



# CHAPTER ONE

## INTRODUCTION

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## 1. Knowledge in the Digital Age : Introduction

### Characteristics and benefits

As we all know innovation, communication media and technology are constantly and rapidly improving, and users now feel, that those tools have become an essential part of their world and their lives.

Until well into the 20th century most workers were manual workers. Today only about 20% do manual work.

More than a half of total workforce, are knowledge workers.

Preparing children, teens, and adults to function in this situation is a top priority of society.

The development and expansion of the Internet, of Social Media, of new ICT based tools as Tablets, iPad etc. and their combination are essential to achieving this goal.

The application of New technologies to education and training has become an important industry and is one of the fastest-growing areas of the entire educational and training sector and will continue this trend far into the future.

Learning through new technologies has definite technical and pragmatic benefits<sup>1</sup> over traditional classroom training.

**It wins against face-to-face learning because of “better - faster – cheaper” reasons:**

- It's **flexible**.
- It's **less expensive** because of not having to travel or spend excess time away from work. The biggest benefit, however, is that it eliminates the expense and inconvenience of getting the instructor and students in the same place.
- It provides a quality product at a lower cost – it's **less expensive to produce**.
- Provides a **consistent** message. It helps to save time and money on not learning of extra material. The objective is to **become competent in the least time and with the least amount of training**.
- New learning technology is delivered in the **right-sized pieces**. Learners don't have to take a one-hour class for the five minutes' worth of content they are looking for.
- It's **self-paced**. Most programs can be taken when needed. It helps to save is time. Speed is a well-known competitive advantage, and not even in business.
- It can work from **any location and any time**. It serves as an equalizer in terms of access and equity.
- It can be **updated easily** and quickly.
- It can be easily managed for large groups of students and **use the work of the best instructors**.
- It can **use an extensive collection of resources**.



iPad is one of the most important ICT based tools

Web-based products allow instructors to update lessons and materials across the entire network instantly. This **keeps content fresh** and consistent and gives students immediate access to the most

<sup>1</sup> Rosenberg M. E-Learning: Strategies for Delivering Knowledge in the Digital Age. -McGraw-Hill, 2000, p. 29-30.

current data. Information can be retrieved just before it is required, rather than being learned once in a classroom and subsequently forgotten.

The Internet provides **new channels** for communicating and to support learning. These include online mentoring, chat, message boards or threaded discussions, e-mail, synchronous training events, etc. These components make the difference between a flat, one-dimensional learning experience and one that **is rich in diversity and choice**.

**Online training is less intimidating, more psychologically “safe” than instructor-led courses.** Students taking an online course enter a risk-free environment in which they can try new things and make mistakes without exposing themselves. People feel safer, if nobody sees their mistakes. This characteristic is particularly valuable when trying to learn soft skills, such as leadership and decision-making. A good learning program shows the consequences of students’ actions and where and why they went wrong. After a failure, students can go back and try again. This type of learning experience eliminates the embarrassment of failure in front of a group.

**The standard paradigm and the reflective paradigm.**

Modern philosopher of education M.Lipman<sup>2</sup> set two contrasting paradigms of educational practice – **the standard paradigm** of normal practice (mostly performed by face – to – face education) and **reflective paradigm** of critical practice (educational principles of new technology are based on this approach).

The dominating assumptions of the standard paradigm are:	The dominating assumptions of the reflective paradigm are:
Education consists in the transmission of knowledge from teacher to learner.	Education is the outcome of participation in teacher – guided learners community.
Learners acquire knowledge by absorbing information, and the facts are the main goal of education.	The focus of educational process is on the grasp of relationships within the subject matter under investigations.
Knowledge is about the world, and this knowledge is unambiguous and unmysterious.	Learners are stirred to think about the world, and knowledge reveal to learners as ambiguous and mysterious.
Knowledge is distributed among disciplines that are non-overlapping, and together are exhaustive of the world to be known.	Getting of knowledge is based not on disciplines, but on problems. The knowledge from different science is required to solve the problem
The teacher plays an authoritative role.	Teachers role is supportive and fallibilistic (ready to concede error).

Distance learning can not only satisfy the demand for alternative forms of education. New learning technologies leads to increased retention and a stronger grasp on the subject, **helps to organize more successful learning process:**

- **Learner-centric approach.** It is the shift from instructor-centric to learner-centric approach. For years, training has organized itself for the convenience and needs of instructors, institutions, and bureaucracies. **New learning technology focuses on the individual learner.**
- Making the learner central to the teaching process has been long established history - which includes being pilloried under the heading of 'progressive education' by many educators and

<sup>2</sup> Lipman M. Thinking in Education. – Cambridge, 1991, p. 14.

politicians. What it implies is a **respect for the learner** as an individual who has different needs and expectations. For example, the need to feel included in the learning process and empowered by the ideas developed. It is a process that aims to facilitate intrinsic motivation in which the learning itself is the main reward. One way of the key differences is the extent to which learners are dependent on the tutor or the learning materials - and there can be good reasons for both approaches.

- Most people are familiar with the traditional education, where lecturer stands in the centre and passes the knowledge all around. People, who are further, find it easier to “catch” what is being passed. But those who are far away, find it more difficult, they “catch” the wrong things or simply get buried. It is however a familiar learning environment for most people.

New learning technology does provide the opportunity to revisit what the style of a learning environment could and should be. Here **people may learn in different ways**, such as individually and collaboratively in small groups - but always on the move in the direction **that best suits them**.

- A new learning technology program can boast the latest technology available, but if it fails to meet the needs, it doesn't matter how advanced it is or how much money is saved. A good experience does not take a one-size-fits-all approach. Instead it focuses on learner and can engage the program and **meet everybody's learning objectives**.
- The introduction to the course usually takes into account the learners' backgrounds, ability levels, and expectations, including their personal learning goals and objectives, or specifies the attributes of the learners for whom the course is designed.

### Personalization

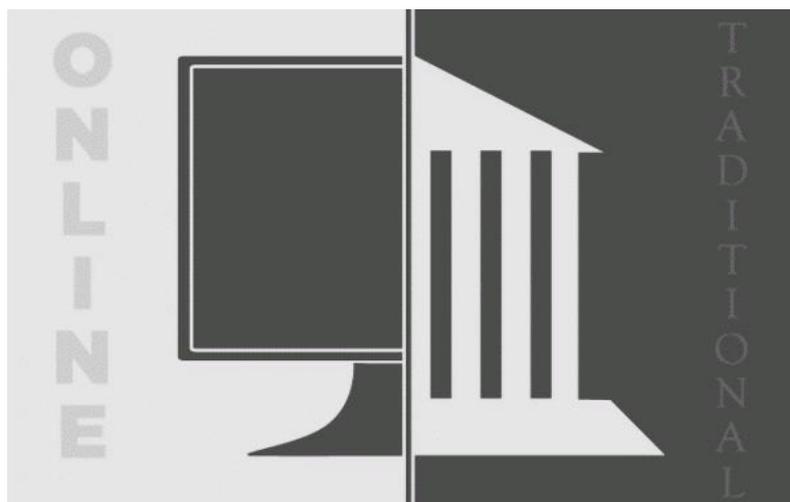
There are many different learning styles<sup>3</sup>. For example, **active and reflective learners**. Active learners tend to retain and understand information best by doing something active with it - discussing, applying, or explaining it to others. They like group work. Sitting through lectures without getting to do anything physical but note taking is for them very hard. Reflective learners prefer to think about it quietly first. They prefer to work alone.

**Visual and verbal learners.** Visual learners remember best what they have seen - pictures, diagrams, time lines, films, and demonstrations. Most people are visual learners. Verbal learners get more out of words - written and spoken explanations.

Everyone learns more when information is presented both visually and verbally.

**Rational and intuitive learners.** Rational learners tend to like learning facts, like solving problems by well-established methods and dislike complications. Intuitive learners often prefer discovering possibilities and relationships, like innovation and dislike repetition.

**Sequential and global learners.** Sequential learners tend to gain understanding in linear steps, with each step following logically on from the previous one. Sequential learners tend to follow logical stepwise paths in finding solutions. Global learners tend to learn in large jumps, absorbing material



Online education Vs traditional education

<sup>3</sup> Felder R.M., Solomon B.A. Cognitive styles and learning strategies. – London, 2002.

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almost randomly without seeing connections, and then suddenly "getting it." Global learners may be able to solve complex problems quickly or put things together in novel ways once they have grasped the big picture, but they may have difficulty explaining how they did it.

**One time learners and repeaters.** Onetime learners spend more time reading and put more efforts on material analysing. But they do it once – after don't "come back". Repeaters like to re - read parts of content, they many times "come back" on pieces they liked most of all or on pieces they don't understood well enough.

There may be detected more learning styles and strategies. New learning technology tries to support all individual learning styles. Whether learner thrive in a highly interactive environment or prefer solitude, learning program should provide components that accommodate individual approach to learning. This allows learner to tap into the resources with which they are most comfortable, resulting in greater knowledge retention.

New learning technology accepts and encourages independent thinking, autonomy and initiative. Learners attain their own intellectual identity, and have possibility to become autonomous thinkers, who do not merely parrot what others say think and do, but make their own judgments, form their own understanding of the world. Autonomous thinkers develop their own conceptions of the sort of persons they want to be, and the sort of world they would like it to be.

**Many elements** are combined to reinforce the message, such as video, audio, quizzes, interaction, etc. There is also the ability to revisit or replay sections of the training that might not have been clear the first time around.

### Motivation

Traditional learning often tries to get students to learn solutions rather than investigate the problems and engage the inquiry for themselves. Learners just have to study the end results of what the others have discovered. Traditional learning neglect the process and stresses up on the results and products. **When problems are not explored, no interest or motivation is engendered**, and education becomes imitation and repeating.

Modern educators propose, that learning process should take as its model the process of scientific inquiry. Then learners will be intrinsically motivated to learn if there is a meaningful nature of the learning environment and activities.

### Responsibility

Students get higher retention of content through personalized learning. Since they can customize the learning material to their own needs, students have more control over their learning process and can better understand the material, leading to a faster learning curve.

Learner-centric scenario requires people **to take on personal responsibility for their own learning**. It can be a more daunting experience for those whose experience of learning is limited to the expert on the mountain - and they need help and support to make the change. New learners are responsible for their own learning. New learning technology empowers them to manage and implement their own learning and development plans.

**Self assessment.** Learners should be able to track and evaluate their own progress, using self-tests, similar to the final evaluation instruments. Learning is effective only in circumstances of self-critical practice, which entails the self-correction<sup>4</sup>.

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<sup>4</sup> Chapnick S., Meloy J. Renaissance eLearning: Creating Dramatic and Unconventional Learning Experiences. - Pfeiffer, 2005, p. 36-37.

## Interactiveness

Most **learning is social**. The coffee room is a more effective place to learn than the classroom. Studies reveal that the majority of corporate learning is informal, i.e. outside of class. New learning technology seeks to foster collaboration and peer interaction.

Online learning should not sacrifice the human element that is so important to learning experience. Programs should offer **online communities** for peer-to-peer collaboration and coaching or mentoring from industry veterans and experts. Students should be engaged in dialogue with the tutor/teacher and with each other.

Students are engaged in experiences that challenge and encourage discussion<sup>5</sup>. **Discussion helps students to grow cognitively - adopt new ideas**, enables students to show that they understand. However, only when they feel comfortable enough to express their ideas will meaningful dialogue occur.

Most new learning technology is project-based and occur in a group context. Conducting their own projects is much more interesting to students than answering sterile textbook problems. And because they get to define the nature of the project (even if they don't choose the topic), they have a sense of control over their learning which is absent in traditional classroom instruction. The authentic learning context of the project increases student motivation and satisfaction.



Interactiveness: social learning tools

New learning technology helps to create successful collaborative teams, emphasizes team efforts that involve communication and social skills, encourages respect for each others ideas. Research on collaborative learning suggests that in the process of collaboration, students are forced to clarify and **verbalize their problems, plane, manage and facilitating solutions**. Furthermore, when students work in teams, they often have the opportunity to work with others from quite different backgrounds and this facilitates an understanding of diversity and multiple perspectives.

Distance education can be more stimulating and encourage more critical reasoning than a traditional large instructor-led class because it allows the kind of interaction that takes place most fully in small group settings. Online students had more peer contact with others in the class, enjoyed it more, spent more time on class work, understood and performed the material better.

## Higher Order Thinking

Of course, traditional education involved thinking, but the quality of such thinking was deficient. New learning technology involves active cognitive processes, such as creating, problem-solving, reasoning, decision-making, and evaluation. Students must connect and summarize concepts by analyzing, predicting, justifying and defending their ideas.

Higher order thinking is a term about quality, not about the quantity. Higher order thinking, learners may develop in learning process, is conceptually rich, coherently organized and persistently

<sup>5</sup> Splitter L.J, Sharp A.M. Teaching for better thinking. – ACER, 1995, p. 36- 38.

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exploratory, resourceful and flexible. Higher order thinking is a fusion of creative and critical thinking, where those two aspects supports and reinforce each other, as when the critical thinker invents new premises or new criteria, and creative thinker gives a new twist to tradition or convention.

Such complex thinking is prepared to recognize the factors that make for bias, prejudices and self-deception (it is important in sociocultural, moral, psychological education). It involves thinking not about its subject matter, but about its procedures at the same time. B.S.Bloom (in **Taxonomy of Educational Objectives**) generated pyramid or hierarchy of skills, at the apex of which are **analysis, evaluation and creation**. If by “analysis” is meant critical thinking, if by “evaluation” is meant judgments, and if by “creation” is meant formation these skills may be called the main components of higher order thinking.

Purpose of higher order thinking is not to help decide what to believe. The **role of higher order thinking is defensive** – to protect people from being coerced or brainwashed into believing what others want to compel us to believe without having an opportunity to inquire for themselves<sup>6</sup>.



Bloom's Taxonomy

## Life-Long Education

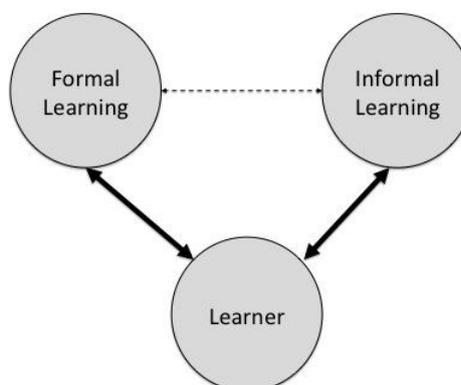
New learning technology is forever. E-learning is continuous education, the forty-year degree. It is a daily learning. Work becomes learning, learning becomes work, and nobody ever graduates. There may be many **different forms of e-learning** - Live e-Learning, Instructor-led, Online, Self-study or informal learning, Computer games, etc, Blended, Social-Learning, Mobile-Learning.

**Live e-learning** (also referred to as instructor-led training through the Internet) is the newest method of presenting training. Many people prefer learning with an instructor but cannot afford the cost or time to travel to a classroom. Other times, people in widely dispersed locations need to be trained simultaneously within a short period of time, with company specifics integrated into the course by the instructor. Live e-learning is a viable solution for these and other training situations. Live e-learning is instructor-led training conducted through the Internet (or company intranet) within a virtual classroom. Live instructor with excellent knowledge of the topic being taught might provide additional insight into the topic based on questions asked by learners in attendance.

If you are expected by the instructor and your employer to be in a class all day for three to five consecutive days, you will probably finish the course faster than if you use self-paced e-learning, unless your employer permits you to devote the same work hours to taking a self-paced class. But live e-learning is more expensive than self-paced e-learning. After all, you have a live instructor or the benefits of a live instructor present at all times. Second, live e-learning can require much more network bandwidth than self-paced training because of its audio, video and collaboration capabilities.

<sup>6</sup> Lipman M. Thinking in Education. – Cambridge, 1991., p. 19-23.

**Informal learning** is perhaps the most dynamic and versatile aspect of learning. Unfortunately, it is the least recognized. Learners need for information (and how we intend to use it) drives the search. Search engines (like Google) coupled with information storage tools and personal knowledge management tools like wikis and blogs present a powerful toolset in the knowledge workers portfolio. Peoples usually discover how to do jobs through informal learning -- observing others, asking the person in the next cubicle, calling the help desk, trial-and-error, and simply working with people in the know.



Learner between formal and informal learning process

E-learning can't replace everything. Solution may be the blended learning format. **Blended learning** is a term now widely used to describe myriad combinations of learning experiences. Blended learning gives permission to combine learning ingredients in new and creative ways to satisfy the tastes of every learner. Blended learning gives everyone the opportunity to shape programs to meet specific needs and goals.

Blended learning provides the best opportunities for learning transition from classroom to e-learning. Blended learning involves classroom (or face-to-face) and online learning. This method is very effective for adding efficiency to classroom instruction and permitting increased discussion or information review outside of classrooms. Learning is a social process, requiring instructor direction and facilitation. Blended learning utilizes the best of classrooms with the best of online learning.

The use of new learning technologies is growing up thanks to the diffusion of new devices and educational process. Teachers have to reflect about the use of these technologies to recognize the possibilities and the potentialities of a new learning course.

**A more in depth analysis of the interaction between Education and New technologies can be found in [Chapter 2 – Education of this Manual](#).**

## 2. The Application Of Multimedia Solutions To Education

### Multimedia Systems In Education

In the former Manual the relationship between multimedia and education was expressed by the position of Vaérie Gyselinck who showed the situation in the early 2000s.

Vaérie Gyselinck of the Laboratory for Experimental Psychology of the Université René Descartes (France)<sup>7</sup> clearly explained, *Multimedia systems are developing quickly and will continue to do so in the near future, especially in instructional fields. A multimedia system typically requires the integration of different types of information: verbal information presented visually or auditorily (e.g. words, sentences, or short texts), pictorial information presented visually in a static or dynamic way (illustrations, photographs, schemas), and sound information.*

*Systems that allow users to navigate between different sources of information with the use of hypertext structures are often considered to be multimedia systems, even if only one type of information is provided (for example, verbal information presented visually). The development of technologies is intended to provide the users with quick and easy access to a large amount of information and a choice between different forms of presentations. Thanks to multimedia systems, the instructional process can be made more flexible, rich, and individualized.*

*From a psychological point of view, however, the question arises as to what extent the use of all these overelaborate systems are beneficial to the learning process. The temptation is strong to simply assume that using multiple forms of displaying information, using realistic and vivid presentations, and providing multiple possibilities to interact with a learning system results generally in better learning (Schnotz, 1999a). Despite all technical innovations, however, the acquisition of information through any technical system is subject to the constraints of human information processing. Thus, people involved in the creation and use of this kind of material must then consider a series of relevant questions. In particular, thought must be given to how various sources of information have to be integrated by the user, either simultaneously or successively. This holds true across whatever goal the user has: either instructional, professional, amusement, or other. Further, one has to consider to what extent the user is able to integrate different types of information. For instance, which rules guide selecting the number and nature of simultaneously presented information? What are the sources of individual differences in processing ability from multimedia systems?*



Multimedia-based course for children in 1995.

Nowadays the relationship between multimedia and education is very strong. More and more teachers use multimedia to help themselves in their work and to facilitate students learning process. Multimedia technologies have a lot of advantages. Thanks to the introduction of new devices students can consult a great number of resources directly on their smartphones without time and space barriers.

<sup>7</sup> In Herre van Oostendorp (Editor), *Cognition in a Digital World*, Lawrence Erlbaum Associates, 2002

This kind of learning process results more attractive and effective. According to ISTE, the International Society for Technology in Education (<http://www.iste.org/welcome.aspx>), in fact, students claimed they learned the material at a much greater depth than in traditional writing projects when the communication involved multimedia productions.

Students seem to be curious about the creation of products that involve images, video, sound and more media stuff.

This kind of technology captures the curiosity of the students while they learn contents that are meaningful and important.

Students can access a lot of multimedia resources on Web. A great number of archives was created in order to support the diffusion of valid informations and resources useful for students and learners.



The MERLOT archive

One example is the MERLOT archive (<http://www.merlot.org/merlot/index.htm>).

MERLOT is a free and open online community of resources designed primarily for professors, researchers and students of higher education from around the world to share their learning materials and pedagogy.

MERLOT is a leading edge, user-centered, collection of peer reviewed higher education, online learning materials, catalogued by registered members and a set of faculty development support services.

MERLOT's strategic goal is to improve

the effectiveness of teaching and learning by increasing the quantity and quality of peer reviewed online learning materials that can be easily incorporated into faculty designed courses.

## Benefits of the use of Multimedia for teaching purposes

According to Salina Saharudin, teacher at Unisel of Malaysia<sup>8</sup>, Multimedia technology has a lot of benefits: it has user friendly interfaces, it is meaningful and easy to use, it has interactivity, it has great efficiency.

Thanks to hypertext and hypermedia teachers are able to use two different kinds of topic exposition: the Linear Presentation or the Non-Linear-Presentation.

Abhaya Asthana (Bell Labs, Lucent Technologies, Westford, MA, USA) recovers this difference explaining the Non-Linear-Presentation like a spider's web, with one idea linked to another, allowing choices in the learner's path.

Enabling teachers to have access to multimedia learning resources, which support constructive concept development, allows the teacher to focus more on being a facilitator of learning while working with individual students.

Extending the use of multimedia learning resources to learning and studying at home represents an educational opportunity with the potential to improve student learning.

Abhaya Asthana highlights also the possibility for students to produce multimedia documents on their own.

This approach provides several educational advantages. Students work with the same information from four perspectives:

<sup>8</sup> <http://www.slideshare.net/salina2309/the-role-of-multimedia-in-education>

- 1) as researchers, they must locate and select the information needed to understand the chosen topic;
- 2) as authors, they must consider their intended audience and decide what amount of information is needed to give their readers an understanding of the topic;
- 3) as designers, they must select the appropriate media to share the concepts selected;
- 4) as writers, they must find a way to fit the information to the container including the manner of linking the information for others to retrieve.<sup>9</sup>

## Media Education

Related to the connection between Multimedia and Education, we have to highlight the presence of a specific branch which studies the importance and the presence of Mass Media such as television in the learning process.

The work performed by MED (<http://www.mediaeducationmed.it/>), for example, is very important for a critical reflection about media thought not just as tools but also as language and culture.

MED promotes meetings, conferences, concourses in order to empower the diffusion of media education. This organisation is active in several different areas: in school and extra-school contexts, in religious contexts and organizes workshops and summer schools for students to remark the importance of media education. MED is very active and operative, the organisation publishes book and manuals about media education and it is constantly developing.



An example of a MED's project

## The application of multimedia to education

According to Tyler Lacombe, technology has developed to the point where many teaching methods that used to be focused on hardcopy approaches such as books, texts, reports, and slideshow presents can now be conducted online. This technology makes use of developing internet structures that allow users to access applications, interact with visual aids, and encounter material in new and helpful ways that were not available before. As more methods develop, teaching methods are growing to incorporate them.

Multiple learning channels, conferencing aspects and continuous resources are very important parts in the process of application of multimedia to education.

### Multiple Learning Channels

Some students learn better through visuals, some students learn better by listening, and some learn by working through material on their own. Multimedia aspects of online teaching allow teachers and trainers to use all three methods, reaching students more easily no matter their learning type.

### Conferencing Aspects

Conferencing abilities are one of the most significant changes to teaching and training in recent years. Online conferencing allows multiple users to join conversations with streaming audio, video, and chat functions that allow digital meetings and E-Learning.

Students can converse with teachers and other classes around the world.

<sup>9</sup> <http://encyclopedia.irank.org/articles/pages/6821/Multimedia-in-Education.html#ixzz1yKQfMui>

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### Continuous Resources

Online multimedia centres are very easy to access, and they can easily be updated to keep them current, unlike hardcopy books. As a result, online course information tends to be useful far longer than more traditional types of teaching materials. Students and employees can refer back to the same resources of data they used when learning if they have any questions. Teachers must maintain such centers of knowledge in order for them to be effective over the long term.<sup>10</sup>

The connection between multimedia and education has to be explored very deeply by teachers and educators. Multimedia has a great potential in the learning process but a critical reflection is necessary to utilize this technology efficiently.

**A more in depth analysis of the interaction between Education and Multimedia can be found in [Chapter 3 – Multimedia of this Manual](#).**

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<sup>10</sup> [http://www.ehow.com/about\\_6520413\\_impact-multimedia-education-training.html#ixzz1yKyzUiMS](http://www.ehow.com/about_6520413_impact-multimedia-education-training.html#ixzz1yKyzUiMS)

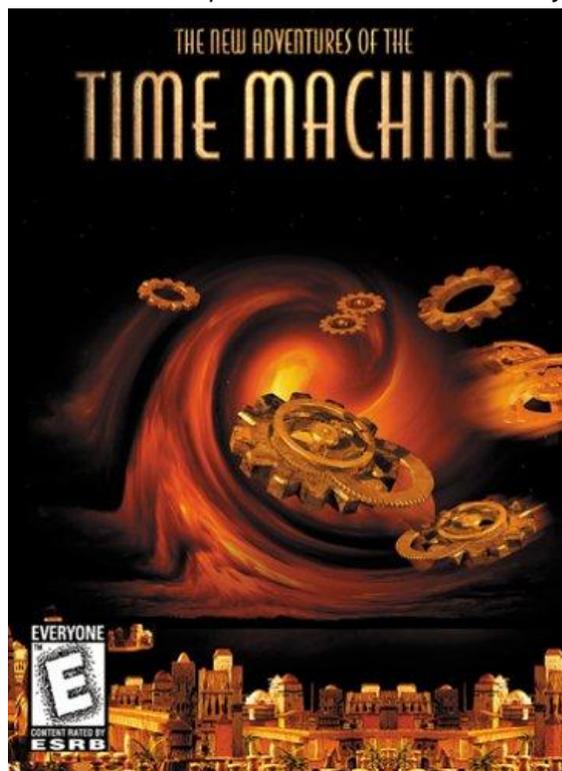
### 3. Education And Videogames

#### Videogames: a key literacy

In the previous version of the Manual the role of videogames in education was explored thanks to the point of view expressed by James Paul Gee and presented as a new frontier to be explored.

There is a book published in 2002 in the U.S.A. that clearly explore and explain the subject of the encounter between videogames and education: *What videogames have to teach us about learning and literacy*<sup>11</sup>. His author, James Paul Gee, thinks that videogames represent a new form of semiotic domain and emerging literacy, and also a new way to learn: as written by Jason Craft in his review of the book<sup>12</sup>, *Gee asserts that video games teach very well . . . indeed, better than our decontextualized, skill-and-drill classrooms. If meaning is situated within, and literacy occurs within, the context of semiotic domains (the term Gee uses for distinct and embodied contexts, matrices of environmental attributes and, crucially, social practices in which signs are given a distinct meaning, and in which a person can be literate), then video games present simulated semiotic domains and give information an embodied and contextualized presence that lends itself better to how we are psychologically structured to learn.*

*This learning is situated not only within the game but around it: the practice of learning a video game is an enculturation practice that involves not only learning the mechanics of gameplay, but learning how*



Cover of *The New Adventures of the Time Machine*

*to negotiate the context of play, the terms and practices of a game's players, and the design choices of its developers. These levels of engagement are what Gee calls, respectively, internal and external design grammars for a given domain. These design grammars are present in any given semiotic domain--from a basketball game to an archaeological dig--and video games, according to Gee, allow gamers to simulate, learn, and manage design grammars in a way that traditional teaching practices do not.*

*This points to Gee's second argumentative thread, which is, I believe, the more compelling: video games "situate meaning in a multimodal space through embodied experiences to solve problems and reflect on the intricacies of the design of imagined worlds and the design of both real and imagined social relationships in the modern world". Video games simulate identities, experiences, contexts, and social relationships in designed spaces. A player learns to think critically about the simulation while at the same time gaining embodied knowledge through interacting with it: taking on new avatars within it, solving problems through trial and error within it, and gaining expertise, or literacy, within it.*

*Gee is not arguing that video games are ready to replace standard classroom instruction. At this point in time, video games primarily teach themselves: a player learns how to navigate the game's territory, how to solve game-specific puzzles, how to kill the "boss" at the end of the game. But Gee stresses*

<sup>11</sup> Gee, James Paul. *What Video Games Have to Teach Us About Learning and Literacy*. New York: Palgrave Macmillan, 2003

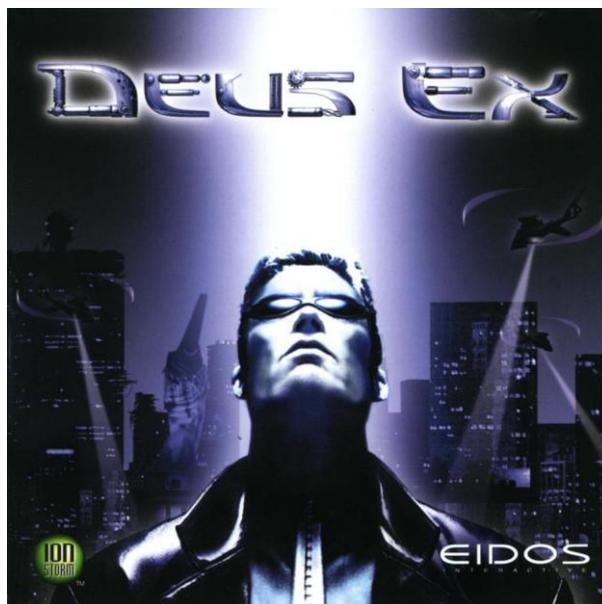
<sup>12</sup> Jason Craft, A Review of *What Video Games Have to Teach Us about Learning and Literacy*, in *Currents In Electronic Literacy*, <http://www.cwrl.utexas.edu/currents/fall04/craft.html>

*that his argument pertains to "the potential of video games", and believes that the method of instruction embodied in video games has potential for non-self-referential disciplines, particularly science.*

*It is very interesting how James Paul Gee starts to tell how he began to play videogames with his son: When I played the game I was quite surprised to find out it was fairly long and pretty challenging, even for an adult. Yet a four-year-old was willing to put in this time and face this challenge—and enjoy it, to boot. I thought, as someone who has worked in the second half of his career in education (the first half was devoted to theoretical linguistics), "Wouldn't it be great if kids were willing to put in this much time on task on such challenging material in school and enjoy it so much?" So I decided to buy and play an adult game ("adult" here means the game is played by teenagers on up; video-game players tend to be anywhere between 3 years old and 39). I somewhat arbitrarily picked the game The New Adventures of the Time Machine, a game involving adventure, problem solving, and shooting (based loosely on H. G. Wells), knowing nearly nothing about video games. Little did I know what I was getting myself into. This game, like nearly all such games, takes a great many hours to play. Many good video games can take 50 to 100 hours to win, even for good players. Furthermore, it was—for me—profoundly difficult.*

*In fact, this was my first revelation. This game—and this turned out to be true of video games more generally—requires the player to learn and think in ways in which I am not adept. Suddenly all my baby-boomer ways of learning and thinking, for which I had heretofore received ample rewards, did not work.*

*My second realization came soon after, when at the end of a day in which I had played Time Machine for eight straight hours, I found myself at a party, with a splitting headache from too much video motion, sitting next to a 300- pound plasma physicist. I heard myself telling the physicist that I found playing Time Machine a "life-enhancing experience," without even knowing what I meant by that. Fortunately, plasma physicists are extremely tolerant of human variation. (The plasma that physicists deal with is not, as he told me, a product from blood but a state of matter; when I asked him why he had not brought any to the party, he explained to me that plasma is so unstable and dangerous that if he had brought any, there would have been no party.) Oddly enough, then, confronting what was, for me, a new form of learning and thinking was both frustrating and life enhancing. This was a state that I could remember from my days in graduate school and earlier in my career (and when I changed careers midstream). Having long routinized my ways of learning and thinking, however, I had forgotten this state. It brought back home to me, forcefully, that learning is or should be both frustrating and life enhancing. The key is finding ways to make hard things life enhancing so that people keep going and don't fall back on learning and thinking only what is simple and easy.*



Cover of Deus Ex

*My third realization followed from these other two. I eventually finished The New Adventures of the Time Machine and moved onto Deus Ex, a game I chose because it had won Game of the Year on many Internet game sites. Deus Ex is yet longer and harder than Time Machine. I found myself asking the following question: "How, in heaven's name, do they sell many of these games when they are so long and hard?" I soon discovered, of course, that good video games (like Deus Ex) sell millions of copies. Indeed, the video-game industry makes as much or more money each year than the film industry.*

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Gee thinks that WHEN PEOPLE LEARN TO PLAY VIDEO GAMES, THEY ARE LEARNING A NEW LITERACY. *Of course, this is not the way the word "literacy" is normally used. Traditionally, people think of literacy as the ability to read and write. Why, then, should we think of literacy more broadly, in regard to video games or anything else, for that matter? There are two reasons.*

*First, in the modern world, language is not the only important communicational system. Today images, symbols, graphs, diagrams, artifacts, and many other visual symbols are particularly significant. Thus, the idea of different types of "visual literacy" would seem to be an important one. For example, being able to "read" the images in advertising is one type of visual literacy. And, of course, there are different ways to read such images, ways that are more or less aligned with the intentions and interests of the advertisers. Knowing how to read interior designs in homes, modernist art in museums, and videos on MTV are other forms of visual literacy.*

*Furthermore, very often today words and images of various sorts are juxtaposed and integrated in a variety of ways. In newspaper and magazines as well as in textbooks, images take up more and more of the space alongside words. In fact, in many modern high school and college textbooks in the sciences images not only take up more space, they no carry meanings that are independent of the words in the text. If you can't read these images, you will not be able to recover their meanings from the words in the text as was more usual in the past.*

*In such multimodal texts (texts that mix words and images), the images often communicate different things from the words. And the combination of the two modes communicates things that neither of the modes does separately.*

*Thus, the idea of different sorts of multimodal literacy seems an important one. Both modes and multimodality go far beyond images and words to include sounds, music, movement, bodily sensations, and smells.*

*Gee is convinced that playing video games actively and critically is not "a waste of time." And people playing video games are indeed (pace the six-year old's grandfather), learning "content," albeit usually not the passive content of school-based facts. (Many games, such as the Civilization games, do contain a good number of facts.) The content of video games, when they are played actively and critically, is something like this: they situate meaning in a multimodal space through embodied experiences to solve problems and reflect on the intricacies of the design of imagined worlds and the design of both real and imagined social relationships and identities in the modern world. That's not at all that bad—and people get wildly entertained to boot. No wonder it is hard for today's schools to compete.*

The predictions of Prof. Gee have become true and nowadays videogames are more diffused in the learning process and the borders of their uses are different. Videogames are exploited for students of different age covering from young to mature ranges.

### The situation now

In the last years videogames were widely developed. The improvement of hardware components of computers, and the diffusion of powerful playing consoles such as XBOX or PlayStation allowed teachers to use appealing videogames with realistic environments reproduced by strong engines.

The most important benefit of using videogames in the learning process is represented by the attraction that games have for students.

When they use videogames they start learning without being conscious of the educational process they are experiencing. Moreover much fun they have, more games they play and much topics they learn.

Educators increasingly recognize the impact of entertainment software and utilize games as a teaching device in a growing number of classrooms. More than just play, entertainment software helps impart knowledge, develop life skills and reinforce positive habits in students of all ages.

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Researchers have found that video games have real potential as next-generation learning tools. Games use new technologies to incorporate principles crucial to human cognitive learning. As Dr. Jeffrey Taekman, the director of Duke University's Human Simulation and Patient Safety Centre noted, "*serious games and virtual environments are the future of education.*"

In addition, a study conducted by scientists at the University of Rochester found that video games can improve players' vision, attention and certain cognitive skills. Study participants also performed better than non-gamers on certain tests of speed, accuracy and multitasking.

In June 2009, the Joan Ganz Cooney Center at Sesame Workshop released a report titled "Game Changer: Investing in Digital Play to Advance Children's Learning and Health" which concluded that computer and video games provide <<*an important, untapped opportunity*>> to support learning, particularly when children and adults play together. That same year, the center launched its Innovation in Children's Digital Media prize program, providing incentives for university media labs as well as the entertainment software industry to develop research-based games that promote learning through digital media.

In an effort to maintain this unprecedented momentum, the Department of Education announced in January 2010 that it would provide initial funding for the nonprofit National Center for Research in Advanced Information and Digital Technologies. The center will offer grants to academic institutions, nonprofit organizations or corporations who propose to research and develop new educational technologies, including simulations, computer and video games, virtual worlds and avatars that serve as tutors.<sup>13</sup>

### What makes a game fun and educational ?

Jayel Gibson states that a game can be both fun and educational. According to her study, teachers have to analyze and understand which elements make videogames fun and which elements make them educational.

She provides a list of these elements.

What makes a game fun?

- Challenge and strategy – this is the core of the game. It includes the objective, the play and the scoring. The game should provide a challenge for its players and allow them to use different strategies to gain a level or win. This is what determines the age group or skill level.
- Element of surprise – this is the variation of the game. The element of surprise must be built into the game to provide laughter, excitement, regret or risk.
- Replay ability – this is the ability to play the game over and over with different outcomes each time. This is measured by the 'boring' factor. If the child gets bored fast, the game lacks replay ability.

What makes a game educational?

- New information – this is the educational information provided. It may be text or graphics, and is normally unknown by the age group or skill level for which the game is made.
- Memorization – this is the part of the game that rewards good memory. If players are able to remember the new information, they can advance in the game.
- Context and Cognition – this is the part of the game that puts the new information to use. Players win or score points by matching pairs, answering questions or problem solving.
- Gender and Ethnic Balance – the game addresses equity issues through cooperative group play, language diversity, and character gender options<sup>14</sup>

<sup>13</sup> <http://www.theesa.com/games-improving-what-matters/education.asp>

<sup>14</sup> [http://www.education.com/magazine/article/Video\\_Games\\_Educational/](http://www.education.com/magazine/article/Video_Games_Educational/)

## XBOX and Kinect

Recently a great number of videogames related to the educational process has been developed in order to involve learning strategies in enjoyable games for students.

A device for XBOX called «Kinect» allows to the player to move his body to control an avatar on the screen, without the use of a controller or a joystick. This new kind of technology makes videogames much involving, absorbing and realistic. Some videogames for Kinect are addressed to children to teach them colours, numbers and words. Potentialities of Kinect are also utilized in practical trainings, for example in medical superior studies.



A medical training use of Kinect

## The case of Foldit

Moreover at the end of 2011 a group of scientists of the University of Washington published a free online puzzle-game called «Foldit» about the creation of proteins. During the game players have to combine amino acids in order to create new proteins. The game has both an educative aim and a collaborative goal.

In fact computers of scientist are not good as human mind of players: they can not find and guess solutions as well as human brain, so scientists registered all correct solutions that players gave all over the world. While players have fun, therefore, they learn about science and contribute to science itself. The results of this experience were incredible.

Thanks to players' intuitions some enzymes linked to the AIDS, and proteins related to cancer have been discovered and studied.

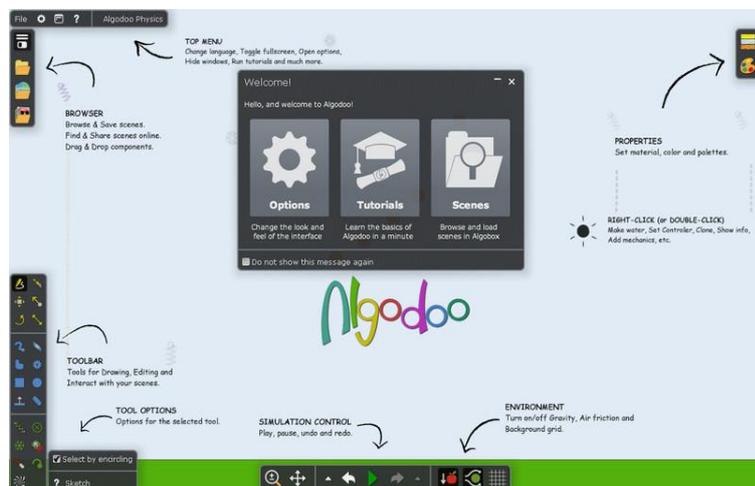
## Potential of videogames

More and more educational video games are now appearing on the computer and Internet. These games teach basic computer skills while also offering insight on a particular topic or subject. Sim City is a good example of this because the game teaches the players basic controls on the computer, but also teaches them on how cities are planned, built, and run.

Teachers and parents are now learning the benefits available to students who use video games. At home kids can use the games to better learn and understand the ideas they're taught in school.

For example, kids who are in reading class can use reading games to ensure that they know the basic skills before they move on to the next level.

Parents can also use these video games to test their knowledge, with kids using the games prior to a test or quiz.



An Algodoo Physics screenshot

Videogames cover a wide range of possible different aged players. From kids of kindergarten to students of high school, from primary school pupils to university students there are lots of different games available in order to make an effective educational process for every age of learners.

Examples of videogames created for different aged learners are «Algodoo Physics» and «Learning Maths». In

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these games, students of every age can find exercises and explanations to train themselves in Physics and Maths.

Exercises are presented after a theory paragraph and they are organized in growing difficulty. Students control time and rhythm of exercises so they can experience a kind of enjoyable, attractive and effective education.

Videogames have a great potential in the education process, but the border between learning and playing has to be critically examined by teachers in order to increase the educational effect produced by this technology.

**A more in depth analysis of the interaction between Education and Videogames can be found in [Chapter 4 – Videogame](#) and [Chapter 5 - Programming](#).**

## 4. Social and Mobile learning

The growth of social media tools and applications over the past ten years has transformed the ways in which most people experience education. Due to the regard that surrounds this area of technology, it is essential that educators are able to approach social media and mobile learning in a considered and knowledgeable manner.

### Social learning

According to Neil Selwyn (Department of Culture, Communications and Media, Institute of Education, University of London) social medias offer new occasions to involve students in the learning process. Social medias are, in fact, perfect environments to learn because they are active, constructive, conservative, complex and reflexive so they contribute to motivate and help students.<sup>15</sup>

The great number of opportunities linked with the use of social medias is proportional to the simplicity of access, production and sharing of resources. In this way it is possible to participate in experiences of collective and collaborative learning in which the participation of students is essential in order to develop their skills.

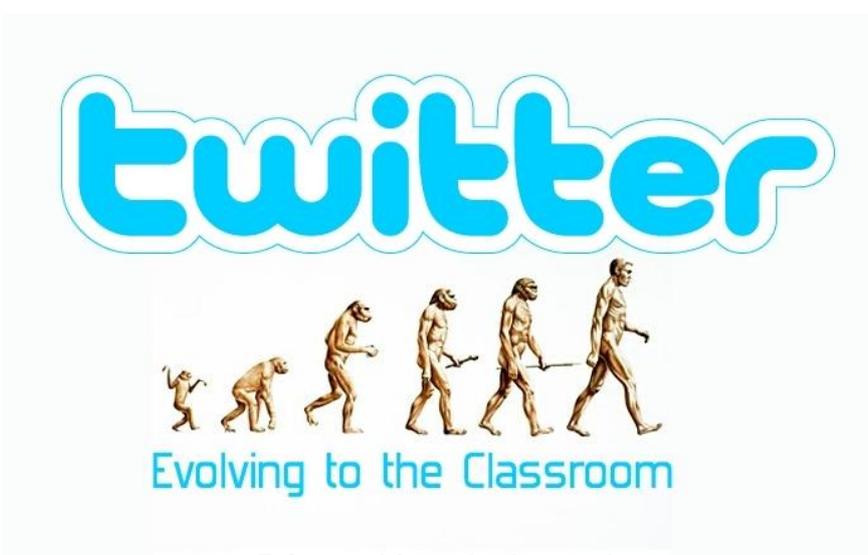
Freedman analyzed a series of activity proposed by teachers who used a social media in order to involve students in learning activities. For example students were encouraged to post on <http://www.twitter.com>

their reflections about lessons. Teachers used the comments of their students as a starting point for discussions in the classroom.

Freedman described also the use of microblogging applied to roleplays to improve learning process. Students, for example, embodied the role of Robert Catesby, leader of the Gunpowder plot in 1605, and published post describing their actions and organizing with other conspirators.

At the end of this experience the result was a better comprehension and memorization of the topic because students were an active part of the historical event.<sup>16</sup>

Ranieri evidences that social networks are also at the bottom of connectivism theory. Social networking sites increase the capacities of people to connect with other users or with expert teachers and with contents. According to this theory social media are tools useful to make knowledge



<sup>15</sup> SELWYN N., *I Social Media nell'educazione formale e informale tra potenzialità e realtà*, «Tecnologie Didattiche» numero 55, EDIZIONI MENABÒ, 2012.

<sup>16</sup> FREEDMAN T., *The Value of Microblogging in Education*, «Form@re» numero 74, Edizioni Erickson, 2011.

accessible to everyone and to participate in the process of construction of informations and education.<sup>17</sup>

Nowadays social medias use in education is common. Teachers have to make a critical reflection about uses of this kind of new learning technology because social medias are continuously evolving and there are several factors to be valued. The didactic use of these devices can be applied only personalizing from time to time and paying attention to situations and methods. Only a targeted use of the devices will clarify the borders of a possible evolution in learning processes.

**A more in depth analysis of the interaction between Education and Web 2.0 can be found in Chapter 6 – Social Games in Education.**

### Mobile learning

Mobile learning refers to all the mobile and wireless technologies as smartphones, tablets or Personal Digital Assistant (PDA) useful to learning process. These mobile devices are the main resources to obtain and exchange information, resources and materials functional to increase personal knowledge. Therefore mobile learning means a process of creation of environments and spaces without material borders in which every member is potentially connected 24/7, all the human knowledge is accessible by everyone in a few seconds and everyone can be a producer of contents as well as a consumer.

Mobile technologies can be used in formal and informal contexts. “Mobile school” stands for learning activities in traditional educational environments supported by mobile devices. “Learning on the move” is about the informal educational use of m-dispositives in physical public spaces as museums, natural parks, artistic sites and in private contexts to achieve professional aims.

In recent years a lot of apps have been developed in order to improve mobile learning. The most part of secondary school students has smartphones so they can easily download and use new apps, for example Blackboard (<http://www.blackboard.com/platforms/mobile/overview.aspx>) which allows them to manage tasks, announcements, grades, blogs and discussions.

By using mobile devices, students are able to operate without space and time constrictions. Their devices are able to connect to the Web with wireless technologies so the presence of a fixed network is no more necessary to access an enormous quantity of resources. Learning contents are also always available for them, without time barriers.



The Blackboard app

<sup>17</sup> RANIERI M., *Le insidie dell'ovvio. Tecnologie educative e critica della retorica tecnocentrica*, EDIZIONI ETS, 2011.

Teachers have to pay attention using mobile learning devices. New learning technologies are, in fact, useful but they have to be used in critical way in order to be really effective and penetrating.

**A more in depth analysis of the interaction between Education and Mobile can be found in [Chapter 5 - Programming](#).**

### **Social medias and mobile learning work together!**

As reported by Hockly in her studies, there is a strong connection between social medias and mobile learning.

The most popular app used on the smartphones is Facebook, a social media which can support learning. How?

#### **1 Integration**

In this case use of social networking is integrated into the app or learning program. An example is the new British Council radio-style podcast *Learn English*: this includes a Facebook page for the podcast presenters, where learners can post comments and questions.

#### **2 Addition**

In this case use of social networking sites or tools are *external* to the app itself, but learners use these networks to support the learning programme.

An example is the *K-Nect mobile project*. US high school kids used specially created apps for learning algebra and maths, but insisted on being allowed to set up blogs and to use instant messaging through which to communicate outside of the program itself. Teachers were initially skeptical, but the social networking part of the project proved immensely successful.<sup>18</sup>



The K-Nect mobile project

### **Social medias and mobile learning are the future**

Social medias and mobile learning are the frontiers of the new learning technologies. As well known in order to reach a good education, it has to be effective, efficient and attractive. The use of social medias and mobile learning, critically approached by

teachers, makes education attractive for students, who apply their minds with pleasure in this kind of education making it more effective.

An innovative way in education process is started in the last years and it is now developing to achieve the most number of people for the most part of their life in order to have a real lifelong learning !

**A more in depth analysis of the interaction between Social Media and Education can be found in [Chapter 6 – Social Games in Education](#).**

<sup>18</sup> HOCKLY N., *Mobile learning #7: mLearning & Social Networks*, 2010.

## 5. Presentation of the Manual

### Chapter 2

The second chapter deals with education connected with E-Learning and new learning technologies.

In the first part the chapter highlights the revolution happened in the education process after the introduction of E-Learning.

The chapter underlines the benefits of the new learning technologies: thanks to E-Learning, education is personalized, interactive, geographical and temporal independent, attractive and effective.

The contents describe the environments in which new learning technologies operate comparing online and Face-to-face instruction.

An analysis of Learning Management Systems (LMS) and the issue about which are the platforms that automate the administration of training events is also addressed.

The capability of videogames of integrating distance learning thanks to the new communication technologies is described.

In the second part, the chapter:

- investigates the practical methodologies of E-Learning focusing on how to design quality E-Learning environments.
- examines the role of online teachers as facilitators of learning process for students, providing a deep description of an E-Learning educational process explaining how success will depend on the quality of the instructional design and the academic and technical support provided to learners and instructors. The best way to succeed according to the contents, is to understand the landscape, and to make choices based on the environment of the organization where e-learning is being implemented: E-learning implementation should be holistic.
- describes the features of an exemplary course: the planning phase, accessibility, goals and objectives, contents and their organization, language, tasks, layout, learning resources and evaluations in order to form an opinion in the reader about technological educational process. The importance of E-Learning platforms such as Moodle is also mentioned.

In the last part of the chapter:

- explains how and why it is important to use videogames in the didactic process. The analysis discuss the basic principles of videogames educational activity and points up the importance of simulations.
- highlights the key-skills of communication and team-building and concludes this passage remarking the benefits of videogames in the learning process and the elements useful to evaluate the selection of an educational videogame with some examples.

### Chapter 3

This chapter addresses the connection between multimedia and new learning technologies.

At the beginning the chapter:

- analyses the uses of multimedia languages in education and the softwares. A clear example is illustrated about the use of an interactive board during a course. The board is a device which combines the elements of a screen for presentations, self-copying board and computer monitor. As the board may be connected to a computer via a cable or via an infra red connection (wireless) it is possible to carry out dynamic work and continuously save the notes on the hard disk.
- The chapter continues with the approach by addressing the theme on how to learn languages with multimedia games, remarking the example of the European project "I Speak Therefore I Write".

In its second part the chapter:

- describes how to produce and manage images with different software for 2D and 3D pictures, such as Photoshop, Vectorial Design software, Macromedia Flash and Blender.

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- examines exhaustively how teachers can produce and use pictures in the educational process and how they can project graphical environments in order to involve students in a 3D learning experience.

In its following parts the chapter focuses on the production of animations and videos:

- how to create .gif animations and how to use the most important features of programmes who make graphical and visual environments.
- how audio features have to be used in order to make environments more realistic and attractive and how to conceive and design an interface for the educational process.

In the end there is an example of a building represented using computer graphic programmes.

## Chapter 4

The fourth chapter explains how and why videogames are used in learning process. Teachers have to make a critical reflection about the topic treated in order to plan efficient and effective educational programmes.

At the beginning of the chapter videogames are proposed as possible learning environments and learning applications.

A brief history of videogames is given in order to provide an idea to the readers about the development of this technology.

In the second part, the chapter provides an overview about the different types and categories of videogames and describes the different ways, a game based learning approach can be included in an educational practice. Either a ready made game can be chosen to be integrated into the teaching, you can adapt or modify an existing game, you can design your own learning game, or you can integrate students in the game design process.

Some guidelines, advantages and disadvantages, as well as the necessary infrastructures, skills and competences the trainer need to carry out these approaches are described. The chapter continues with two very detailed and practical examples of designing videogames for learning: "The Dark Room" and "Return to Castelvechio".

The chapter ends with a discussion on violence in videogames. A paragraph, about the question of the psychology of aggression, highlights that many of the most popular and successful games are not violent.

Links integrated in the text, moreover, point out to further reading and additional resources.

## Chapter 5

This chapter explores the topic of mobile learning. It is about the relationship between the educational process and all the mobile devices and apps who help teachers in their work. It is especially focused on Corona SDK.

Corona SDK is proposed as an excellent option for any kind of mobile developer from beginner to advanced for creating high-performance multimedia graphically rich applications and games for the iPhone. With Corona, you can quickly create iPhone applications in a matter of hours. No Objective-C/Cocoa required, and no C++.

The largest advantage of Corona is that it allows you to work with one code base and produce products for many different devices. Corona SDK will allow you to create apps for all iOS devices and Android devices.

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Corona uses the Lua programming language to create applications. Lua is a scripting language commonly used to develop games. It has a good amount of market adoption in the development community.

The chapter offers a lot of examples of apps and games developed for mobile devices: an analog clock app, an accelerometer application, an entertaining magic ball application and a basketball game.

In the chapter all the passages for the creation of these apps are described in order to explain how apps are made and how educators can create their own apps.

## Chapter 6

The chapter number six deals with social games in education.

Social medias are widely spread al over the world. The diffusion and the success of social networks is a fundamental element that attracted the attention of educators and teachers who started to use social medias in order to make the learning process more effective. Videogames played on social medias are called social games.

The chapter highlights that students are changing. A new generation of students is entering vocational training, a group called the "Millennials" or the Net Generation.

The chapter also remarks the importance of casual games. Casual games are one of the most popular categories of games played over the Internet. Casual games are videogames developed for the mass consumer, even those who would not normally regard themselves as a 'gamer'.

The core of the chapter is represented by the topic of social games and the ways they can be played. Environments, incentives and needs are highlighted in this part of the book, in which a notorious example can be found: CityVille. CityVillle is a sim game which involves placing houses and business in field, connecting them with roads, growing crops to supply the business and then investing in community buildings to keep your population happy and increase the amount of people the user can have living in her/his town.

The Chapter continues describing social games security and malware that can affect the users in order to steal virtual money or account, personal datas, personal credit cards number, and provides a very useful security Decalogue.

In the end of the chapter some perspectives for the future are presented in order to propose and stimulate critical reflections of educators about social medias.