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first name and surname of the evaluator

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school/centre

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position

Evaluation questionnaire **PlatMat BLIND STUDENT Tool**

The survey aims to help us determine a set of functions in the EuroMath tools.

Brief description: The PlatMat BLIND STUDENT application enables a blind student, who knows or does not know Braille, to work with a teacher or to work on his/her own on mathematical problems in the classroom, at home and via Internet, as well as efficient communication with the teacher in solving mathematical problems. The application creates opportunities for blind students in integrated classes to keep pace with colleagues without visual impairments, while in specialist centres - faster and more effective learning of mathematics. Blind student is being enabled to read formulas in a voice and on the Braille line, edit formulas in Braille notation¹ or in AsciiMath notation, using QWERTY keyboard or Braille keyboard. The editing of formulas can be supported by special touch gestures. It is possible to navigate the formula by using the QWERTY keyboard or touch gestures with simultaneous voice reading. It is possible to navigate through graphics (planimetric figures, function graphs) with touch gestures resulting in audio reading of graphics. The audio reading of graphics consists of synthetic speech with information on graphics and on its encountered elements, as well as generated sounds, modulated or with constant parameters. It is possible to navigate through the entire document with simultaneous information on the type of objects encountered in the document (result field, response field, commentary, graphics, question, answer) and with the semantic voice reading of the of the encountered formulas. Student can receive or send documents to/from the teacher or send them to via WiFi or the Internet. Student can conduct voice and text chat with the teacher, also Braille.

Possibilities of PlatMat BLIND STUDENT Tool:

1. reading with a NVDA screen reader a multimedia mathematical document containing formulas, graphics, and recorded comments;
2. reading semantic formulas with synthetic speech or on the Braille line;
3. student's access to exercises (documents) published by teachers on the portal;
4. edition of formulas relating to the exercise only in the result field, which prevents inserting the result in the incorrect places of the document, as well as erroneous modification of the text of the exercise;
5. arithmetic calculations in the exercise are supported by:
 - a) virtual cubarithms
 - b) a calculator with a voice reading of the expression
6. exercises of the pairing type, that can be simple tests (with one correct answer) have a special interface for navigating (through questions and answers to a given problem) which is accessible to a blind student;
7. edition of formulas and arithmetic calculations are possible both using the QWERTY keyboard and the Braille keyboard (physical or virtual on the QWERTY keyboard);
8. edition of formulas can be helped with:
 - a. AsciiMath editor using QWERTY keyboard
 - b. touch gestures on the touch screen;
 - c. semantic reading of formula elements with synthetic speech;
 - d. virtual Braille keyboard on the QWERTY keyboard;
9. navigation through the formula using the QWERTY keyboard, combined with semantic reading of formula's elements and voice information about the placement of the virtual navigation cursor, supported by

¹ Polish Braille Mathematical Notation (BNM – Brajlowska Notacja Matematyczna)

touch gestures, also combined with the possibility of editing, in Braille or AsciiMath notation, the indicated fragment of formula;

10. graphic visualization of formulas on the screen (facilitation for the teacher) resulting from student's calculations conducted in Braille;
11. graphic screen visualization of formulas (facilitation for the teacher) resulting from student's calculations in the AsciiMath notation using the QWERTY keyboard;
12. student's acoustic apprehension of on-screen graphics by touching the screen;
13. Braille and typhlographic printouts;
14. 3D printouts of geometric drawings and graphs of functions on a grid;
15. communication via Internet with the teacher - voice conversation, text chat, also in Braille, exchange of documents between teacher and student;
16. technical sounds ('audio-icons') that help student to be aware of the state of the application (opening of the application, opening and closing windows, including the window for editing the result, cubarithms, calculator, closing of the application);
17. program functions available via keyboard shortcuts;
18. navigation through the document analogous to web page navigation, enabling quick recognition of the type of content included in the document.

Please select the numbers of functions which in your opinion will not be useful for blind students in inclusive mathematics education in your country. We also ask for comments on how to increase the usability of given functions

Number of function	Justification of the lack of usability	Suggestions on how to improve usability

Additional remarks concerning on assistive ICT needs:

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Usability of the PlatMat BLIND STUDENT Tool

Please cross out the points with which you do not agree.

What does PlatMat BLIND STUDENT Tool offer to student and teacher?

1. **increased student's self-reliance in solving mathematical problems in a classroom** through
 - a) digitizing exercises and providing the possibility of learning their content on one's own – the formulas (read) and graphics (screened acoustically) regardless of the type of WE/WY devices used by the student,
 - b) the possibility of an on-going teacher's corrections student's self-reliance in solving the problem, thanks to visual monitoring of student's screen on the teacher's computer,
 - c) the possibility of self-reliant editing, listening to and correcting the formulas by the student.

2. **increased student's self-reliance in solving mathematical problems at home** through
 - a) digitizing exercises and providing the possibility of learning their content on one's own – the formulas (read) and graphics (screened acoustically) regardless of the type of WE/WY devices used by the student,

- b) possible, if necessary, remote help from a teacher/tutor having access to student's screen via the Internet,
 - c) possible, if needed, help from parents who can see on the screen the student's work in the graphical form of formulas - that is such that can be viewed by people with undamaged sight - regardless of the unknown by parents Braille notation or AsciiMath used by the student,
 - d) the ability to edit, listen to and correct formulas by the student on his/her own, and listen to the recorded or written explanations of the teacher read by synthetic voice,
 - e) the possibility to search and download by the student of additional helpful multimedia documents published on the www.platmat.pl portal by teachers.
3. **acceleration of student's work on mathematical exercises** through
- a) the possibility of a quick navigation through the structure of the document, during which student receives the acoustic information about the encountered elements of the document,
 - b) semantic reading with synthetic voice of whole formulas and their parts,
 - c) the possibility to navigate through the elements of the formula with simultaneous reading of the indicated elements and information on the location of the navigation cursor,
 - d) preliminary acoustic familiarisation with graphics, without the need for typographical printing,
 - e) accelerated navigation through the formula by means of touch gestures instead of keyboard (QWERTY or Braille) keys,
 - f) quick transfer to teacher, via WiFi communication, of the student's work done in the classroom, and via the Internet of work done at home,
 - g) the possibility of a quick response from the teacher, who can also help if necessary, after having remotely read the student's screen,
 - h) quick search for a document (one's own, sent by the teacher), e.g. by date, name, author.
4. **freeing the student from the necessity of using Braille devices** by
- a) the possibility of declaring preferred types of WE/WY devices in the application, e.g. QWERTY keyboard and reading with synthetic voice,
 - b) the possibility of temporary declaration, on a given lesson, of resignation from Braille devices and using the QWERTY keyboard and reading with synthetic voice (e.g. in case when the Braille keyboard was left at home).
5. **increased friendliness and better facilities for the student learning math** by
- a) using modern IT tools adapted to the needs of a blind student learning mathematics,
 - b) adaptation to the WE/WY devices preferred by the student,
 - c) working with an accessible mathematical document - accessible document structure (as on the website) and content (text, formulas, graphics, result fields, answers fields, questions, answers, comments),
 - d) semantic reading of formulas and navigation through formulas along with the reading of formula elements,
 - e) acoustic viewing of graphics for initial familiarisation,
 - f) facilitated interaction with the teacher and greater speed of interaction:
 - visual monitoring of student's screen; quick receiving of both, student's work by the teacher and exercises sent by the teacher to the student;
 - voice and text chat via the Internet;
 - teacher's indications of errors in the student's work with special recorded or text comments (read by synthetic speech), which make it easier for the student to quickly recognise the mistakes detected by the teacher,
 - g) the possibility of editing/modifying by the student, limited to special result fields, answer fields or cubarithms or else to text exercises of the pairing type, which prevents modification of the received exercise content or placing the results in an improper place of the document,
 - h) information provided orally about the current location (e.g. in the formula) or by technical sounds (audio-icons) on the situation in the application, e.g. an event - opening or closing the editing window.
 - i) the possibility of convex and 3D printing on one's own,
 - j) the possibility of using the available multimedia mathematical documents published on the portal as an additional help.

Summary of the usefulness of the PlatMat BLIND Student Tool

In the following summary, please cross out the points with which you do not agree:

- a) Possible greater involvement of the student and concentration on the lesson,
- b) Better social position in the (integrated) classroom,
- c) greater efficiency and effectiveness of teaching/learning,
- d) facilitated self-learning.

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date and signature