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The role of digital technology in schools in France

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Abstract: This article discusses the contributions of digital technology within the school environment in France by comparing numerous myths circulating in this field derived from research: increased motivation and autonomy of students, more active learning, a response to specific needs... does digital technology really enable all of this? What's teachers' attitude towards digital tools? It turns out that the answer to these questions is mixed, with education still far from having completed its "digital revolution". Digital tools indeed boost student motivation, but the impact is modest. Research suggests students may be overwhelmed, find it too demanding, or misuse interactive features. Digital technology's promise of autonomous learning is also challenged. Offering resources alone doesn't guarantee engagement, with attendance and motivation playing crucial roles. Digital tools benefit students with disabilities in various ways, but the effectiveness of some interventions remains moderate, highlighting the need for ongoing research and replication. When it comes to teachers, their use of digital tools varies from subject and type of task, and only when the use has added value.

1. Introduction

We will examine the contributions of digital technology within the school. We will try to identify the potential added value of digital tools in classrooms: what do they bring to teachers for better teaching and to students for better learning? One difficulty in this field is related to the fact that many "myths" are freely circulated, unfounded claims, sometimes even accompanied by a "everyone knows that..." These assertions can reflect strong beliefs in the virtues of technology and hopes for an improvement, or even a revolution in pedagogical situations. Therefore, we propose to confront some of these claims with the current state of knowledge derived from research.

2. The role of technology in schools

2.1. Digital technology improves student motivation

Anna Potocki and Eric Billottet conducted a survey of 979 teachers from the academies of Poitiers and Toulouse regarding the teaching of French[1]. Among these 979 teachers, 946 agree with the statement: "with digital tools, students are more motivated." The analysis of the literature in the field allows us to identify different reasons that put forward for this motivating effect: the generation effect (they grew up with it, that's why they like it); the "fun" effect (digital is playful); the animated effect (it's dynamic); the interactive effect (digital makes the student active, they manipulate and explore content).

Overall, when students are surveyed, the motivation effect is confirmed, but in a nuanced way[2]. The gain in motivation is significant but relatively low, the "fun" effect is rarely achieved, and tools that are genuinely fun (such as video games used at home, for example) are comparably much more so than those used in the classroom. The weakness of the motivation gain has a significant consequence: it is not with digital tools that we "remotivate" those demotivated students. Another more important levers exist to improve students' motivation: designing tasks adapted to the level and needs of students, promoting awareness of individual progress, diversifying tasks, working on the perception of the usefulness of the knowledge taught as well as teaching methods[3][4].

2.2. Digital technology leads to a more active learning

One key to the success of school learning lies in the cognitive engagement of students: they learn when they reflect, ask questions, try to understand, and make hypotheses. For example, students learn better when they make efforts to deeply understand the text which they are reading rather than reading the same text superficially. Teachers can have an impact on this aspect of learning, such as asking their students to write a summary of the text or collectively synthesize it. Digital technology has often been presented, in this case, as a promoting tool in a more active learning.

Indeed, multimedia documents allow the presentation of rich content in various formats (text, images, sounds, animated images) and in an interactive way (students choose their path based on their interests). Students are therefore expected to be more cognitively active than with a paper document. However, research in the field shows that sometimes students are overwhelmed by the informational richness of these digital materials; there is too much content to process and relate.

In attempting to make learning active through a tool, there is a risk of making learning inaccessible. Interactive materials, where students must choose their path, where each mouse click results in displaying different content, also run the risk of making learning too demanding. This is also the risk caused by "serious games," which, in seeking to engage students more, may divert them from learning: it is observed that sometimes, in the end, students have played a lot but have not learned any academic knowledge. Finally, there are cases where students use various functions of the tool, manipulate objects on the screen, without engaging the necessary mental activities for learning. For example, a student's interacting with a video by pausing and rewinding does not mean they understand the content of the video. Finally, digital learning environments are sometimes so difficult to use that students spend more time or cognitive efforts on learning how to use the tool than learning academic knowledge.

2.3. Digital technology promotes students' autonomy

In higher education in particular, but also in secondary education, a persistent belief exists: thanks to digital technology, students can learn what they want autonomously and remotely. In reality, although this perspective is extremely widespread (it has supported the development of a significant portion of e-learning and massive open online courses or MOOCs), it can be characterized as naive. A resource, even of high quality, is available does not necessarily enable autonomous learning. To learn on one's own, not only a strong motivation is required, but also significant qualities in organizing one's time, planning, and regulating one's learning. In short, one needs to be autonomous in their learning, while most individuals are not.

In a remarkable study, Edwards and Clinton examined a limited aspect of autonomy[5]. They focused on the impact of providing lecture videos to 160 undergraduate students in science (compulsory course). Students had the choice, for certain lectures, to either watch the video or attend the class. The results show that when the video is available, students attend class less. The students who still attend class achieve better results in the assessment than those who watch the lectures on video.

When it comes to what students do, the authors noticed that 28 students (out of 160) neither attend class nor watch the videos. On the contrary, 30 students attend class and watch the videos (some even watch them multiple times). In other words, the availability of lecture videos falsely leads students to believe that they can learn by watching the videos. By not attending class, they tend to fall behind, and they cannot ask questions to their professor or listen to the answers given to other students. The video does not solve the problem for students who are not motivated to learn. On the contrary, the most motivated and strategic students not only attend class but use the video as an additional resource, especially during revision. In other words, the learners who engage the most in the consultation of additional content are likely those who need it the least due to their high level of motivation and skills.

2.4. Digital technology makes it possible to adapt to the special needs of pupils

Pupils with disabilities have historically been the first to benefit from digital tools, whether the disability involves motor skills, sight or hearing. The ability to add sound to texts and images for visually impaired pupils, to transcribe oral speech into writing or sign language for hearing-impaired pupils, or to set up personalised interaction with a computer for pupils with very limited mobility, are just some of the many technologies that have been developed. For example, for several years researchers have been working with computer science on the design and evaluation of keyboards for people with muscular dystrophy, keyboards that reduce the effort required to write by reducing the distance between co-frequent letters. More recently, and particularly over the last twenty years, increasing hopes have emerged in the field of cognitive disorders.

The use of digital tools to support learning for students with autism spectrum disorders has given rise to numerous studies. Among all these studies, those involving the use of avatars are particularly promising. Individuals with autism spectrum disorders often face challenges in processing information conveyed by others' faces, such as emotions. The advantage of an avatar presented on a computer screen lies in the fact that it provides much less information than a human face. By thus reducing the amount of information to process, it becomes possible to gradually make the processing of faces in general, and emotions in particular, more accessible. Imitating another human being can be too challenging, while learning through avatars by imitation is more achievable. Another highly promising research involves robots, which, for nearly the same reasons as avatars, allow children with autism spectrum disorders to learn by interacting with an agent much less overloaded with information than a human being.

The specific difficulties in learning to read have also led to numerous studies involving the design and evaluation of digital tools. This field serves as an example of the added value brought by digital technology, but also highlights the challenges encountered when it comes to designing truly effective digital tools. For instance, Ecalle, Kleinsz, and Magnan developed a computer-assisted learning system that teaches children to quickly categorize words. Students facing difficulties in reading in the first and second grade in elementary school showed improvement in silent word recognition, reading words aloud, and reading comprehension[6]. Another experiment confirmed these results and demonstrated an enhancement in reading fluency[7].

Another strategy aims to facilitate reading for students with dyslexia by changing the text presentation format. Thus, Zorzi and colleagues (2012) demonstrated that by increasing the spacing between letters within a word and between words in a text, the speed and quality of reading can be improved in Italian or French dyslexic children without any prior training. These students read on average 20% faster and make half as many errors[8]. This positive result was replicated by Schneps and colleagues, who further showed that reading speed could be improved by reducing the length of lines, for example, by presenting the text on a small screen, but without affecting comprehension[9].

A last strategy is by far one of the most widespread and commonly used: orally presenting texts using text-to-speech tools, allowing dyslexic students to listen rather than read. The hypothesis is that the oral presentation of written texts reduces the demands of reading, thereby facilitating comprehension. Wood and colleagues analyzed 22 studies dedicated to this technique. Their meta-analysis shows that the use of text-to-speech tools improves comprehension on average, but the improvement is moderate[10]. Results in the field are inconsistent (sometimes positive, sometimes negative), partly explaining the moderate improvement. It appears that research in the field has overlooked the fact that a text heard rather than read has a drawback: it is a continuous stream of information without pauses. On the contrary, a written text allows pauses, the ability to go back and revisit parts that were not well understood. For an orally presented text to be effective, it could certainly include pauses during which students stop listening to focus on comprehension (Vandenbroucke & Tricot, 2018)[11]. However, this last point still needs further replication.

2.5. Teacher make little use of digital tools

Contrary to widespread belief, the vast majority of teachers use digital tools. According to the PROFETIC survey of 2,472 teachers, 92% of primary school teachers use them to prepare their lessons. In the classroom, only 60% use digital tools, mainly for language study, reading and arithmetic, according to the same survey. But usage varies greatly depending on the teaching function concerned. In French (Potocki & Billottet, 2019), for example, digital tools are more often used for "having students to read written documents, searching information (on a text, an author)" or for "proposing differentiated teaching" than for "working on oral expression (production of audio documents, etc.)" or for "creating a composite document (video, poster, slideshow, etc.)".

Word-processing software is frequently used, while digital books are rarely used. In mathematics, two-thirds of teachers have their pupils use a calculator every day, and very frequently dynamic geometry software (GeoGebra, Cabri3D, XCAS, etc.) and programming software (Scratch, Python, etc.). However, they make very little use of solvers or automatic diagnostic software with their students. They use digital tools more to check calculations or show a geometric figure, than to do geometry work at home, for example[12][13].

3. Conclusion

Compared to other professional sectors, education does not seem to have experienced a "digital revolution." However, things are changing, but differently depending on the aspect of education and the discipline considered. Perhaps some expectations were too "simplistic". We have examined some of these expectations, which have sometimes become clichés:

- Digital technology improves student motivation but modestly. In no way can it solve the problem of students who are not motivated to learn.
- Digital technology enables more active and demanding learning. However, active learning is not so much a matter of medium as it is of the cognitive engagement of students.
- Digital technology promotes student autonomy but only for the most autonomous and motivated ones.
- Digital technology allows for adaptation to the specific needs of students, but it is a field in which there is still immense progress to be made, both in research and development.
- Teachers use digital tools less when these tools do not bring any added value.

The widespread but differentiated use of digital tools, based on the taught discipline, the desired pedagogical function, and the specific tool, leads to the hypothesis of rationality: in general, many teachers employ digital tools when they provide real added value without consuming too much time.

This added value is specific to the discipline, pedagogical function, and the targeted learning. The value of calculators for calculation verification is very high, as is the value of search engines for documentary research: in both cases, teachers frequently use these tools and have their students use them. On the other hand, using computer-assisted mind maps seems to provide very little added value; in fact, it is a practice rarely observed in the classroom.

In comparison to other professional sectors, education has not undergone a digital revolution but rather changes and evolutions. Some of these changes give the impression that we are only at the very beginning of the process.

References

[1] Potocki, A. & Billottet, E. (2019). Impact of digital technology on learning to read, speak, and write. Paris: Cnesco.

[2] Amadieu, F., & Tricot, A. (2014). Learning with digital technology: myths and realities. Paris: Retz.

[3] Lieury, A., & Fenouillet, F. (2013). Motivation and academic success (3rd edition). Paris : Dunod.

[4] Viau, R. (2015). Motivation in the educational context. Louvain la Neuve : De Boeck.

[5] Edwards, M. R., & Clinton, M. E. (2019). A study exploring the impact of lecture capture availability and lecture capture usage on student attendance and attainment. Higher Education, 77(3), 403-421.

[6] Ecalle, J., Kleinsz, N., & Magnan, A. (2013). Computer-assisted learning in young poor readers: The effect of grapho-syllabic training on the development of word reading and reading comprehension. Computers in Human Behavior, 29, 1368-1376.

[7] Potocki, A., Magnan, A., & Ecalle, J. (2015). Computerized trainings in four groups of struggling readers: Specific effects on word reading and comprehension. Research in Developmental Disabilities, 45, 83-92.

[8] Zorzi, M., Barbiero, C., Facoetti, A., Lonciari, I., Carrozzi, M., Montico, M., & Ziegler, J.C. (2012). Extra-large letter spacing improves reading in dyslexia. Proceedings of the National Aca- demy of Sciences, 109, 11455-11459.

[9] Schneps, M. H., Thomson, J. M., Sonnert, G., Pomplun, M., Chen, C., & Heffner-Wong, A. (2013). Shorter lines facilitate reading in those who struggle. PloS one, 8, e71161.

[10] Wood, S. G., Moxley, J. H., Tighe, E. L., & Wagner, R. K. (2017). Does use of text-to-speech and related read-aloud tools improve reading comprehension for students with reading disabilities? A meta-analysis. Journal of Learning Disabilities, 51, 73-84.

[11] Vandenbroucke, G., & Tricot, A., (2018). Does the oral presentation of narrative texts enhance the comprehension of dyslexic students in CM2 (fifth grade)? Neuropsychological Analysis of Learning in Children, 152, 111-121.

[12] Grugeon-Allys, B. & Grapin, N. (2019). Contribution of digital technology to the teaching and learning of numbers, arithmetic, and algebra. Paris: Cnesco.

[13] Soury-Lavergne, S. (2019). Dynamic geometry for learning and teaching mathematics. Paris: Cnesco.