

Innovation and Training: Targeting, Designing and Broadcasting

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Abstract

This article deals with how innovation has revolutionized current teaching methods, especially from the point of view of the people creating educational content. There are three main steps to creating good training materials: targeting, designing and broadcasting. The first step, targeting, consists in analyzing the training project before its conception, by targeting the audience and preparing the content, in order to set up the best learning strategy. The second step is designing. Today's technology gives instructional designers an array of different ways to create and present learning content. In addition to the attractiveness and the physical aspect of training materials which is now crucial, technologies such as 3D, games or Big Data also influence training designers' work as well as learners' opinions on learning. The final step is broadcasting. This part of the training material producing process is probably the most innovative of all. Indeed, nowadays new broadcasting methods keep appearing every single day. From Learning Management Systems to the "Bring Your Own Device", connected learners have a multitude of ways to access the educational material at their disposal.

Keywords

Training / Innovation / Learner / Designing / Technology / Targeting / Designing / Broadcasting / Teaching / Connected / Online / e-learning / Big Data / Serious game / Gamification / Storyboard / MOOC / Flipped Classroom / Learning Management System / Bring Your Own Device / 3D / Leap motion

Introduction

The literature about innovation in the e-learning field is substantial. However, it often focuses on new technologies and their impact on learners. Before offering innovative and appealing educational content to learners, there are many parameters to take into account. Instructional designers have to analyze who the learners are in order to adapt the content and determine what tools are the most suitable for designing and broadcasting this educational content.

This article aims at analyzing and presenting the key steps to elaborating a training program and how the arrival of new technologies has impacted the creation and the diffusion of educational content.

We will first present what is necessary to do before the conception of a training program such as defining a learning strategy and adapting to a specific audience. Then, we will tackle the design of educational content and discuss some innovations that have emerged to create appealing and dynamic content like the use of 3D, gamification or the development of Big Data. Finally, we will analyze the new ways to broadcast and to access this content.

Before the conception of a training program

The conception of a successful training program is made possible by the understanding of all the aspects it deals with. Indeed, an effective and attractive training material is a material that has been thought out and imagined to answer the following questions:

- Who am I dealing with?
- What information do I already have, where can I find the information I need?
- What kind of learning environment am I dealing with?

The answers to these questions give the prerequisites to build the learning strategy and to save time when it comes to conceiving the material.

What is a learning strategy?

For instructional designers, a learning strategy is a method or plan set up to achieve the learning objectives. The learning strategy is the key element to achieve the purpose of training, which is to pass on knowledge and allow the learner to acquire the skills he needs. Meeting this purpose requires knowing the specificities of the audience the training program is created for, the learning environment the learner is immersed in, and figuring out where to find the content of the training program.

Targeting the audience

In every situation, targeting the audience is the key to a successful communication plan, and it is even more important when dealing with instructional content. As [Module 2 of the Online Learning Center](#) points out: “Audience focus is central to both the communication process and message analysis”. Two criteria affect the creation of the instructional content and command the learning strategy:

- Is the audience composed of professionals or students?
- How old is the audience and what is its experience?

What if the audience is composed of employees?

The importance of in-company training has lately grown up significantly. The learner completing in-company training has specific characteristics due to his work, his experience and his time.

Generally speaking, an employee does not have a lot of time to complete training programs, unless the company he works for provides training dedicated time slots. This means that an employee does not want to spend – “waste” – time training, when there is work to be done, meetings to assist, and customers to satisfy.

The job of the instructional designer then consists in creating a training program that:

- goes straight to the point,
- is not too long,
- is flexible enough.

Because of these requirements, e-learning programs are very successful for in-company training. Companies also like e-learning because it allows to deliver consistent training across multiple locations. However, classroom training cannot be neglected since it gives a structure to the training program: it makes it less optional and allows the learner to actually take time to learn. Having an assessment at the end of the course is also a good way to interest the learner.

What is the audience of university training?

Over the last decade, many changes took place in the University model. The profile of the students who are following university courses is no longer the same and the way of transmitting knowledge relies more and more on technology and innovation. Most universities are now “connected” places where keeping up with technology is a constant challenge. The way of teaching itself had to be re-thought to keep pace with the technological revolution.

Besides, University is no longer a place for “young people” who are following theoretical courses. “Mature students” are going back to school to acquire new skills and to keep in step with the work market; teaching had to become more practical. It also had to take into consideration that many students are working on the side and do not have 100% of their time dedicated to studying. These transformations characterize the audience instructional designers deal with in universities: students who want to become efficient professionals, using technological innovations.

Classroom training as it used to be in “traditional education” can be seen as “outdated” by some universities. The audience requires more interactions and flexibility. E-learning, MOOCs, virtual classrooms, blended learning, 3D, etc., are as many possibilities to captivate the audience of university training.

How do age and experience influence the way the audience is targeted?

Just as in marketing and publishing strategies, matching the content of a training program to the age and experience of the audience is what makes a difference between a successful training program and a failed one. Indeed, a student in mechanical engineering and a 20-year-experienced mechanical engineer do not have the same level of understanding of their field of expertise. Depending on his/her age, the learner may not have the same relationship to technological devices. Though, no matter how complex the technology used to conceive the training program is, it must remain easy to use for the learner.

In general, the younger the audience is, the more playful the training should be. A better guidance and a teaching structure are also necessary for young students for example. An older and experienced professional audience does not require the same care.

Dealing with the content

Once the audience of the training program is targeted, instructional designers still have to figure out the content of the training program. Thanks to the accurate targeting of the audience, they know how to deliver it but still does not know what exactly they have to say. Instructional designers need to be proficient in teaching methods and be able to use adequate tools to create training programs.

However, it does not mean knowing everything about the subject of the program that has to be designed. Instructional designers can design training programs for all kind of subjects – science, medicine, management, security, etc. His expertise is on education. For that reason, they must rely on other's expertise.

The more reliable way to be sure that the content is accurate is to work with a Subject Matter Expert (SME). Working with SMEs allows instructional designers to establish clear learning objectives. Learning objectives are “brief statements that describe what students will be expected to learn by the end of school year, course, unit, lesson, project, or class period.”¹ SMEs are not expert in teaching but it is only with their help that instructional designers can understand the issues of the training material, and the key concepts that must be learned. Working with SMEs instead of working alone and finding the information on your own makes a huge difference in the reliability of the content.

Sticking to the learning objectives through the content of training modules is essential to keep the learner motivated. Keeping in mind that the content must be usable in the real world allows instructional designers to sort out what is practical knowledge and to get rid of useless content that is only going to bore the learner.

Understanding the divergences between in-company training and university training

The audience met in in-company training and in university training being different, it is not surprising to see that divergences appear in the learning strategy. Beyond the type of audience, a key factor to these divergences lies in the differences of learning environments. “Learning environment refers to the diverse physical locations, contexts, and cultures in which students learn. [...]The term also encompasses the culture of a school or class—its presiding ethos and characteristics, including how individuals interact with and treat one another—as well as the ways in which teachers may organize an educational setting to facilitate learning [...]”²

The main divergence between both learning environments is the social aspect. Learning is the purpose of students and they are all together, in the same location to fulfill that purpose. This creates learning dynamics which does not – always – exist in companies. That is why having quizzes, blended learning and sticking to the learning objectives is so important in incompany training.

¹ The glossary of Education Reform: <http://edglossary.org/learning-objectives/>

² The glossary of Education Reform: <http://edglossary.org/learning-environment/>

Though students have the motivation to succeed an exam and get a degree, employees have no other motivation than getting more knowledge for something they might think useless or unimportant. The learning behavior is directly impacted by the social aspect of a learning environment. In general, the more the learners think what they learn is important and useful and the more accurate and playful the training is, the more the learners are going to be interested and invested in learning.

One of the other divergences is about the learners' autonomy and how they manage their time. Employees will plan their training time depending on the time they have left when their more urgent tasks are done. They will do the training more willingly if they know that they can pause and resume it when they want. However, at university, training is part of a whole scheme. The idea is to create steps and to make sure they are completed. These divergences are not insuperable but they are important enough to be taken into consideration by instructional designers.

The preconception is definitely a step that cannot be skipped when it comes to instructional design. When it is properly achieved, instructional designers can look to all the tools and innovations that exist and start creating playful and attractive training materials.

Designing a training program: standards and innovation

The arrival of new practices in the creation of educational content has a strong impact on how to design this content, no matter if instructional designers are educators or employees. With the appearance of Generation Y (the internet generation, that is to say people born between 1980 and 1999), and Generation Z since the beginning of 2000 (the generation born with the information and communication technology, the internet and the social media, amongst other), instructional designers need to adapt. Those generations and the new technologies they daily use, have greatly impacted in the creation of educational content. The traditional learning process is no longer adapted to these ultra-connected generations. Consequently, the creation of educational content has to evolve to meet these generations' needs. To do so, new tools and methods have emerged such as video tutorials, online courses or more recently 3D, serious games or Big Data.

These last years, innovation has therefore increasingly progressed and companies, schools and universities have progressively implemented these new methods to facilitate the learning process and make it more appealing.

Creating appealing documentation

Design in the educational field may seem shallow as what is really important is content. However, let's take the example of an employee who has to follow an online course or a student who needs to complete an exercise. If no time has been spent formatting their training materials, which therefore do not appeal to them, they may decide to skip learning. In this way, designing training materials, in the sense of making them appealing to learners, is not shallow but essential.

Thus, when creating training materials, instructional designers do not simply have to deal with content but also with how to present it and how to format it so that it looks attractive to its audience. This is well illustrated within a company such as Thales Global Services. The Thales management system, Chorus 2.0, provides a large set of training materials to all Thales employees. These materials range from E-learning modules to PowerPoint presentations to booklets and leaflets.

Statistics on these materials allow us to gauge which type of training employees prefer. And it is no surprise to see that e-learning modules are the most popular. We can assume that this is due to the newness and ensuing attractiveness of this type of training material as more time is often spent designing e-learning modules. But what makes a document attractive? What physical aspects make people enjoy reading a document?

First impressions are as important when it comes to documents as when meeting new people. Indeed, people tend to think that a document is easier to use when it is attractive whether it is actually true or not. It has also been found that a document that simply looks difficult (written in small print, key information not highlighted) will deter readers from reading it. The physical appeal of a document relies on several points. As the overall attractiveness criterion in training materials is quite subjective and depends on everyone's personal tastes and preferences, we will focus on other, more objective, criteria: usability and format.

The usability criterion

Usability refers to how easy and pleasant an interface is to use. When a document or training materials is described as usable, it means that it is user-friendly thus easy to use, which makes it appealing to learners. Several elements are to be taken into account when talking about usability.

One of those is legibility. Legibility is "our ability to physically read the words on the page or screen" ("What makes a good document? The criteria we use", Rob Waller, April 2011). And the more legible a document/interface, the more usable and pleasant it is to learners.

The Simplification Center of the University of Reading has carried out a study in 2011 ("What do people notice about their documents?", Karen Stanbridge, April 2011), within the framework of which they have asked several people to keep a diary of what they thought about documents that they had to deal with daily (bills, forms, information leaflets, etc.).

During this study, one of the main elements that people paid attention to was legibility. People often complained that the fonts used in documents they had to analyze was too small, that the colors that were used prevented them from reading the content or that the page layout or line spacing made some documents difficult to read and required more concentration. As a result, elements that may seem insignificant, such as font, color or layout, are actually essential to providing a good reading experience to people (in our case, learners) and therefore to making documents more appealing.

Additionally, it is important to note that legibility does not apply solely to textual content. As we will see later on, more and more types of training materials are available to learners (videos, e-learning modules, serious games, etc.). Often times in these new materials, voice-overs are needed. In those particular cases, optimizing legibility would mean using a native speaker's voice in order to give the learner an optimal and more appealing learning experience.

Usability of materials can also be improved with the use of graphic elements. Indeed, it has been shown that information presented graphically was easier to understand and looked more appealing to readers in comparison with plain text ("What do people notice about their documents?", Karen Stanbridge, April 2011). The Simplification Center study mentioned above, has shown that people were highly receptive to the use of diagrams in documents and liked when key information was highlighted using some sort of graphic element.

Finally, another element to take into consideration concerning the usability of a document is its overall attractiveness. As mentioned earlier, first impressions of a document greatly influence people's decision to read it or not.

In the case of documents, first impressions are based on physical appearance that is attractiveness. This criterion is quite subjective but what can be said for everybody is that "We look for attractive documents with uncluttered but informative covers and early pages" ("What makes a good document? The criteria we use", Rob Waller, April 2011). This, of course, applies to educational materials. An employee that is given a dull, uninviting Powerpoint training material to read may never do so and the same goes for university materials.

The format criterion

Another criterion to be taken into account when judging on the overall appeal of a training material is its format.

Today, a majority of learners can be said to be "connected", that is that they are "native speakers of the digital language". As such, learners are more receptive and more attracted to new training formats such as videos, e-learning or serious games rather than oldfashioned documents: "As a Connected Learner, if I'm given the choice between reading a 2 page document and watching a 5 minute video, I'll choose the video!" ("Microlearning: when less is more", Vodeclis ³A Skillsoft company, 2014).

Learners are indeed increasingly fond of the video format when it comes to learning. According to Vodeclis, "video is the most effective medium for communicating information in a short period of time. It is extremely effective for performance-based training, since a picture is worth a thousand words, and a picture with audio is even more so!".

³ Vodeclis is an enterprise learning solution provider.

The same goes for e-learning. E-learning is any learning content that is delivered on a computer through a variety of media and that uses instructional methods (examples, practice exercises) to help learners acquire knowledge and skills ("Effective eLearning design", Henry L. Steen, December 2008). As learners are more and more connected and in touch with technology, many of them would prefer learning through an elearning module rather than a plain old document. And often, a well-created e-learning module also is more effective than this plain old document ("Microlearning: when less is more", Vodeclis A Skillsoft company, 2014).

First of all, it is a very visual and interactive type of training material as opposed to text documents. As just mentioned, it uses a variety of media from videos to animations to audio, which helps keeping the learner's attention.

Second of all, e-learning modules are thought out from the start from the learner's point of view. Using storyboard, that is "visual organizers, typically a series of illustrations displayed in sequence, for the purpose of previsualizing a [...] web-based training", instructional designers create materials meant to transfer knowledge to the learner. This explains why today's learners are so fond of e-learning. The usability and format criteria have therefore become essential to create appealing educational content especially in order to catch learners' attention, who are increasingly connected and are used to rapidly move from one topic to another. The arrival of new methods has facilitated and improved the creation of educational content and has helped increasing learners' interest.

Using 3D to make the learning process more tangible and attractive

Dassault Systèmes Global Academia is an innovative department that provides schools with 3D Software solutions. The department develops projects using 3D software such as CATIA or Solidworks that educators will be able to replicate in their classrooms in order to make technical concepts more tangible for students.

The main goal is to develop the concept of flipped classroom for secondary and higher education (Engineering schools, universities, etc.). The notion of flipped classroom differs from the traditional learning process by which learners passively attend a course in order to learn concepts. Indeed, the flipped classroom consists in learning at home and practice and debate with other learners in class. In this way, educators no longer act as teachers or professors but as coaches and help each learner in a personalized way. This notion is close to the learn-by-doing and project-based learning methods (or even based-learning) by which learners acquire knowledge by practicing or by managing a project.

The two following projects created by this department are good examples to illustrate these two notions. The first one, developed in partnership with the publisher Hachette Technique aims at integrating 3D animations in a digital textbook for a STI2D Classroom. The second project was developed with zSpace, an innovative company which creates 3D graphics tablets, and aims at designing educational 3D content and implementing it into the zSpace to enable learners to both see in 3D and manipulate that content.

These two experiences have in common the development of 3D scenarios using CATIA Composer, software to adapt existing 3D content (that educators can easily find through online libraries, provided by companies like Dassault Systèmes) in order to create content such as technical documentation or interactive and dynamic animations, amongst others. This type of software enables educators to download 3D content and adapt it to their courses. Educators can easily elaborate their own 3D scenarios and their own exercises based on what they teach and according to learners' level. Then, they can share this 3D content with learners through lectures or online.

These projects perfectly fit with the previously mentioned concept of flipped classroom: learners can directly interact with the 3D content at home through the digital textbook and safely manipulate in class thanks to experiences such as the zSpace project.

Using game codes to make the learning process more entertaining

The notion of Gamification can be defined as “the process of adding games or gamelike elements to something (as a task) so as to encourage participation”⁴(such as video games elements like badges and rewards system, competition, simulation, immersion for instance). Gamification can be applied to either on-site learning or distance learning, through e-learning units.

Bertholet and al. (20) in "La gamification" spotted four types of gamification strategies (role play gaming, storytelling, cooperation game and competition game) that we can group into two main categories: the immersive strategy with role play gaming or storytelling and the interactive strategy with cooperation and competition games. In the first strategy, Learners are immersed in an environment where they will complete missions or explore to learn concepts. The second strategy is the one based on social interactions, by which learners will have to work together to complete the game (cooperation game) or to compete with others (competition game). The type of strategies implemented by educators depends on the educational purpose and the target audience. In this way, the tasks completed by learners cannot be too repetitive or too theoretical. The idea is to establish reward systems (score, badges, etc.) to catch the learners' attention.

The notion of serious games and Leap Motion go one step further. With Serious Games, the idea is no longer to apply some video game codes to a specific field but to develop a multimedia content using video game design techniques and therefore combine the educational aspect (“serious”) with the fun one (“game”). As for leap motion, it is a tool able to recognize hand and finger motions and reproduce them on screen. Applied to education, this tool is at the crossroads of 3D and gaming. Here again, the main goal is to combine learning and entertainment by enabling learners to directly interact with their environment.

Serious games and leap motion enable learners to get involved and to progress without the fear of failure. Implementing this kind of strategies depends on the educational purpose and the audience, but also the financial means. These processes are expensive (up to 100 000 €) and instructional designers need to create a scenario but also to work on the game design which has to be interactive and dynamic in order to be entertaining.

⁴ Definition from Merriam-Webster online dictionary (<http://www.merriam-webster.com/dictionary/gamification>)

Personalizing educational content with Big Data

The concept of Big Data includes two main ideas. The first one is the notion of sharing information and, therefore, sharing data continuously emitted by people and stored either by companies or by external databases through social networks or internet service providers, amongst others. The second one is to analyze the different means of transmission (video, images, cloud computing etc.). Indeed, thanks to technological innovations, it is now possible to analyze these data to personalize and adapt content depending on the purpose and on the audience. Big Data is a topical issue in the field of technical communication because it enables technical writers to analyze user habits and adapt content. This is the same principle in the design of educational content, particularly in the context of e-learning content. Each time learners interact with educational content (via e-learning platforms for example), they transmit data. This data can now be analyzed by learning management systems, online platforms which enable instructional designers to manage and share educational content. Using Big Data helps instructional designers to know how learners use the educational content, how long they spend on an e-learning unit or if they visit pages several times. This enables instructional designers to better understand learners' progression in the learning process and therefore adapt the content depending on what they do. Using learners' data to create educational content allows instructional designers to analyze learners' behavior when they use this content, to anticipate certain scenarios and therefore personalize content in order to better adapt it to learners' needs.

Broadcasting a training program: new methods

The digital era gives a new dimension to teaching, and the question of how the information is broadcast is raising as it has to be accessible to a targeted audience. Students of generation Y are permanently connected, and those of generation Z only know smartphones, tablets or computers. Therefore, certain amounts of broadcasting media are created to make information accessible and dynamic, for example the use of information and communications technology (ICT). This process called "connectivism" ("[Connectivism: learning theory of the futur or vestige of the past?](#)", Rita Kop & Adrian Hill, October 2008) links new technologies to training by promoting the creation of networks in order to share and broadcast knowledge.

Using new learning methods

Several projects in teaching innovation aim at mobilizing and broadcasting knowledge by using new teaching methods. The Sciences Po's FORCCAST project (Formation par la Cartographie des Controverses à l'Analyse des Sciences et des Techniques) aspires to prepare students to follow scientific and technical controversies that they have to map using leading edge digital tools. These tools allow to pass on knowledge acquired by students in different output formats: websites, videos, drama, simulations of realistic situations, etc.

This implies the reinvention of educational purposes, methods, digital equipment and the educational system. Therefore, the 'teaching rooms' concept has been adopted to allow learners to work in groups in the best learning conditions possible.

Indeed, working in groups can often be laborious and inefficient if it is not done in good conditions. As a result, learners end up working alone, and the teaching objectives are not fulfilled. This teaching room promotes group work by proposing innovative and technical equipment, for example shared tactile tables (for each group), stage zones, mural screens to guarantee easy access to information for everybody, and that the learning process rapidly makes progress. Thus, students are encouraged to communicate and share information so that the broadcasting approach is complete.

Eager to pass on, broadcast and adapt these innovations to different degree levels, the project intends to set up duplicable educational protocols through the creation and development of several tools and digital contents, required to be modular to facilitate their reuse. In fact, in order to be broadcast, the project has reached the development phase of databases to facilitate the access to technical information and previous researches to a larger audience (high schools, every degree levels in universities, etc.). The creation of modular technical materials, glossaries, simple digital tools, the participation to festivals, the organization of events like Summer Schools are ways to constitute a larger network in order to broadcast methods and expertise.

Learning strategies to share and broadcast knowledge

There are different learning strategies, thought out according to formats and effects expected on learners, and according to the objectives that they promote. The development of new technologies has given birth to e-learning, as opposed to on-site courses, where learners follow training sessions via the Internet and, consequently, computer hardware.

Nevertheless, studies have shown that the rate of dropping out of e-learning courses is high because learners are alone with their devices. This is why we observe the growth of new learning strategies aiming at mixing new technologies and learning through collaboration between learners, teachers, and sometimes experts. These strategies are thought out by teachers according to the learning objectives that learners have to achieve and so that the learning process is efficient and appealing. Therefore, it is important to establish the objectives in relation to the knowledge of each learner to promote a useful collaboration, where everyone shares and broadcasts their own knowledge and expertise, their social skills and know-how within a community. This community is also composed of teachers and experts who can share their tacit knowledge. As they grow, the number of pieces of information broadcast in the community widens.

Hence, the broadcasting of knowledge occurs with the collaboration and sharing of information between learners, and the creation and development of communities motivated by common topics.

Among these strategies, social learning is a collaborative approach of knowledge transmission allowing to build up the expertise of a company or institution and to broadcast it through social networks, and electronic medias for example ("[La révolution du social learning](#)", Fabien Humbert, March 2011). As opposed to e-learning, learners are not alone, they exchange about the subject of their training and have a chance to progress together, making the process more motivating and more funny.

Blended learning involves mixing different learning methods and media within the same course. The aim is to associate on-site courses and e-learning while using social media to create communities via Facebook, Twitter, blogs and e-learning platforms to share and broadcast information within a broader public ("[Teaching in blended learning environments: creating and sustaining communities of inquiry](#)", N. Vaughan, M. Cleveland-Innes, D. R. Garrison, December 2013).

Flipped classrooms, as mentioned above, encourage students to work at home and participate in activities during the course. This promotes dialog between students and teachers. As the student has already integrated the basics of the class, the teacher can easily share his/her knowledge.

Bring Your Own Device (BYOD) is a strategy that entails bringing one's own computer device at work (or school) instead of the one provided by the company or institution (for example, a phone, a laptop, a tablet, etc.). This approach aims in increasing the users' efficiency for they know better their own devices. Thus, they can work anywhere outside of the company or institution by accessing every document and information they need.

As part of the educational system, the BYOD approach is entertaining because learners can bring their own smartphones, tablets, laptops to register to the courses online, participate to online activities, efficiently and rapidly share information within a group thanks to the Internet connection ("[BYOD : quelles sont les bonnes pratiques](#)", February 2015, CNIL). The broadcasting process is facilitated thanks to collaboration between learners.

Tools and means of diffusion

As new learning strategies emerge, appropriate tools have to be provided to learners and educators so that they can better exploit these strategies, and optimize the learning process. According to the MOOC platform [FUN](#), MOOCs (Massive Open Online Courses) are online training open to anyone, anywhere. Each course counts an unlimited (in theory) number of participants, indiscriminately. Whole courses can be followed online, so it is active learning with learning objectives. They gather the criteria of traditional courses, theory, practice and assessment, but they add a stimulating aspect endeavoring to broadcast knowledge by connecting people and resources on a common theme. There is a distinction between cMOOCs and xMOOCs. The objectives and learning contents of xMOOCs are defined by teachers, whereas cMOOCs are based on the connectivism theory and are handled by learners. Anyone can broaden the content and contribute to the course.

MOOCs allow to cut loose from simple e-learning, where learners are alone, and give way to rich and entertaining discussion spaces, broaden by geographically dispersed people.

However, contents and discussions are handled and structured by the hosts of these platforms. The amount of information provided is broadcast in a large geographic space. The other advantage of a MOOC is the participation of experts, who can share their knowledge and experience, and transfer their passion to learners, which cannot easily be done in classroom training.

One of the challenges of modern and innovating training systems is to make instructional content accessible at any time and almost instantly to all the targeted learners, no matter where they are.

Moreover, the system should allow as many possibilities as traditional teaching. This means that it should be able to provide several types of training media; interactive ones that make communication possible between learners and teaching teams and, innovative ones that carry out knowledge in various but adequate ways.

Learning Management Systems were created to meet these requirements. A Learning management system (LMS) is a software platform that allows training, teaching and interactive presentations to be delivered over the internet (<https://www.mindflash.com/lms>). LMSs are not only storage systems for instructional contents. They are like a bridge between teaching teams and learners. When creating an e-learning module for example, instructional designers can publish the modules using SCORM⁴ standards which allow to track the progress of learners and how much they have scored at quizzes for instance. SCORM is a set of technical standards for e-learning software products. Specifically, SCORM governs how online learning content and Learning Management Systems (LMSs) communicate with each other (<http://scorm.com/scorm-explained/>). Both progress and results are accessible at all times to the teaching teams creating a class dynamic despite the distance.

Following on from 'teaching rooms', new innovative formats based on LMSs have been tested, such as virtual classrooms and virtual universities. They allow to connect learners and teachers to work spaces via an online portal. They promote the interaction between learners and teachers, the access to information for everyone from a computer device. LMSs do not only make possible the broadcasting of information. They provide a space where people can communicate and share information and tools for course administration and pedagogical functions: announcement areas, e-mail, chat, list servers, instant messaging and discussion forums, learning resources, links to internet resources, assessments (submission, multiple choice testing, collaborative work and feedback). LMSs like Moodle, Sakai, Dokeos are in the center of the broadcasting strategy. There are collaborative spaces that facilitate learning sharing. Thanks to them, knowledge is now within reach, teaching is free from space constraints, to such an extent that there are more in more virtual universities.

Conclusion

We have seen that the educational field is very conducive to innovations. e-learning, 3D, Big Data are some examples of technologies that have revolutionized the area. However, these innovations are already a few years old or even decades old in the case of e-learning. So are we not witnessing a decrease in the number of innovations in the field? We talked about connected learners who are fond of technology and always reaching for the latest trends, but aren't those innovations already too old-fashioned for them?

These technologies also raise problems such as identity and data protection. Today, Big Data allows developers to access a variety of data sources with remarkable ease. Thus, the use of Big Data in the educational field could be prejudicial to learners whose identities and personal information may not be completely protected and secure.

The use of the Internet and computer devices within classes has raised a lot of questions concerning security and control. Indeed, in schools, learners have full access to their devices and can, for example, use their camera anytime they wish, and the Wi-Fi access can generate intrusions, etc. Moreover, learners can't be controlled since they have access to social networks and websites and teachers can't check the comings and goings of each learner. For some, trusting them can limit the misuse, and for others, strict rules have to be implemented for this method to be experimented and efficient.

Instructional designers have to adapt to rapidly changing trends to always keep the learner's interest and adapt to a connected audience and to new learning tools, while considering the potential security issues. Another risk is to focus too much on the appearance of training materials and the media used to convey information, the quality of the learning content, which remains the most important part of any training material, could deteriorate.

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