Digital Media in the Classroom: Quality over Quantity

The use of tablets can boost pupils' willingness to learn – if their potential is maximised

Whether pupils benefit from the use of computer-based technology in classroom teaching depends less on the frequency with which it is deployed but rather on how it is integrated into the classroom environment. When used in a thought-provoking way or, for example, in a manner that encourages a discussion of the results, digital technology has the potential to positively influence the effort students put into learning. This was demonstrated in a joint study by researchers from the Hector Research Institute for Education Sciences and Psychology at the University of Tübingen and the Leibniz-Institut für Wissensmedien. They investigated whether the use of technology can positively influence pupils' willingness to learn and whether changes in learning behaviour are connected to both the frequency and quality of their use. The results were published in the journal Contemporary Educational Psychology.

In this context, the study showed that the outcomes differed across the subjects in which the technological tools were deployed. In maths lessons, students' learning motivation increased both in the short and long term if they perceived the use of digital technology as cognitively activating – regardless of the frequency of its use. In German language classes, on the other hand, the frequency of deployment turned out to be the decisive factor. Pupils' motivation to learn increased in line with the frequency with which they used tablet computers in class.

About 700 students in 28 seventh and eighth grades at 14 secondary schools in Baden-Württemberg were given tablets as part of the study. Teachers were asked to integrate them into their lessons but were not obliged to do so. Over a period of 16 months, both teachers and students were questioned about their experiences of using the tablets in class.

To determine how willing students were to make an effort, they answered questions such as '…I worked as hard as I could' or '…I tried to learn as much as I could'. The quality of the lessons was assessed according to the extent to which the students perceived their lessons as cognitively activating. For example, they were asked whether their teacher sometimes let them go astray with their assumptions in class and let the students recognise these aberrations themselves. Regarding the frequency with which computer-based technologies were used in maths lessons, the research team did not find any positive correlations with changes in students' academic efforts. However, the more cognitively activating they perceived the lesson to be, the more positively their willingness

to make an effort changed. Moreover, girls showed a more positive change in their effort than boys.

'As with any other medium, it appears that the decisive question concerning the use of technology for a productive learning environment is not whether technology is or isn't used in the classroom, but rather how it is integrated to create a high-quality lesson', explains Tim Fütterer from the Hector Institute, the lead author of the study. One reason why the frequency of use proved to be more significant for academic effort in German classes could be due to the novelty effect since technology is used less frequently in this subject. The novelty effect involves a brief yet fleeting increase in attention. 'A potential explanation for the subject-specific variations could also be that mathematics teachers tend to be more tech-savvy – we see this in our data. A third explanation might be that there are simply more suitable software applications for teaching maths', Fütterer adds.

'Digital media can achieve lasting effects if their learning-related potential is fully exploited. Dynamic and interactive visualisations in multimedia learning environments, for example, can illustrate phenomena in a way that allows them to be processed more deeply', explains Professor Katharina Scheiter from the Leibniz-Institut für Wissensmedien. Multiperspectivity is also an added value of digital technology. It allows topics to be examined from different perspectives, ranging from science and journalism to posts in discussion forums, for example. Moreover, e-learning tools are already able to address the differing needs of individual students.

Prof. Dr. Katharina Scheiter/©IWM Tübingen, Paavo Ruch

Having said that, Germany still lags far behind in international comparison when it comes to the digitisation of schools. As recently as 2020, almost ten pupils had to share a single digital device, compared to less than two in the US. Moreover, teachers feel inadequately prepared for teaching with digital technology. 'A didactically valuable use of digital media in the classroom, however, presupposes that teachers possess adequate knowledge of educational technology', says Tim Fütterer. Therefore, such knowledge must be incorporated into the education and training of teachers in a manner much greater than has been the case up to now.

Original Publication:
Fütterer, T., Scheiter, K., Cheng, X., & Stürmer, K. (2022). Quality beats frequency? Investigating students' effort in learning when introducing educational technology in classrooms. Contemporary Educational Psychology. Advance online publication.
https://doi.org/10.1016/j.cedpsych.2022.102042

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Das Leibniz-Institut für Wissensmedien (IWM)

The Leibniz-Institut für Wissensmedien (IWM) in Tübingen investigates how digital media influences knowledge and communication processes. Foundational and applied research focuses not only on institutional learning fields such as schools and universities, but also on informal learning on the Internet, at the workplace, or in museums. At the IWM, researchers from various disciplines work together, with many colleagues coming from the areas of psychology, communication science, neuroscience, and computer science.