COMPENSATION OF DIGITAL COMPETENCE DEFICIENCY WITH SOFTWARE ERGONOMIC TOOLS

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ABSTRACT

In the contemporary digital world, a lot of information needs to be processed every day. Our security depends on the quick and accurate processing of this information. Figure-based information processing is faster and simpler than the text-based one. The level of IT skills and skills may be lower in this way, so a system that is applicable to a broader social circle is needed. The solution would be to make the use of info-communication tools accessible to people with low vision, those with learning difficulties, non-speakers, the elderly and children who are unable to read because of their age. In this article, the author attempts to illustrate the difference in the processing of visual and textual information through a simple survey and make recommendations for the ergonomic compensation of digital competence gaps with software.

KEYWORDS

CLASSIFICATION

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INFORMATION FLOW AND PROCESSING SPEED

The modern-day information transmission speed and rate in the last 100-150 years has significantly accelerated compared to the previous period [1]. In the previous period, mass media and information reached only a very narrow circle or significantly distorted information before it reached the people [2].

INFORMATION HUNGER OF A KNOWLEDGE-BASED SOCIETY

Here the focus is not on industrial societies, but on the knowledge-based, information societies. The principles of computer, historically put down by John von Neumann along with the creation of electronic computers (EDVAC, 1949), greatly contributed to modern spread of the informatics and information technology throughout our lives [3].

THE PROBLEM OF INFORMATION PROCESSING AS A SECURITY CHALLENGE

We have access to information in the visual and audio-visual form of the IT interface. We have the information in the form of text, images, audio and video [4].

Electronic devices that display information "communicate" with us. In other words, they expect a different decision in the form of messages to inform the user. The user's decision is executed in a predefined manner. These are usually called pop-up windows [5]. In order for the user to take his decision and issue the command given in the message, he or she needs to be informed [6]. The initial data is usually found in the pop-up window. This information is usually available in text format [7]. In a good case scenario, the text message will inform the user in the user's native language, but in other case in a foreign language [8]. It may also happen that although the user receives the information in his or her mother tongue, the user may not understand the terminology if he or she is not familiar with that level of knowledge or because that their general literacy skills are low or illiterate (e.g., preschool-age children) [9]. But they may also have reading difficulties, which is a common phenomenon at the present. It is also possible that in the absence of visual acuity (glasses, contact lenses), they cannot read the message [10]. In this case, the user cannot access or understand information contained in the data provided. This is a critical level security problem [11]. That problem is comparable to the problem of driving without understanding of the driving signs and traffic lights [12].

SOFTWARE ERGONOMIC SOLUTION OF THE INFORMATION PROCESSING PROBLEM

Software ergonomics standard ISO 9241 gives developers a point of reference in order to create an ergonomic system. The ISO 9241 standard is intended to promote the ergonomic design of a screen work and to ensure that screen operators can reliably, efficiently and effectively manage screen operations. ISO 9241 addresses the requirements and guidelines for the hardware, the software and the environment features that contribute to the usability and the ergonomic principles underlying them [13].

Stated security issues are challenges that need to be considered urgently. The internet is nowadays available to many people, since many of them have mobile or other devices that have access to the internet in some form [14].

TEXT MESSAGE VERSUS PICTOGRAM MESSAGE

However, for the users faced with the aforementioned problem, the vulnerability as a result of the improper handling of text pop-up messages, we should find some form of secure solution.

DEVELOPMENT OF THE TEST TASKS

The hypothesis is that, in contrast to pop-up text messages, the interpretation of pictogram messages is simpler in the case of a short reaction time. The hypothesis will be tested by conducting a research. The corresponding experiment consists of two phases.

I prepared a set of sample tasks that contain fictitious pop-up messages in a single text form (Figure 1), as well as the pictograms version (Figure 2). The task sequences were reserved for a single MS PowerPoint slideshow. The slideshows contain 10 tasks as described previously, with the difference that the tasks do not follow each other in the two slideshows. Each of the slides contains one task to be executed. The slides changed automatically every 5 seconds.
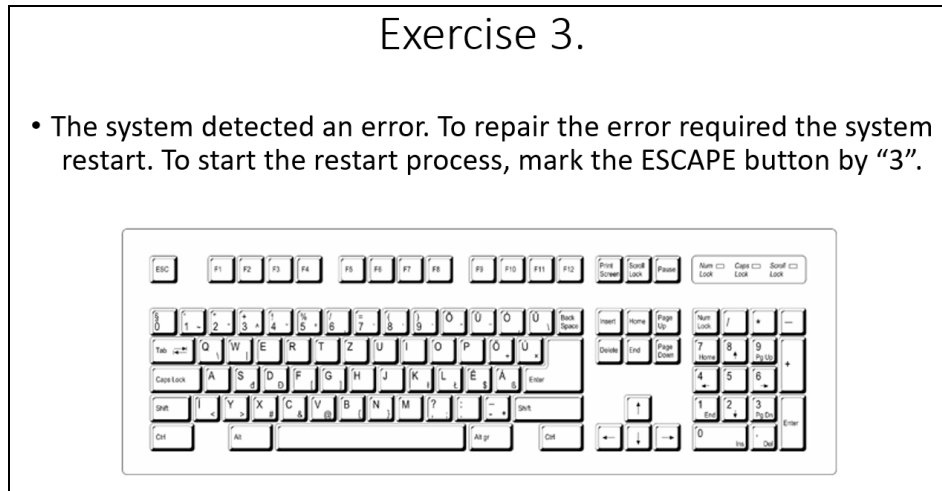

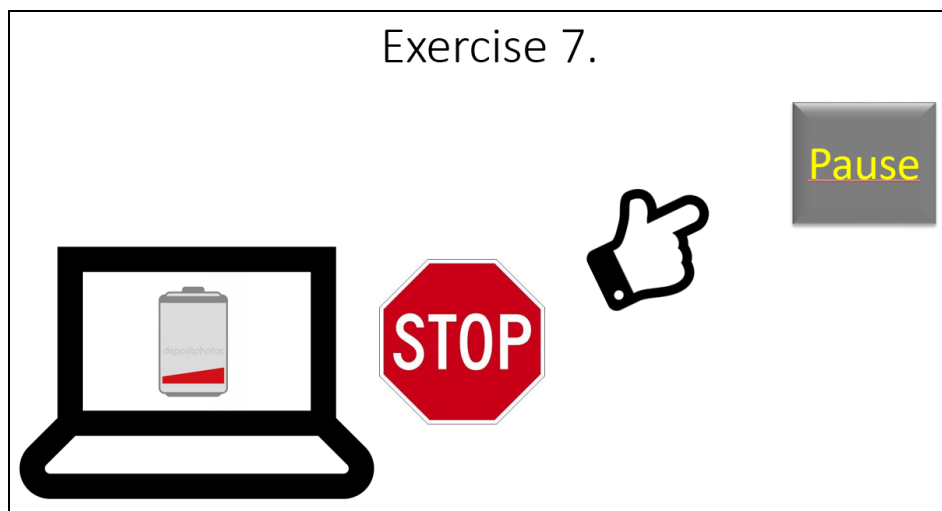**Figure 1.** One of the tasks of the text test.

Figure 2. One of the tasks of the pictogram test.

CONCEPTUALISING THE TEST TASKS

I prepared a paper-based worksheet for the task series, with a description of the task execution and a drawing of a computer keyboard (Figure 3).

In three out of the ten tasks, there is more than one option. For each task, a different key was assigned to the task executor in order to avoid the fact that the exact answer cannot be determined in evaluation. In the case of pictorial slideshow, if the attention or danger was presented, I used the pictures representing the road signs.
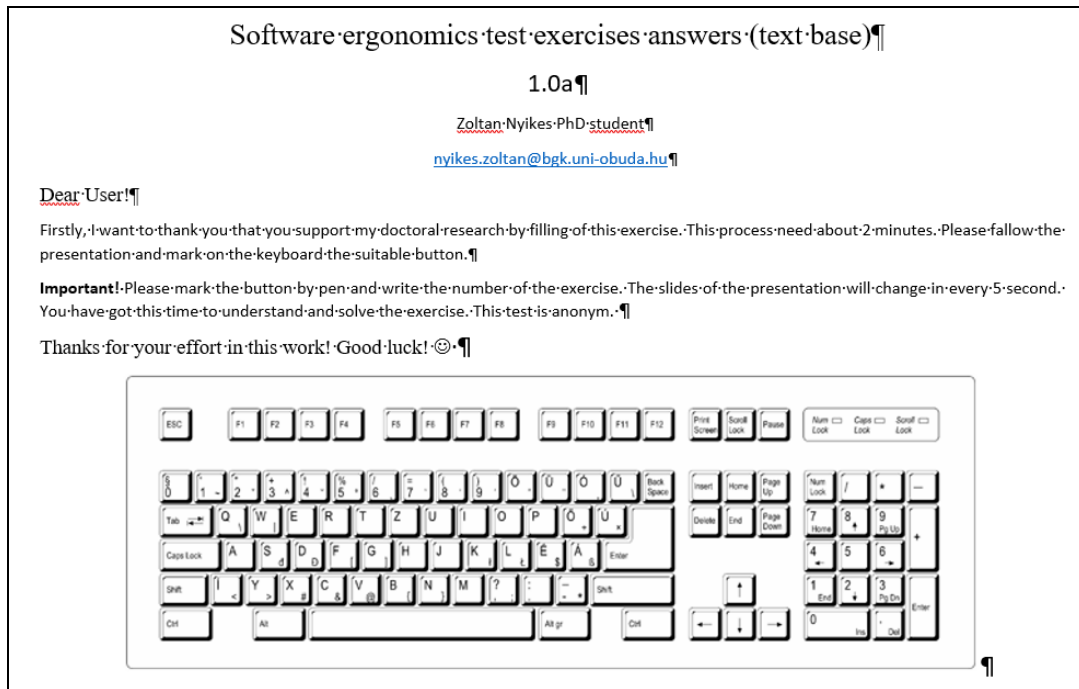
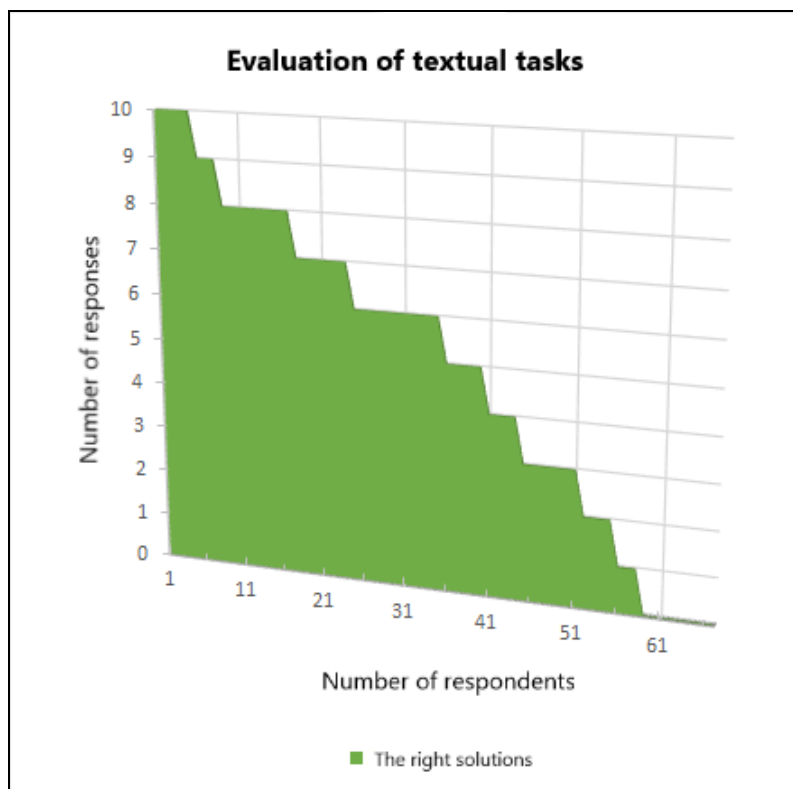**Figure 3.** One of the tasks in the paper-based worksheet prepared for the test.

Figure 4. Diagram of evaluation of the text task.

PERFORMING THE TEST TASKS

The preliminary experiment was carried out with 67 full-time and correspondent MSc and BSc student group. First, they had to execute the text queue and then the pictograms on a separate task sheet. 10 questions could be answered by 10 good answers. If there were more than one key in a task, but only one or only one combination of keys needed for the task, and the respondent had more than one option, I evaluated it as a mistake.
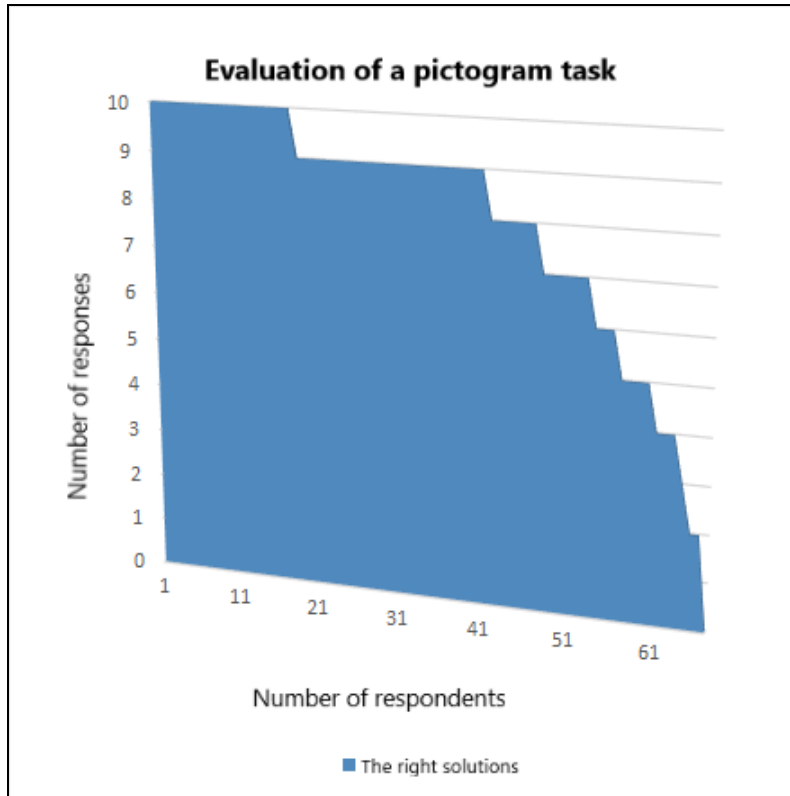
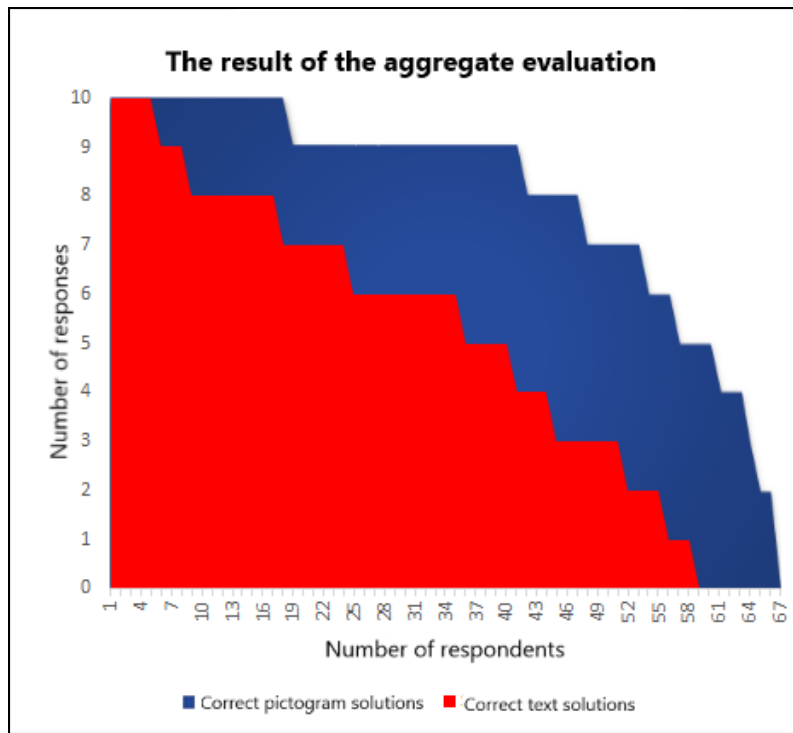**Figure 5.** Diagram of evaluation of the pictogram task.

Figure 6. The cumulative evaluation diagram.

EVALUATION OF THE RESULTS OBTAINED

In the case of the textual task (Figure 4), results of a minimum of 50 % and above were achieved by a total of 40 respondents, accounting for nearly 60 % of respondents. There were 9 respondents (about 13 % of respondents) who, for some reason, did not give any answer.

In the case of pictograms (Figure 5), a 50 % or more was achieved by 60 respondents, accounting for 89 % of respondents. Of the responses in this task type, one did not have any answers. It can be seen that there were 10 respondents who did not make a bad answer, accounting for nearly 15 % of respondents. From the cumulative results (Figure 6) of the textual and pictogram tasks, the results of the pictogram tasks were far better. Tasks could be performed in the same unit amount of time. This means that the text task was not understood as quickly as the pictograms.

CONCLUSIONS

This article developed a solution proposal that would be a safe, a short- and a mid-term approach to solving the user's security challenges in information processing and user response using software ergonomic. I took into account the current software ergonomic rules in developing pictogram test messages instead of the text messages. The evaluation of the test tasks shows that a significant proportion of users had a good solution of at least 50 % for pictograms, which was about 30 % more than the executives of the textual task. This difference contributes to proving the correctness of the stated hypothesis.

In my further research, I would like to propose the development of an online Emergency Aid Help Line, where the user can detect an attack on the Internet by using the help of a 7/24 Emergency Center in order to protect his/her infocommunication tools.

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