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Observation of HandiMathKey Appropriation Phase by Disabled Students in a Middle School

Frédéric Vella[a,*], Nathalie Dubus[b], Christine Gallard[b],

Cécile Malet[b], Véronique Ades[b] and Nadine Vigouroux[a]

[a]
IRIT, UMR CNRS 5505, Paul Sabatier University, 118 Route de Narbonne, 31062 Toulouse Cedex 9, France

[b]
ASEI, Jean Lagarde center, 1 Avenue Tolosane, 31520 Ramonville-Saint-Agne, France

Background: The mathematical input in text editors by disabled students is demanding both at the func-tional level (motor disorder) and at the cognitive level (attention, visual-spatial, memory) and generates fati-gability little productive and effective gain. To re-duce these demands, HandiMathKey, a mathematical keyboard software was designed by applying a user-centered method. The aim of paper is to report how different disabled students have appropriated Handi-MathKey in a middle school by an observation carried out by a multidisciplinary team. The hypothesis is that HandiMathKey can be learned and used by all students with disabilities.

Method: A team (one mathematics teacher, one oc-cupational therapy and one specialized education as-sistant) leads an interdisciplinary workshop to observe how the students accept and use HandiMathKey. This field study has started since September 2018 at the Jean Lagarde rehabilitation and education Center.The HandiMathKey was proposed to 23 students (19 with hand motor impairment, 3 with visual impairment and 1 other with dyspraxic and dysgraphic disorders) in three classrooms of middle school. Two classrooms use the HandiMathKey with the Microsoft Office editor, the third with the one Libre Office. Every three weeks for each class, a workshop takes place during the class time: the teacher introduces the HandiMathKey fea-tures corresponding to the mathematical concepts be-ing taught; then the students are invited to do mathe-matical exercises and the occupational therapist may assist them in getting to grips with the HandiMathKey. During the workshop two types of data are recorded: 1) notes of teacher and occupational therapist within re-flection diary; 2) activity log of the use of HandiMath-Key. After five workshop sessions the students are in-vited to reply to answer a SUS (System Usability Scale questionnaire).

Key results: This study confirms the interest of hav-ing a multidisciplinary team for observation and as-sistance in the appropriation phase of HandiMatHKey. We report the five observations of 9 students with mo-tor impairment. The students were all volunteers but during these workshops they did not seen the imme-diate interest of HandiMathKey. The students appropriate HandiMathKey due to the interface affordance. However, there is a need to learn how to use the LibreÂ-Office text editor. The typing with HandiMathKey and LibreOffice is similar to reading the mathematical forÂ-mula, which makes it more affordable for students with planning and visual-spatial difficulties. As the sessions progressed there is a greater participation of students.

Conclusion: This field study shows that the appropriÂ-ation phase of HandiMathey is necessary for students to agree to use it as an assistive technology. Another perspective is to analyze the typing speed and the error rate.

Keywords: Mathematical Virtual Keyboard, AcceptÂ-ability, disabled students, observation, education.

*Corresponding author. E-mail: Frederic.Vella@irit.fr