A person's intelligence limits their computer proficiency more than previously thought, say researchers

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A new study has found that intelligence, in the form of general cognitive abilities such as perception, thinking and remembering, is more

important than hitherto thought at predicting a person's ability to complete common tasks with a PC. The study was published in the *International Journal of Human-Computer Studies* in August 2024.

"Our research findings are the first clear proof that cognitive abilities have a significant, independent and wide-ranging effect on people's ability to use a computer. Contrary to what was previously thought, cognitive abilities are as important as previous experience of computer use," says Aalto University's Professor Antti Oulasvirta, who studied human-computer interaction extensively with his team.

The findings have implications for digital equality, say the researchers, because everyday user interfaces have simply become too complex to use. Practice alone is no longer enough, with intelligence becoming an equally critical factor in predicting performance in computer tasks.

"It is clear that differences between individuals cannot be eliminated simply by means of training; in the future, user interfaces need to be streamlined for simpler use. This age-old goal has been forgotten at some point, and awkwardly designed interfaces have become a driver for the digital divide. We cannot promote a deeper and more equal use of computers in society unless we solve this basic problem," Oulasvirta says.

The research was carried out jointly by researchers from the Aalto University Department of Information and Communications Engineering and the University of Helsinki Department of Psychology.

Age still the most significant factor

Test subjects belonging to different age groups participated in the study. They were given 18 different tasks, and the researchers observed how they performed. The tasks included software installation, navigation, use

of spreadsheets and filling in forms.

The estimation of cognitive abilities is based on a standardized and well-established measurement method in the field. This is the first ever study to measure users' actual ability to perform daily tasks on a PC, as previous studies have relied on participants self-assessing their abilities via questionnaire.

"We know that people may have a false sense of their own abilities, which is why it was important to measure how well they actually performed in the tasks," says University Lecturer Viljami Salmela from the University of Helsinki.

The study provided a wealth of new information about the most vital cognitive abilities. While the speed of processing is important in computer games, it is not emphasized in everyday tasks on the computer.

"The study revealed that, in particular, working memory, attention and executive functions stand out as the key abilities. When using a computer, you must determine the order in which things are done and keep in mind what has already been done. A purely mathematical or logical ability does not help in the same way," says Salmela.

According to Oulasvirta, there are also major differences between applications and user interfaces. "For example, the most important thing in using a spreadsheet program is practice, while linguistic capabilities are highlighted in information retrieval tasks and executive functions are emphasized in online banking."

"However, the research findings also show that age remains the most important factor in how well an individual can use applications. Older people clearly took more time to complete their tasks, and they also felt that the assignments were more burdensome," says Salmela.

More information: Erik Lintunen et al, Cognitive abilities predict performance in everyday computer tasks, *International Journal of Human-Computer Studies* (2024). DOI: 10.1016/j.ijhcs.2024.103354

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