

Controversy Mapping, 3D Animation, Gaming: New Media to Transform Education and Cognitive Experience

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Abstract

This article aims at demonstrating how *new media* offer different ways of learning that fully involve learners. **Controversy mapping**, **3D animations** and **gaming** make learners able to better express themselves and to progress at their own pace. This new learning process involves a certain **adaptability** to change from learners and educators. Due to a major shift in communication, learners are willing and able to learn by themselves.

We will expose the huge contrast between the traditional ways of **learning** and the new ways that new media bring. These new learning media help better manage information overload, improve position stand in public space, and add **interactivity**. Thanks to them, deep transformations are led: learners become **self-learners** and benefit from customized teaching enabled by **bottom-up education** - and therefore become more and more active in their **cognitive experience**.

Keywords

new learning media / cognitive experience / learning / interactivity / 3D animation / controversy mapping / gaming / adaptability / self-learner / bottom-up education

Introduction

New technologies and education: this association may seem anachronistic or antithetic but is in reality more and more present in schools, high schools and universities. The idea of a self-personalized learning has been deeply questioned by the progressive arrival of new media and new technologies: in the education field, books and grades are becoming old-fashioned. This turn in methods also implies a turn in the teacher/student relationship and in the teaching and learning processes. What are the consequences of those new media on the way we read, teach, learn, understand and think?

This article aims at demonstrating how new media offer different ways of learning that fully involve learners and to what extent they have an impact on education and cognitive experience. We want to question the notion of adaptability to change from learners, educators and society by adopting the point of view of the Y generation¹.

We will first present a state-of-the-art of new media from the 1990s to nowadays. Then, we will try to characterize the reasons of this boom by focusing on three different media: controversy mapping, 3D animations and serious gaming. Finally, we will define the consequences and benefits for learners.

¹ For more information about documentation and Y generation, please see BORENSTEIN *et al.* in the References section.

Traditional Learning Methods versus New Media

Students from the Y generation often used the same material as their parents did: handbooks, generic course material and sometimes audio records. Teachers had to struggle to find new documents to complete their lessons. Fortunately, the Internet and the democratization of new media have helped teaching and learning methods evolve in a more student-friendly way.

The FORCCAST² project is an educational project led by Sciences Po and gathers fourteen partners. The pedagogical approach of FORCCAST aims at mobilizing cognitive positions little used in traditional pedagogy. The project is divided into three parts: exploration, contribution and participation.

The first part of the project aims at raising awareness about the evolution of professional and civic contexts. To be able to find their way, future citizens need tools to explore and visualize the complexity of public debates. The goal is to contribute to the development of these tools through the creative use of digital technologies.

The contribution to collective knowledge is done by using new writing tools (web and video) and by learning to participate in debates through simulations of realistic situations.

The participation part aims at teaching students how to mobilize newly acquired proofs. It allows them to acquire new skills in different digital fields. The arrival of both new methods and media implies the reinvention of educational purposes, methods, digital equipments and educational system or teaching methods.

The academic department at Dassault Systèmes (Academia) is dedicated to the research of innovating teaching methods and works towards the improvement of academic learning. Innovating institutions often join Dassault Systèmes race towards modernity to bring together their knowledge and tools. Among many others, they initiated the project of animations in digital books [1].

In partnership with the publishers Hachette Technique, Academia has created 3D animations with the 3DVIAComposer software and integrated them into digital handbooks in order to better illustrate tools and systems studied in scientific sections in high school (STI2D³) [2]. Students can access these animations from the Internet and watch, manipulate and decompose technical items studied in their curricula, which they could never do with 2D illustrations or even with a real tool. In addition, these animations can be used in Technology in English classes⁴ to study a language inside the thematic fields students like and know about.

Developing new media can also help implement flipped classrooms. These classes consist of a reverse learning method, where the teacher asks students to study a subject from the curricula at home. During the following class, the teacher can answer more specific questions from the students who know more about the subject and above all, the teacher can give students exercises and practical work to do in class while supervising them personally. The tools made available for students must be modern and adapted to the subjects they are studying.

Serious games can have different purposes. Hence the main object of this article, we decided to focus mainly on the teaching and educational aspects in these games.

The main interest of serious gaming is the fun aspect. Moreover, serious games allow learners to progress without the pressure of grades, judgment or failure [3]. They manage to

² FORCCAST: *Formation par la Cartographie des Controverses à l'analyse des sciences et techniques.*

³ STI2D: *Sciences et Technologies de l'Industrie et du Développement Durable.* It is a new section created in highschool and dedicated to physical engineering and sustainable development techniques.

⁴ These classes are called ETLV: *Enseignement Technologique en Langues Vivantes.*

make a subject more interesting and understandable through its visual and sound bases and its gameplay.

Today, several other media have raised and are massively used for teaching and learning purposes.

Among them, they are, of course, e-learning trainings. They often consist of visual and sound materials, such as slides and videos, aimed at allowing the learners to know more about a topic in a shorter amount of time than if they had to enroll in an in-class course.

In line with e-learning, there are tutorials. They can have different formats: texts, images, videos. They are generally meant to show users procedures to follow. Tutorials are very popular as they are easy to find and take, but also because they are easy to build up and to make available for the audience.

Another very popular media format for learning are the MOOCs⁵. Those courses are often gathered in an online platform and put online by several institutions. For example, the Coursera platform⁶ gathers several MOOCs mainly dedicated to technical sciences and designed by university teachers. The interesting feature of MOOCs is that they gather all the requirements of traditional classes: users watch a lesson, practice as the speaker in the video demonstrates the procedure to be achieved, and at the end, they have to do some exercises related to what they have learned and post them online, or send them to the teacher who uploaded the MOOC content.

As we reviewed the different media available today, we could wonder why they were needed.

Why Did these New Media Boom?

One of the reasons that can explain the boom of these new media is the fight against information overload (also called infobesity [4]) by trying to sort the information or to show it in short formats.

In fact, individuals are overwhelmed with information coming from traditional or digital media. With the help of new technologies, readers can sort the information and select what they want to read and learn. The general increase of different information materials implied a tendency toward an increasing specialization, which thus implies multifaceted information [5]. Thanks to the controversy mapping studied in the FORCCAST project, students learn how to sort and organize the information, and because they create videos or websites, they can sum up all the information and make it available for a large audience.

Another reason for this boom is time. New media give the impression to save time. But according to some studies, people are in fact so overwhelmed with information that they feel more and more stressed and oppressed. We are increasingly subject to the dictatorship of the present and emergency [6]. Because of the progressive arrival of new media, people are constantly being forced to act in the present, leading in turn to a permanent form of “acting out”. This is directly related to the concept of actor-learner that we will develop in the last part.

New media also help to reconcile the gender gap existing in some fields. Indeed, it is known that few female students are to be found in scientific courses [7].

Interactive and multifaceted learning methods can make scientific courses more attractive and break the cliché assuming that women are less good with “numbers”, for example.

Besides, animated 3D models can help the most resistant learners (both male and female) visualize complex systems.

⁵ MOOC: Massive Open Online Course.

⁶ The Coursera platform is available at <<https://www.coursera.org/>>.

Collaborative work has been made much more popular and effective thanks to new media. The notion of working together to produce something is a key-concept in FORCCAST. Collaboration is done at different stages: among the Sciences Po students and with students from external schools, who helps them with their projects. Usually, students choose to collaborate by dividing the tasks within the group. There is a will in FORCCAST to inscribe this collaboration in time, thanks to the creation of a database containing every previous controversy case studies, but also an exchange platform available for students who want to learn more about concepts, see examples, etc. This database is one of the main objectives of the project, and should be operative in 2016.

In DS, since the models are accessible from home, students can work in collaboration on projects. It is easier for them to focus on interactive school media. They may even work together on a problematic or apart, communicating on the Internet.

In the gaming industry, collaboration has been going on for a long time: just like MMORPGs⁷ require from players to play together in order to achieve a goal that would not be achievable by a player alone, some serious games require students and teachers to help each other.

Today's education addresses students born in the new media era who know almost instinctively how to use any new communication device.

When visiting the test classrooms with Dassault Systèmes, we saw the encouraging effect of new learning media on secondary education students. A class was asked to study one animation among four chapters on the digital book [8]. They all had been interested in this new learning media and had kept reading and looking around the animations. They said they felt more comfortable in a digital environment, because they had known it since they were born and it reminded them of video games. Moreover, we noted that students watched all animations instead of stopping to the one they were assigned.

After seeing the reasons why these new media were needed, we need to look at the consequences for the learners.

What are the benefits for learners?

New media can thus beneficiate to learners. In the FORCCAST project, new media can help decrease the level of disparities between students. The way of learning is becoming self-customizable, and takes into account external personal criteria such as individual interests, weaknesses and strengths.

According to the National Educational Technology Plan developed by the US Department of Education, personalized learning is "adjusting the pace (individualization), adjusting the approach (differentiation), and connecting to the learner's interests and experiences". Personalization gives the learner a degree of choice about what is learned, when it is learned and how it is learned. However, they still have to meet some objectives [9].

FORCCAST also adapted its grading methods: students are invited to give a grade to their teachers at the end of the year to evaluate their pedagogical and communication skills and to give a feedback that could help improve methods.

As for DS, the benefits of animations were acknowledged by teachers as, after pupils studied the animations at home, they notice they knew more about the subjects and could then continue on practical exercises and more specific courses. New media can thus help save a lot of time.

Students who experience more difficulties can watch the animations again, interact on forums, find answers on the Internet and follow the courses as many times as they wish to master a subject. New learning media seem to even the chances between learners from different backgrounds. In addition, it boosts their self-confidence and independence in class because they can work by themselves on complex systems.

⁷ MMORPG: Massive Multiplayer Online Role Playing Game.

As for serious gaming, there could be several issues bringing differences between students and teachers who are facing these media. These issues are related to money, equipment and time. A solution could be to get serious games properly tailored to the needs of the schools, students and teachers. These games could be designed to be playable on common system versions that almost anyone has at home and in schools, and should include challenges and levels that take more or less time to achieve, depending on the time teachers and students want to allocate to gaming sessions.

Another interesting aspect for serious gaming is immediate feedback. As students play, they immediately see if they are going the right way or not: when solving an enigma for example, if they get the wrong answer, they will not be able to keep going in the game. They could then get some in-game hints to solve the enigma.

Plus, the fun aspect helps evening out the differences between teachers and students: they are equal in the game, both actually can learn from it, and share their experience.

In a way, learners live a transition: they go from a passive position to an active one.

They can give their opinions and express their ideas. This concept of “active learner” is one of the key concepts for the FORCCAST project, because it fosters the participation of students through their learning process. New technologies and software help them at different stages of work: to exchange their documents and arguments through collaborative platforms, but also to learn keys of public speech. At the end of the year, students have to present the controversy in front of an audience, and learn to enhance their oratory skills and to make stress productive.

Students do not simply watch and take note from animations. They actually can drag, move, decompose and measure them. Animations offer at least as much possibilities as a real tool [10]. It is a fact that manipulating and taking part in the activity is much more formative and rewarding for the learner than just learning about it.

On the other hand, animations also allow students to spend more time working on practical cases. They have got the theoretical knowledge at home and have the professor's expertise in class to orient them more precisely in the right direction. The learning approach is reversed but seems to fit better the current state of mind.

In the case of serious gaming, as learners are players and progress at their own pace, they are active in the way they learn. They can choose to complete a task several times to make sure they fully understood how it works, and can sometimes try several ways to achieve a same goal in order to determine which way is the most effective. Learners make themselves part of a bottom-up process, as they gain self-confidence because they learn to face challenges to ultimately master the topic they are working on.

Conclusion

New media brought – and still bring – new ways of communicating and learning. They help students get more confident and independent thanks to tools they use in daily life and are at ease with, while encouraging collaboration for greater and better results. They also help evening out differences among students, and between students and teachers. In the end, students are truly actors of their learning process, and could turn to be teachers themselves, with tools and subjects they fully master.

However, more and more people affirm today that because of new media, they cannot really focus and learn the same way people used to before. In a way, learning and memorizing new things has become obsolete, since everything could be found in a second on the Internet. Should we worry about this turn of events and regret our pre-Internet brain?

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To go further

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