international medical statistical diagnosis registers, designed to be used in patient statistics: ICD-10 and DSM-IV[92].

The latest Swedish version of ICD-10[93] contains a series of diagnoses under heading F, relating to learning difficulties and developmental disorders. Section F81 relates to "Specific developmental disorders in learning skills". Sub-sections include *F81.0 Specific difficulty in reading* and *F81.1 Specific difficulty in spelling*. According to the directions, F81.0 covers problems with both reading and writing, while F81.1 applies only to spelling and writing difficulties. These conditions may not be due to "low mental age, problems with vision or insufficient schooling". What is meant by "low mental age" can be interpreted in two ways. Either it means that the diagnosis can never be applied to persons with global learning difficulties, or that a discrepancy criterion is imposed. Nothing explicit is said about this. Either of the diagnoses can be made if at the same time the diagnosis *R48.0 Dyslexia and alexia* can be eliminated. So how does that work?

Chapter R in ICD-10 covers diagnoses that are difficult to assess: The introduction states that "The categories in this chapter cover such less well-defined conditions and symptoms, which could indicate two or more illnesses with roughly the same degree of probability (…) and where there is no data for a final diagnosis". Section R48 is called "Dyslexia (reading difficulties) and other symbol dysfunctions not classified elsewhere". Section *R48.0 Dyslexia and alexia* is not usually used in connection with disorders due to congenital conditions, as these are categorised under the F diagnoses.

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91) Taken from <http://www.sos.se/sosfs/1995_4/1995_4.htm>.

92) DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, 4th edition, published by the American Psychiatric Association. The latest version was published in 1994. DSM-IV-TR came out in 2000, a text revision designed to update certain information as DSM-IV reflects the research situation in 1992. The next edition (DSM-V) will be published in 2010 at the earliest. ICD-10 = The International Statistical Classification of Diseases and Related Health Problems, compiled by the WHO. The latest English version is dated 1990. Some revisions were made in the Swedish translation, which was completed in 1997.

93) The Swedish title is *Klassifikation av sjukdomar och hälsoproblem 1997*.

On its website,[94] the Swedish National Board of Health and Welfare writes that the language of ICD-10 is not "binding for the formulation of the diagnoses given in patient journals or other medical documentation" – this means that there is room for interpretation, and this does happen: many areas of medical specialisation have formulated their own interpretations or their own practices.

The Board inspects and approves well-motivated, logical developments, and has for example approved *Svensk Foniatrisk-Logopedisk Diagnosklassifikation 2000* [Swedish Phoniatric-Logopedic Diagnosis Classification 2000]. In its specialised version, section F81 is "Specific learning skills disorder", and sub-sections include *F81.0 Specific difficulty in reading and writing/"Dyslexia"* (note inverted commas) and *F81.1 Specific difficulty in spelling*. The R diagnoses in this specialised version are headed as "Symptoms and illness signs of acquired speech and language disorders". Section R48.0 is here called *Dyslexia/alexia*. This version, unlike the main version of ICD-10, states that the conditions are acquired. This may seem odd, but it is not uncommon in aphasiology to refer to an aphasic's reading and writing difficulties as dyslexia. This clearly illustrates how widely the meaning of the word dyslexia can vary between specialist areas.

As an individual professional, one has an independent responsibility to follow "science and tried and tested experience". Anyone who feels wrongly treated or dealt with by a speech and language therapist, for example, can report the matter to the National Board of Health and Welfare's review board. This is intended as a guarantee for the patients. The professional must be prepared to defend his or her actions in the event of a report being made.

In Sweden, DSM-IV, the other international diagnosis system, is primarily used in psychiatry. The Swedish version contains such diagnosis names as *315.00 Reading difficulties* and *315.2 Writing difficulties*. The DSM-IV diagnoses presume that a difference between IQ and 'reading performance'/'ability to express oneself in writing' can be measured, but it does not state how great this difference must be. In practice, two standard deviations are often used. Depending on how great a discrepancy is required, the number of identified 'dyslexic people' will vary.

The criteria for *315.00 Reading difficulties* in the guide[95] most often used, read (in back-translation from Swedish to English):

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94) Taken from <http://www.sos.se/epc/klassifi/KSHinled.htm>.

95) "Mini-D-IV" (1995). The passage has been translated literally back into English from the Swedish version of "Quick Reference to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV)". The Swedish version was translated from the English by Jörgen Herlofson and Mats Landqvist. Publisher: Pilgrim Press.

A. Reading performance, gauged through standardised, individually conducted tests into reading skills or reading comprehension, is clearly below the expected level for people of the same age, with an equivalent level of intelligence and education in line with their age.
B. The disorder in criterion A considerably complicates school work or other activities that require literacy.
C. If a sensory disorder is also involved, the reading difficulties are more pronounced than expected.

The guide also states that reading aloud by individuals with reading difficulties is characterised by distortions, substitutions or omissions, and that both reading aloud and in silence are characterised by slowness and misunderstandings.

It is interesting to note that 'reading skills' in DSM-IV is used as a collective term for something which in reality can, and should, be divided into components, such as single word decoding and speed. It is even more remarkable that according to DSM-IV 'reading performance' can refer either to 'reading skills' or reading comprehension. This is because there is a closer link between general ability and reading comprehension, than between general ability and the ability to decode words (Vellutino et al, 2000). This is even more pronounced if one looks solely at verbal intelligence. If the reading comprehension value is used as a measure of 'reading performance', this means that even in theory, fewer people can fulfil the discrepancy criterion!

The American basic version of DSM-IV[96] states that assessments of reading accuracy, reading speed or reading comprehension can be used to signify reading achievement.

The following criteria are given for diagnosis *315.2 Writing difficulties* (once again in back-translation from Swedish into English):
A. The ability to express oneself in writing, gauged through standardised, individually conducted tests (or function assessment of writing skills), is clearly below the expected level for people of the same age, with an equivalent level of intelligence and education in line with their age.

96) "The essential feature of Reading Disorder is reading achievement (i.e. reading accuracy, speed, or comprehension as measured by individually administered standardized tests) that falls substantially below that expected given the individual's chronological age, measured intelligence, and age-appropriate education (Criterion A). The disturbance in reading significantly interferes with academic achievement or with activities of daily living that require reading skills (Criterion B). If a sensory deficit is present, the reading difficulties are in excess of those usually associated with it (Criterion C). If a neurological or other general medical condition or sensory deficit is present, it should be coded on Axis III. In individuals with Reading Disorder (which also has been called "dyslexia"), oral reading is characterized by distortions, substitutions, or omissions; both oral and silent reading are characterized by slowness and errors in comprehension."

B. The disorder in criterion A considerably complicates school work or other activities that require the ability to express oneself in writing (e.g. writing grammatically correctly or structuring a text).
C. If a sensory disorder is also involved, the writing difficulties are more pronounced than expected.

Parallel arguments relating to the term 'reading performance' can be made regarding this diagnosis. It is highly dubious to lump together all the various sub-components encompassed by the term 'ability to express oneself in writing'. Spelling is in itself a complex skill and spelling mistakes should be analysed qualitatively. Spelling is a different dimension of writing than expressing oneself in grammatically comprehensible sentences or taking the reader's perspective. DSM-IV does not take these nuances into account.

As demonstrated, the fact that diagnosis systems are international does not mean that the directives for their usage are unambiguous. Ultimately, it comes down to an individual's professional assessment and arbitrarily set boundaries. Moreover, there is always some alteration of meaning in translations between different languages.

The WHO's ICD-10 classification system is a list of *states of health* (illnesses, injuries, disorders) intended for use within health care. In 2001, the World Health Organization updated its classification system for functional conditions and disabilities. It is now called ICF[97] and is accepted by 191 countries. The Swedish translation has recently been completed and the National Board of Health and Welfare will be arranging meetings about ICF in autumn 2002. ICF focuses on how the person *functions* and does not mention dyslexia, although there is a series of codes for functions that are applicable in reading and writing contexts, such as the following (literally translated from the Swedish):

b16801 Reception of the written language
Mental functions for interpreting written messages in order to understand their meaning
b16811 Expression of the written language
Mental functions which are necessary in order to produce meaningful written messages

The WHO points out that a single disability may be due to a range of different illnesses or injuries, etc. There is therefore a link between ICD-10 and ICF – between states of health and functional conditions – and the systems should be considered in parallel. This reasoning would appear to be applicable in the world of reading and writing: difficulties in spelling, for example, can be due to a variety of factors (not just medical conditions) such as acquired or congenital brain damage, sporadic schooling or a different mother tongue.

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97) Taken from <http://www.sos.se/epc/klassifi/icf.htm>.

Criticism of the discrepancy criterion

As we have seen, a discrepancy criterion for a diagnosis entails being able to gauge a difference between two factors in tests. By international standards, relatively few reading researchers today advocate a definition of dyslexia based on a discrepancy between IQ and 'reading performance', for instance. For educational and psychological reasons it may of course be useful to ascertain an individual's ability profile in order to highlight any cognitive strengths and weaknesses, but this should not be confused with relating an *average* IQ level to crude assessments of 'reading performance' or 'ability to express oneself in writing' to establish a diagnosis.

The criticism against the discrepancy criterion is mainly based on the fact that difficulties in reading and writing appear at all ability levels (see e.g. Fletcher et al 1994, Stanovich & Siegel, 1994). As little as 10-15 per cent of the variation in literacy can be explained by differences in measured IQ (Høien & Lundberg, 1999). As mentioned before, general ability has a closer correlation with reading comprehension than with word decoding. There are people with high IQs who struggle with basal word decoding, just as there are people with global learning difficulties who are excellent at decoding (although they often have difficulties assimilating the content and more figurative meanings).

Researchers such as Flowers et al (2001) have shown moreover that IQ does not correlate to how children with reading and writing difficulties respond to educational measures.

Using a discrepancy criterion can also lead to awkward ethical standpoints. Emerson Dickman, an American attorney who specialises in the rights of people with disabilities and also vice president of the International Dyslexia Association (IDA) Board of Directors, expresses on his website[98] critical thoughts about having an education system where the right to special needs teaching is based on formulations that require a discrepancy between ability and skill, which is often true in many areas of the USA today. All definitions of this type in practice require that a pupil 'fails sufficiently' in order to have access to resources – the safest course being to stay on the right side of this arbitrarily set boundary in order to continue receiving special help.

In an article on learning difficulties which received great attention, Lyon et al (2001) also point out that a discrepancy cannot be measured with certainty before a child reaches the age of 9 or 10. If a child finds it difficult to read and write, special measures can obviously not be postponed while waiting for a sufficiently large gap between general ability and literacy to emerge – the school must help all children with

98) Taken from <http://www.emersondickman.org>.

reading and writing problems, regardless of the cause. If a certificate of dyslexia is required, this can however affect the younger children's opportunities for access to special needs teaching.

The world of education

Diagnostics are not part of the educational world, but rather the clinical world, and specific diagnoses are therefore not raised in the school charter. Obviously schools must ensure that all pupils who need help in developing their reading and writing ability receive it – no medical diagnosis should be required for this. This is in fact the very core of a teacher's task. However, it does not mean that the school should stop investigating difficulties and strengths.

Sweden's Education Act (Section 4, §1) states that 'students in need of special support' should receive help. The ordinance regarding compulsory schooling (Section 5, §1) says that headteachers are obliged to ensure that programmes of measures are drawn up for pupils who need special support measures. If there are special grounds, the teacher may when grading a pupil disregard individual goals that the pupil should have achieved. Special grounds refers to disabilities or similar (Section 7, §8). Nonetheless, the way in which the programmes of measures are drawn up does vary.

The formulation 'special needs' in the Education Act can, in my opinion, both help and hinder pupils. It can help if the school discovers characteristic difficulties, maps them and implements adequate measures – and happily this is often the case. However, it can hinder if the school fails to discover and recognise function impairments, and instead awaits 'maturity'.

In other words, the formulation 'in need of special support' is wide open to opinion and chance. One still occasionally comes across school personnel who think that a certificate of dyslexia has to be produced for specially targeted measures to be taken. There is nothing in the school charter which requires such certification.

In schools, it is most common for a special needs educationalist to conduct studies into reading and writing difficulties. The test material used varies, although testing of skills in spelling, reading, single word decoding, word comprehension and phonological awareness are usually included. At some schools assessments are carried out by teams comprising, for instance, a special needs educationalist, a psychologist and a school doctor, or sometimes a speech and language therapist connected to the school. In some cases the school does not conduct tests, but refers the pupil to the health care service. Some teachers seem to think they have to do this, using the argument that 'educationalists are not allowed to diagnose dyslexia'. In the most unfortunate cases, measures for children with reading and writing problems have been set

aside while waiting for external test results, and often the queues for health care resources are several years long.

In the issue of opportunities for computer aid, many children with reading and writing difficulties do not fall within standard social support systems. In an agreement between the state and county councils in 1984, the health care service assumed principal management and cost responsibility for assistive technology in an educational context. This agreement applied to certain groups of users – and the group with reading and writing difficulties was not mentioned. Consequently, county council judgements today vary in terms of who is encompassed by this agreement and which groups are entitled to personal assistive technology in accordance with the Swedish Act on health care and medical treatment. A typical example is the assessment of whether a computer should be regarded as basic school equipment (and therefore not the responsibility of the county council) or an item of personal assistive technology. All in all, this leads to differing conditions – and unfairness. On occasion a school may purchase equipment, and in a few cases the assistive technology centre has distributed computers and programs for school children. In some cases parents have ended up paying for all the equipment in order to resolve the matter. This is of course an unfair system if access to assistive technology comes down to whether or not a pupil has parents on a high income.

An inquiry into assistive technology has now been ordered by the Swedish government, and will be complete in September 2003. The inquiry's tasks include analysing the supply of assistive technology in an educational context taking into account the rapid development within the field of technology, reviewing the system of payment, and submitting proposals for constitutional amendments and other measures.

A correctly adapted computer is a powerful tool for a pupil who has difficulties with the written language. However, the computer must be adapted – a computer on its own is 'mute'. Good adaptation requires expertise from several different quarters. Of course, no one wants to see an anarchy-like situation where anyone who finds it difficult to spell claims their 'right' to a computer.

Once again, the important factor is that individuals in need have access to the right equipment. A detailed description of a person's difficulties and *how* a computer program would compensate for and ease those difficulties, should be an obligatory part of any basis for making a decision. This requires that the person preparing such a decision basis has in-depth knowledge both of computer programs, and of reading and writing difficulties. Logically, the school should be responsible for the tests, as this is where the actual usage will take place.

Colleges and universities

Swedish colleges and universities offer relatively good support to students with disabilities. The definition of disability used was recommended in 1993 by the Swedish academic congress of headteachers, and reads (translated from the Swedish):

Disability refers to a permanent or prolonged somatic function impairment. Documented reading and writing difficulties/dyslexia are placed on an equal footing with disability.[99]

The definition of the term disability is currently being discussed by Sweden's disability co-ordinators in the four regional networks within higher education. The point of departure for this discussion is the report entitled *För en öppen högskola*[100] which has been produced by a work group. The report proposes the following definition (translated from the Swedish):

The term disability refers to a permanent function impairment. This also encompasses documented specific reading and writing difficulties/dyslexia, remaining childhood neuropsychiatric disabilities, and documented mental health problems.

Almost half[101] of the undergraduate and postgraduate students with disabilities in Sweden who have contacted the co-ordinators for students with disabilities at one of Sweden's universities or colleges, belong to the group with 'reading and writing difficulties/dyslexia'.

In the 1990s, Sweden's National Agency for Higher Education began a trial with a specially adapted form of the university aptitude test for people with dyslexia. Anyone with reading and writing difficulties wishing to take the adapted form of the aptitude test must be able to produce a certificate that he/she has 'reading and writing difficulties/dyslexia'. The report made for this purpose must follow a specific template and answer specific questions, which focus solely on the ability to take the aptitude test. Spelling ability, for instance, is not assessed at all in this evaluation, as it is regarded as less significant in this context – the reading is the central factor.

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99) Taken from <http://www.sb.su.se/akademi-handikapp/oppetforum/index.html>.

100) *För en öppen högskola - om förutsättningar för studenter med psykiska och neuropsykiatriska funktionsnedsättningar* [For open higher education – on conditions for students with mental and neuropsychiatric function impairments]. Stockholm University report, March 2002. Produced by a work group, compiled by Ann Holmlid.

101) Taken from <http://www.sb.su.se/akademi-handikapp/oppetforum/sidor/statistik.html>.

In order to undergo an evaluation ahead of the university aptitude test, the student-to-be can turn to one of the test leaders on a list, which the Swedish Dyslexia Foundation has long been responsible for, as commissioned by the National Agency for Higher Education.

This approach has come in for some criticism, partly because no criteria are given for the people on the list, and because the price of an evaluation varies dramatically between different testers. A further complicating factor is that many experienced, recognised authorities in the field have for various reasons chosen not to appear on the list. It is unreasonable not to approve evaluations by such people, even though they are not on the list.

The National Agency for Higher Education's trial period was assessed[102] in 2001 and extended until spring 2002. In June 2002 the authority decided to make the specially adapted aptitude test a permanent feature. It has also been decided to appoint a group of experts to assess the competence of the certificate issuers, and to draw up criteria for such assessments.

Individuals can also request special consideration on applying for higher education, which means that a specific disability must be taken into account when dealing with applications. The applicant must prove his or her disability by including a certificate with the application. Also higher education students with reading and writing problems who require access to adapted computers on site, extended exam times, note-taking support and the like, must produce a certificate of 'reading and writing difficulties/dyslexia'. In practice, the list of testers for the university aptitude test has become the norm in these contexts as well, although it is not supported in the system of regulations.

The labour market

The traditional procedure within the Swedish National Labour Market Administration (AMV) is that reading and writing difficulties are evaluated by an industrial psychologist with special training in the area. Since 1992, the AMV has identified job-seekers with the occupational impairment 'dyslexia/specific learning difficulties' with a unique code in its administrative system. Before this code appeared, it was harder to judge how many of the job-seekers had these difficulties, as they were concealed behind other occupational impairment codes. The unique code was important for creating separate resources for the group with an occupational impairment related to the written language. According to National Labour Market Board statistics, 2,740 people had this code in June 2002, which corresponds to around 2.4 per cent of all unemployed and registered people with a disability code.

102) *Utvärdering av högskoleprov för dyslektiker* [Evaluation of the university aptitude test for dyslexic persons]/Therese Ahlqvist, 14 May 2001.

There are teams within the AMV that work exclusively with unemployed people who have reading and writing difficulties/dyslexia. Measures include special programmes for facilitating their return to the labour market. AF Rehab Stadshagen in Stockholm has a national co-ordination remit. The team consists of seven people working with method development, workplace alignment, training and other areas.

It is generally easier for people in employment to obtain assistive technology for reading and writing difficulties, than it is for children in schools.

A common solution is that the social insurance office and the employer share the costs of evaluation and equipment. From my own personal experience in this field, it is not a 'dyslexia diagnosis' that is usually required, but rather a good description of how the employee's difficulties *handicap him or her in the work situation*, along with an explanation of how specified assistive technology, in combination with training, could overcome the occupational impairment.

The health care system

Unlike in some other countries, in Sweden it is common for reading and writing evaluations to take place at hospitals, primarily by speech and language therapists, but also by clinical psychologists and more rarely by doctors. Qualification as a certified speech and language therapist in Sweden entitles that person to use the ICD-10 diagnosis system, which was described in the section entitled *International diagnosis systems*. However, the ultimate responsibility in the health care system always lies with a doctor.

Speech and language therapists usually test skills (spelling, single word decoding, vocabulary, reading speed and comprehension) as well as underlying sub-functions, which can help explain shortcomings which are visible on the surface in the form of poor spelling, for instance. Tests on e.g. auditory and visual short-term memory, word retrieval and phonological awareness may also be included. Both standardised quantitative materials and qualitative assessment foundations are usually used.

Most speech and language therapists are aware that most children who develop reading and writing difficulties have a history of delayed linguistic development in their pre-school years. This is why speech and language therapists also meticulously chart the oral and receptive language.

In some places, there is a 2-3 year waiting list for a speech-language clinic. It is not reasonable to let time pass while waiting for a school pupil to get an appointment with a speech and language therapist and possibly receive a door-opening diagnosis, especially if afterwards the

system is not in place to deal with the results of a reading and writing evaluation on home ground.

An alternative point of departure

Organisations such as the United Nations use normative instruments of different levels of importance. The strongest of these is the *Convention*, which becomes law in the countries that subscribe to it, while a *Declaration* is an expression of a political, rather than a legal, undertaking. A *Recommendation* is like a challenge to the member states.

The Salamanca Declaration[103], adopted by 92 governments and 25 international organisations at a UNESCO meeting in Spain in 1994, contains principles, guidelines and standards for teaching children and young people with special needs. The emphasis is on the individual and the teaching, rather than on diagnoses. The Declaration mentions that the education system should take into account the various interests, abilities and needs of pupils.

The guidelines also contains wording relating to individual differences (article 21), supplying extra assistance (article 31) and adequate teacher training (article 42).

Using the Salamanca Declaration as the point of departure in discussions concerning reading and writing problems puts the *needs* of the individual in focus, rather than the *diagnosis*. The question then arises as to how the education can be adapted to meet these needs. This is fundamentally a different starting point to trying to demarcate the precise definition of dyslexia. The Salamanca Declaration is not a law, and a lot remains to be done to realise the intentions inherent in the document.

The UN's Standard Rules on the Equalization of Opportunities for Persons with Disabilities[104] was adopted by the Assembly in 1993. In Sweden, the standard rules constitute an important foundation for working with disabled policy issues. Like the Salamanca Declaration, the standard rules are the expression of a standpoint, but from a legal point of view they are not equivalent to an act of law.

103) Taken from <http://www.unesco-sweden.org/PDF/ett01versiontva.pdf>.
104) Taken from <http://www.skane.hso.se/filer/FN.pdf>.

What does the FMLS say?

The following can be gleaned from the FMLS charter[105] adopted in 2001:

§1 GOAL Aspect 1
The Swedish Association for Persons with Difficulties in Reading and Writing/Dyslexia, FMLS, has as its goal to actively support those who have learning disabilities in these areas as well as to safeguard and monitor their interests. /taken from website/

In this goal statement, the FMLS highlights the fact that we are dealing with *disabilities* (and not, for example, with maturity or a second language background). The level of terminology is similar to that found in the WHO's ICF classification system, relating to functional conditions and disabilities, rather than health conditions. As a disability organisation, the FMLS represents "everybody in Sweden who has difficulties with the written language – children, young people and adults – regardless of the cause of the problem". The Association works to minimise the disabling effects of finding it hard to read and write, which is clear from its slogan: "The FMLS – makes it easier to deal with reading and writing difficulties". For the FMLS, formulating an exact definition of dyslexia is very much a secondary issue, even though the Association obviously assumes an active role in the debate.

In 1990, the FMLS was recognised by the National Board of Health and Welfare as a disability association entitled to state subsidy, and it became a fully integrated part of the disabled movement in Sweden. Contrary to what many people believe, the fact that the FMLS was recognised as a disability organisation did *not* mean that a definition of dyslexia had been agreed upon. The Association thinks that the term 'disability' is equated with the term 'diagnosis' in far too many contexts, which perpetuates misunderstanding and distorts the debate.

Concluding comments

Reading and writing are probably two of the most complex human behaviours. We master the art of reading and writing with differing degrees of ability, and only an extreme minority of people cannot read and write at all. It is clear that reading and writing difficulties can be caused by function impairment. The predominant dyslexia theory today is based on a hypothesis that the basic cause of dyslexia can be found in the phonological system, and that the problems are fundamentally biological.

105) Taken from <http://www.fmls.nu>.

At present, each referral body in society appears to have developed its own terminology, its own rules and regulations, and its own approach to dealing with reading and writing problems, which has resulted in a highly unclear situation. There would seem to be no communication regarding this between referral bodies. We wander freely between expressions such as dyslexia, reading and writing difficulties/dyslexia, specific reading difficulty/'dyslexia' and, as we have also seen, dyslexia/specific learning difficulties. Definitions and limitations vary. The people who suffer are always those who need qualified help, especially as a certificate is often required. A teacher told me about a job she was given, which clearly illustrates this. An adult student had two certificates, one from a doctor who diagnosed dyslexia, another from a psychologist who concluded that there was no dyslexia. It was now the task of the teacher to issue a final verdict. The body ordering the job requested the diagnosis, rather than details of the disability, which is unfortunate as the criteria for the diagnosis vary.

Let's now play around with the idea that everyone involved – the school, the health care system, higher education and the labour market – agrees to reserve the term dyslexia exclusively for cases in which word decoding difficulties and phonological shortcomings of some degree or other can be quantified. In theory this is completely feasible. But – and this is the most important question – how then can the dyslexia diagnosis be linked to remedial measures and resources? What happens to all those people with reading and writing difficulties who 'fall outside the framework' of our definition? There is no automatic link between what a test profile looks like, and how disabled or handicapped an individual is. Therefore, we can hardly claim that it is a more serious *disability* to have phonological reasons for shortcomings in reading and writing ability, than others. It is extremely important that these issues be considered today, when we see a tendency to demand a certificate of dyslexia (with or without various slashes and addenda) in order to mobilise resources.

Reading and writing problems must be put into a context to be fully understood. It therefore seems pointless to search for the precise, indisputable definition of dyslexia. Reality is so complex that it constantly throws up questions. In all likelihood we will have to learn to live with this, as in so many other contexts relating to complicated human behaviours. Whatever we do the boundary will be arbitrarily set, and the number of people identified as having dyslexia will vary depending on our choices.

However, we do need some kind of universal terminology to describe different function impairments that may lie behind reading and writing problems, in order to provide various referral bodies and individuals with a more thorough informational basis. Evaluation is certainly called for – not primarily to 'find dyslexics' but to understand what in each unique case causes and characterises difficulties with the written

language, and to provide qualified, individually tailored measures for *everybody* who has difficulties reading and writing.

A stronger link between evaluation results and measures is also needed – regardless of whether the person with the reading and writing difficulties has been diagnosed with dyslexia or not. The school system must help everybody who has reading and writing difficulties, with or without a diagnosis. There must be no watershed in the shape of the word 'dyslexia' here to hinder progress. In working life, it is particularly evident that observed difficulties must be viewed in relation to the environment, so that we can assess the degree of handicap and recommend training, compensatory strategies and technology.

All this demands expertise of the people who conduct the evaluations. They must ask the right questions, test the right aspects and be able to interpret, see connections and propose firm measures. If we place higher quality demands on the content of the evaluations, we may even create a self-cleansing system in the evaluation sector itself.

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The Educational Material of the Future

The Educational Material of the Future constitutes an initial attempt to bring together experiences from several different projects focusing on developing and testing various forms of reading and writing devices for people with reading and writing difficulties/dyslexia. The document contains a specification of requirements for educational material with an underlying needs inventory, as well as an Appendix entitled *Dyslexia: terms, official regulations and approach* by certified speech and language therapist Bodil Andersson.

Ungaifocus

Ungaifocus (Young People in Focus) is a project regarding assistive technology and its provision for children and young people. *Ungaifocus* encompasses dissemination of information, expertise development, needs analyses and support for product and method development. Approximately 60 projects in various fields have received support.

A three-year trial programme is being run within the county councils of Halland and Norrbotten in southern and northern Sweden respectively. The project is run by the Swedish Handicap Institute together with five disability organisations.

Ungaifocus is being financed by the Swedish Inheritance Fund, and will be completed in December 2002.

The Swedish Handicap Institute is a national resource centre on assistive technology and accessibility for persons with disabilities.

We work for full participation and equality for persons with disabilities by ensuring access to high-quality assistive technology, an effective provision of assistive devices and an accessible environment.

The activities of the Swedish Handicap Institute cover:
- testing and procurement of assistive devices
- research and development
- analyses of needs, knowledge and method development
- training and capacity building
- accessibility and design for all
- international cooperation
- information

The Swedish Handicap Institute is run by the Ministry of Health and Social Affairs, the Federation of Swedish County Councils and the Swedish Association of Local Authorities.

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Best nr 03326-pdf