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Possibilities and adaptation scope of test problems for blind students

Introduction

In the time of solving by students several competence tests, it is extremely important to provide equal access to them for everybody. Blind pupil or student must be provided with properly adopted and prepared in Braille tests, to solve test problems with success. Tests should not appear only in a case of an exam because blind persons should have possibility to perceive abilities of solving problems of the particular type earlier. It is necessary for tests, fitted in form and sometimes content to perceptual abilities of blind persons, to be the only tool of examining knowledge during the whole education process.

One should put attention on Braille writing and a tactile reading process specifics making adaptation. It is also worth to remember that a text printed in Braille requires three times more space than the same text printed in a black-print. British RNIB (Royal National Institute of the Blind) informs that it is necessary to write a text in a black-print, in capital letters, using Arial 24 point font, to imagine the space used by any Braille text¹.

The black-print Braille has been used for visualization of test problem adaptation. The black-print Braille is a kind of writing truly modelling the Luis Braille system. All principles of the system have been maintained in contrast black-and-white notation. Colourless, three dimensional dots have been changed into two dimensional black dots. High contrast between dots and a background has been obtained in the way which significantly facilitates identification of particular signs². The rule of reading in a black-print Braille is very simple and recognition of Braille signs much easier for a sighted person. Raised dots in a Braille sign

¹ Students – accessing course material, [[:] www.rnib.org.uk, 01.09.2006.

² Paplińska M., *System Louisa Braille'a – nie tylko dla niewidomych*, [in:] *Pedagogika specjalna – kontynuacja tradycji dla przyszłości*, red. Zabłocki K. J., Gorajewska D., Warszawa 2004, p. 117-122.

have been marked as big black dots. Inactive dots in a sign, so those which are not raised, have been marked as smaller, black dots³.

The Braille system and tactile reading specifics

Braille – the most popular, orthographic, convex dot character system for the blind. A code, which letters and symbols are written down in as signs including raised dots. The basis of the system and so called ‘generic sign’ is a Braille cell with average height 6.5 millimetres. Number of dots and their arrangement in a cell enables obtaining 64 combinations. Symbols signifying letters from ‘a’ to ‘z’ and punctuation, and supporting signs, which, despite some differences between system varieties in particular languages, have international character, are the base of the alphabet. Braille is an equivalent of the black-print for a blind person; it enables writing of more complex content in any notation, e.g.: music, mathematic, physical, chemical, etc.

Braille reading is fully based on compensation phenomenon. The phenomenon relies on take-over of one analyser, which had been totally injured, by another one⁴. Tactile Braille reading is usually performed by slight touch of a Braille text by index fingers of both hands. The dominating hand reads and another one takes a supporting role⁵. The correct method of using not only both hands but also fingers is extremely important for tactile reading. K. Fellenius emphasizes that one finger of a reader is dominating and usually it is an index finger of a right hand. Other fingers assist a reading finger checking what have been read, what is going to be read or for location of a next verse, while another hand is reading⁶. Although, a way hands are tracked is individual for every reader, cooperation and coordination of both hands is always important. The coordination enables maintaining orientation on a page, because when one hand reads Braille signs, a second one usually finds a next verse⁷. Correctness of particular Braille signs identification depends on the proper positioning and set-up of fingers. Too big

³ Paplińska M., Papliński P, *Using the LaTeX System in Teaching Seeing People the Black-print Braille*, [in]: *The European Conference on Modern Education Techniques for Blind and Visually Impaired Children*. Owińska 25-26.04.2003, Poznań 2003, p. 146-155; www.braille.pl, 1.09.2006.

⁴ Grzegorzewska M., *Wybór pism*, Warszawa 1989.

⁵ Kuczyńska-Kwapisz J., Kwapisz J., *Rehabilitacja osób niewidomych i słabowodzących*. Przewodnik metodyczny, Warszawa 1996, p. 127.

⁶ Fellenius K, *The Braille Beginner – A Constructive Learner*, The Educator, International Council for Education of People with Visual Impairment (ICEVI), volume XIII, number 1, Autumn 2001.

⁷ Witzak-Nowotna J., Paplińska M., *Checklist – a New Source of Knowledge about Skills Connected with Reading the Braille Alphabet*, [in]: *The European Conference on Modern Education Techniques for Blind and Visually Impaired Children*. Owińska 25-26.04.2003, Poznań 2003, p. 185-196.

angle between a plane of a page and fingers influences disadvantageously on development of reading abilities, because signs consisting of upper and lower part of a Braille cell are recognized incorrectly. The area of a finger pad, forced by big angle with a page plane (orthogonal configuration), is too small for perception both upper and lower points in a Braille cell⁸.

General rules of Braille text editing

The main rule of a Braille text reading is maximal increasing of its readability for the blind, taking Braille system specifics into consideration. Modification of complex sentences, consisting of several subsections including next subsections inside, is one of the solutions. The sentence should be divided into smaller ones, in that case. It deals with integration of content by a blind reader, mainly. In visual and tactile reading, processes of content integration do not happen at the same time for both ways of reading. Blind people are forced to more frequent integration of a read text fragment. Integration should be done at least within a phrase, to make a text understandable. Integration happens in a totally different way for sighted reader, because it is done just at the level of a sentence and even a paragraph, sometimes⁹. It is worth to remember that in a case of an exam, which has a vast source text as an element, it should be divided into numbered paragraphs. Such an enumeration makes quick finding of the proper text part easier for the blind. Indication of the proper paragraph number in an instruction, which is a basis for the answer, may be helpful¹⁰.

Text distinguished with a font typeface, e.g. italic or bold etc., is irrelevant for the blind. These are additional signs to be read, which sometimes make text perception more difficult. According to the E. Więckowska opinion¹¹, if text distinguishing is necessary and relevant for the content, the information on that should be provided in the instruction. The single word should be distinguished with the italic font sign then (put before and after the word), and the text fragment with two italic font signs before the first word and one after the last word of the distinguished text.

Adaptation of test problems for the blind – examples

⁸ Witczak-Nowotna J., Paplińska M., *Kwestionariusz oceny umiejętności związanych z czytaniem pisma Braille'a*, Niepełnosprawność i Rehabilitacja 2003, nr 3, p. 36-49.

⁹ Carreiras M., Alvarez C. M. *Comprehension Processes in Braille Reading*, Journal of Visual Impairment & Blindness 1999, No 9.

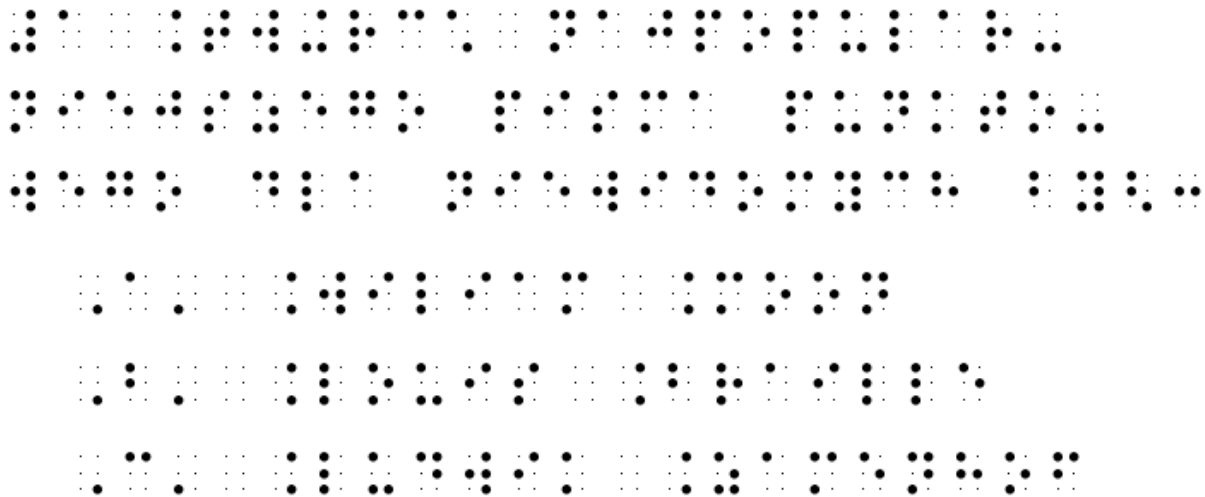
¹⁰ *Zasady adaptacji arkuszy egzaminacyjnych dla niewidomych i słabo widzących* s. Elżbieta Więckowska, Małgorzata Placha, Elżbieta Zakroczyńska, Agata Kunicka-Goldfinger, Łaski 2004 (unpublished), Łaski

¹¹ *Zasady adaptacji arkuszy egzaminacyjnych dla niewidomych i słabo widzących* s. Elżbieta Więckowska, Małgorzata Placha, Elżbieta Zakroczyńska, Agata Kunicka-Goldfinger, Łaski 2004 (unpublished), Łaski, p. 5.

Test adaptation in a black-print does not require complex transformations. It is worth to remember about a few significant elements, which are covered in an example test problem in the black-print, below.

1. Mark with a circle the correct answer. **The creator of the most popular dot writing for the blind was:**
 - a. Wiliam Moon
 - b. Louis Braille
 - c. Ludwik Zamenhof

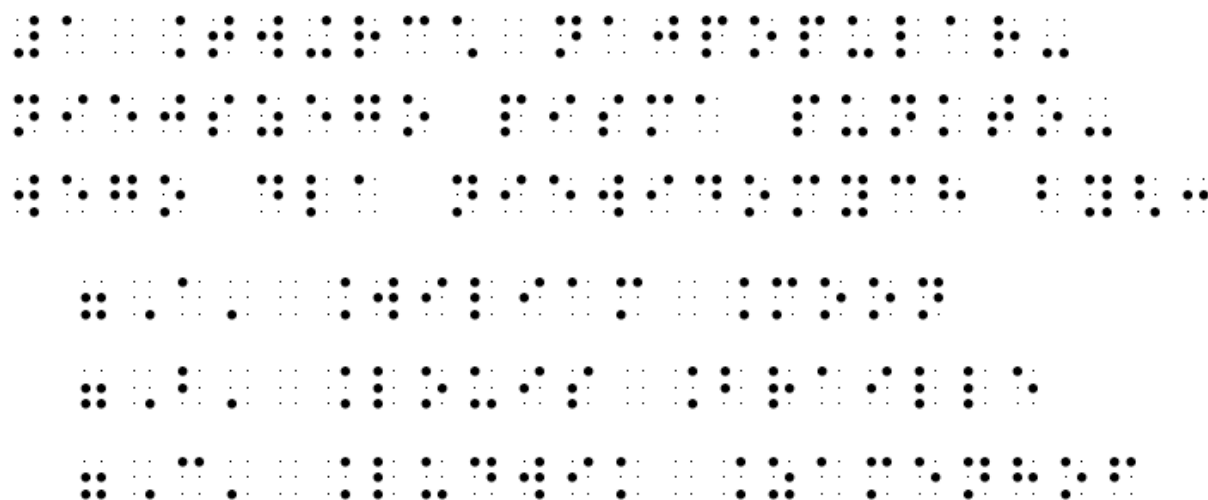
Information concerning number of questions and pages should be put in the first part of the test printed in Braille, before questions. If it is not an exam but periodical test of knowledge, information can be provided orally. Instruction *Mark with a circle the correct answer* should be removed when the question provided in the example is adopted to the Braille version. This is a result of the fact that it is possible for a blind person to mark an answer with a pen and, at the same time, he or she would not be able to read his/her own marks in a case of come back to the particular question. Besides, text should not be distinguished with a bold font in a Braille version, because distinguishing in a text is totally unnecessary and makes content perception more difficult. Clear marking of questions and answers with paragraphs instead is a significant enabler for orientation in a text (picture 1).



Picture 1. Test question in Braille (in Polish) (compiled by M. Paplińska).

Definition of a way of marking the correct answer is the most important information that should be included in the first part of a test. Youth and adults can indicate answers on a separate sheet of paper, signed with a name and surname e.g.: Jan Kowalski 1b, 2a, 3c, etc. Another way is blurring a conventional sign situated by every answer. The conventional sign

on the picture 2 is a tactilely characteristic additional symbol including dots 2, 3, 5, 6. Pupil/student rubs the symbol with a stylus for marking a correct answer. Exercises with marking a correct answer with a tack on a test that is pinned to a cork table, laying on a table before a pupil, can be proposed to younger children. The proposal makes sense when a teacher can check pupil answers without delay and when the test is completely pinned to the blackboard. Plasticine can be used instead of tacks. It is always worth assuring if a pupil/student has understood how to mark an answer, e.g. asking him for repeating.



Picture 2. The same answer as on the picture 1; modification by introducing a new conventional sign (including dots: 2, 3, 5, 6) preceding every answer (compiled by M. Paplińska).

English adage *Think with the fingertips not with eyes!* should be used during preparation of adaptation in Braille: tests, exercises, graphics. It concerns both form and content of texts. It would be unfair to check knowledge requiring reading information from convex graphics, which a blind person has never had under his fingertips before. If all graphics elements were accurately prepared in Braille and made convex, such a material would surely be full of tactile chaos, impossible for correct, holistic interpretation. That is why not everything should be in Braille. Some exercise in black-print, e.g. join into pairs with arrows, are aimless for a blind person. It is definitely better to replace them with e.g. a text with empty places to fill-in. In exercises for young children, it is better to mark a place to fill-in, with a word or letter, by e.g. pasted dot made of plasticine than a Braille line. Plasticine dots on a page are easier to be found than pointed line among a convex text.

Reading speed

Specifics of touch has negative influence on reading speed of a blind person. Research on tactile reading speed, which were conducted by many scientists, although differ between each other in results, but always prove that tactile reading is 3-4 times slower than visual reading¹². Average Braille reading speed of an advanced user is 90-115 words per minute (WPM) and average visual reading speed is 250-300 WPM¹³. Letters and words in visual reading are recognized in a whole at once during breaks of eye movements. A person do not look at a text letter by letter but rather at the whole structure of words and sentences, and perceives all elements at the same time. But in Braille reading, signs are read in a serial way, letter by letter¹⁴. It is worth to remember about slower, comparing to visual reading, rate of tactile reading and necessity of prolonging the time for solving the test.

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¹² Czerwińska M., *Pismo i książka w systemie L. Braille'a w Polsce. Historia i funkcje rewalidacyjne*, Warszawa 1999, p. 23.

¹³ Rosa A., Huertas J. A & Simon C., *La lectura braille*, [In:] *Psicologia cognitiva de la ceguera*, Rosa A. and Ochaita E (Eds), Madrid 1994, p. 322.

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Summary

Test adaptation in a black-print does not require complex transformations. It is worth to remember about a few significant elements like format, text editing and way of marking the correct answer. One should put attention on Braille system and a tactile reading process specifics making adaptation. General rules of Braille text editing have been presented in the article. The black-print Braille has been used for visualization of test problem adaptation.

Możliwości i zakres adaptacji zadań testowych dla niewidomych uczniów

Streszczenie

Adaptacja testów w czarnym druku na pismo Braille'a nie wymaga skomplikowanych przekształceń. Warto pamiętać jednak o kilku istotnych elementach, takich jak format i redakcja zadań testowych oraz sposób zaznaczania odpowiedzi, itp. Dokonując adaptacji należy mieć na uwadze specyfikę pisma Braille'a i procesu czytania dotykowego. W artykule przedstawiono zasady redakcji tekstu brajlowskiego, które zostały zobrazowane konkretnymi przykładami w brajlu czarnodrukowym.