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A CONCEPTUAL VIEW OF E-TRAINING SYSTEMS

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Abstract

The use of new information and communication technologies to bring about learning examines its effectiveness for the learners. Indeed, these new technologies progress with giant strides in all the organizational and the educational sectors and particularly higher education In order to better understand e-Learning, we propose to initially specify its terminology. Second, we are going to approach its historical evolution. Third, we shall distinguish between the e-learning model, the traditional learning model and the blended learning model. Finally, we are going to focus on the actors in e -Learning.

Keywords: e -Learning, teaching by correspondence ; blended learning; actors ; Approach

1. INTRODUCTION

The use of new information and communication technologies to bring about learning examines its effectiveness for the learners. Indeed, these new technologies progress with giant strides in all the organizational and the educational sectors and particularly higher education.

This new method supposes several pedagogical, social and economic advantages (Ben Romdhane, 2010). Thus, e-learning, particularly, offers better flexibility of time and space, a facility and a personalization of e-learning (Mbarek, 2008). Moreover, e-learning supports the minimization of the costs engaged for the learning and a better productivity improvement.

The present study seeks to achieve the following goals:

- To enrich the theoretical framework of e-learning
- To release the specificities of e-learning in the Tunisian context.

The major interest of our research is to highlight the advantages of e-learning. Our paper covers the definition of e-learning, then, highlights the fields of its application, and finally proposes to clarify the challenges of its effectiveness.

In addition, the objective of this research is to present e-Learning as a new concept, while considering its field of application through the use of new information and communication technologies.

1.1. The Definitions of e-Learning

The evolution of the realized researches in the field of e-leaning has been the object of several studies developing its terminology (Romiszowski; 2003; Fenouillet and Déro, 2006; Ben Abid – Zarrouk, 2010). Indeed, several definitions have been extended by the literature. However, the definition of e-Learning proves to be complex since it involves various technological forms (Fenouillet and Déro, 2006). Considering the diversity of the technological forms, there is no consensus over the definition of e-Learning. Within this framework, the definition of e-learning proposes to us to only focus on the studies where learning is carried out through Internet (Fenouillet and Déro, 2006).

Several Anglo-Saxon scientific researchers have employed a multiplicity of terms to nominate e-learning, like the following terms: “computer-Based Learning”, “Internet Learning”, “Online Learning”, “Distributed Learning”, “Networked Learning”, “Tele-learning”, “Virtual Learning”, “Computer Assisted Learning”, “Web-Based Learning”, “Web-Based Training”, “Distance Learning”, “Asynchronous Learning Network”, “Learning Object Download” (Fenouillet and Déro, 2006; Sharifabadi, 2006; Mbarek, 2008). Consequently, it is right to conclude that all these terminologies have the same meaning.

E-learning is an online learning model which is broadly characterized by the use of new information and communication technologies. It has been the object of various definitions. Consequently, the definition of e-Learning is enlightened with the multiplication of the researches in the field. Table 1 illustrates a synthesis of E-learning definitions.

Table 1: Definitions of e-Learning in the literature

Authors	Definitions
Homan and al. (2000)	*"A learning device resorting to digital technologies such as the Internet, the Intranet and the wireless technologies etc."*
Alavi and Leidner (2001, p 2)	*"The environment in which the interactions of the learners with the learning materials (the readings, the tasks, the exercises etc.), the colleagues, and/or the instructors are mediated through advanced information technologies".*
Sambrook (2003, p. 507)	*"any learning activity supported by the ICT"*
Romiszowski (2003)	*"E-learning is based on four learning forms, which are: the autonomous learning, the collaborative learning, the synchronous online learning and the asynchronous off line learning. The author adds that e-learning is used via Internet. That includes the forums, the chats and, the videoconferences."*
Tastle and al. (2005)	*"an educational device which resorts, not only to Internet, Intranet, Extranet, Satellite technologies, but also it resorts to other means of e-learning, either multi-media or not: CD-ROM, interactive CD and computer-assisted learning"*
Fenouillet and Déro (2006, p. 3)	*"E-learning is the use of Internet to reach teaching resources, teachers, other learners, supports and this during a learning process, with a view to acquire knowledge, skills and experiment".*
Shaifabadi (2006, p 391),	*"The use of Internet in order to reach learning equipments, to interact with the contents, the teacher, and other learners; and to obtain a support during the learning process, in order to acquire knowledge, to build personal significances, and to develop the learning experiment".*
Ben Abid–Zarrouk (2010, p 3)	*"Each learning device which uses a local network, extended or Internet to broadcast, to interact or to communicate. What includes e-learning within a distributed environment (except teaching via the traditional correspondence model)"*. The author adds that this device *"can involve the synchronous and the asynchronous, tutoring, self-study systems, or a combination of the aforementioned elements"* (p.3).
Ben Romdhane (2010, p. 17)	*"a teaching innovation based on the use of multimedia technologies and Internet allowing the learner to acquire how, to store, to distribute and to share information/ knowledge by transgressing the barriers of times and space associated with the traditional learning"*.

While referring to these definitions, several authors have adopted a restrictive sense of the concept of "e-learning" while only considering the use of Internet, Intranet and wireless technology (Homan and al. 2000; Shaifabadi, 2006). Nevertheless, other authors have adopted a broader sense of the concept while considering the following terms: "communication and information technologies", "advanced information technologies", "multimedia technologies like CD ROMS, the interactive CD" and "computer-assisted learning (Alavi and Leidner, 2001; Sambrook, 2003; Tastle and al.2005; Ben Romdhane, 2010). Further, other researchers have highlighted the learning models (Romiszowski 2003; Ben Abid – Zarrouk, 2010). Also, several other authors have specified the main actors in e-learning, namely: the learner, the teacher and technology (Alavi and Leidner (2001); Shaifabadi, 2006; Fenouillet and Déro 2006; Ben Romdhane, 2010).

By taking into account the above mentioned definitions, we propose the following definition of e-learning:

E-learning is a teaching innovation founded on the use of Internet and Multimedia technologies allowing the learner to acquire, store, distribute, share knowledge information and to interact with other learners, teachers and tutors.

1.2 Historical Evolution of e-learning

Several academic researchers have reviewed the historical evolution of e-learning (Niper, 1989; Fenouillet and Déro, 2006). Indeed, the authors have highlighted the various learning generations, namely: correspondence teaching, teaching by television and the industrial model, interactive distance learning, and e-learning.

1.2.1 First generation: teaching by correspondence

In 1840, the first teaching by correspondence came out in England and marked the beginning of distance learning in Europe, to develop thereafter in the rest of the world. Niper (1989) suggested that this method is especially aimed at adults who could not complete their secondary or superior education. Thus;

these learners have been assisted by correspondence and sometimes by telephone. Within this framework, Niper (1989) showed the weakness governing the interaction between the tutors and their learners.

In addition, the Thirties, were characterized by the advent of the first technology innovation of the radio (Fenouillet and Déro, 2006)

1.2.2 Second generation : Teaching by television and the industrial model

The Seventies have been marked by the creation of the National University of Distance Education in Spain and the "British Open University" in Brittain (Niper, 1989; Fenouillet and Déro, 2006). Within this framework, the courses were diffused through television, the tapes the audio and the video.

Niper (1989) attested that this second teaching generation was prescribed in the behaviorist teaching approach where the printed text form is required. The author highlighted the importance of the teaching role played by the audio visual.

However, the interaction between the learner and the tutors was limited to the correction of the work by correspondence and sometimes by telephone. In addition, the National University of Distance Education counts more than 380 000 students currently and the "British Open University" counts more than 200 000 students, nowadays.

1.2.3 Third generation : interactive distance learning

The Eighties were marked by the significant use of distance learning models such as computer-assisted learning, cable video conference, satellite or telephone, e-mail, Web discussions, the use of the diskettes and the CDs (Niper, 1989; Fenouillet and Déro, 2006).

In addition, Niper (1989) had noted that this third generation is dominated by the "constructivist" teaching approach. Indeed, this approach supported the exploitation of interactive technologies for collaborative learning, the reformulation of the studied concepts by the learner, the instant anonymous auto-evaluation, etc. (Niper, 1989).

1.2.4 Fourth generation: e-Learning

The Nineties have marked the first use of Internet, which have considered e-learning (Fenouillet and Déro, 2006). The authors stipulate that the Internet made possible the interaction among the learners on the one hand and, between the learners and their teachers, on the other hand.

Within this framework, Fenouillet and Déro, (2006) have quoted the main advantages of e-learning. Thus, the researchers claim that e-learning is a specific media as it makes it possible for the learners to interact with other learners or teachers in a synchronous or asynchronous method. These two learning methods "cover all the field of computer-assisted communication" (Fenouillet and Déro, 2006, p.5).

Moreover, two other advantages were considered by Mc Comb (1993); the accessibility to the learning contents and to the virtual communities. In addition, Fenouillet and Déro (2006), suppose several advantages of the asynchronous communication. First, it's about increasing contacts, self-checking and conflicts minimization. Second, it's the asynchronous nature of e-learning which makes it possible to promote the emergence of collective intelligence. Third, it makes it possible to avoid the monopolization of the speaking time and supports the reflection time. Fourth, it makes it possible to push the thorough analysis of the subject in question.

Thus, it appears from the literature review that e-Learning is the fourth generation. Consequently, table 2 illustrates a synthesis of the generations presented above.

Table 2: Historical Evolution of E-learning

	Method	The conceptual Basis	Pedagogy	Advantages/ Disadvantages
First Generation	Correspondence teaching. Use of the radio	Behaviourist Approach	Audio	Weak interaction between the learner and the tutor
Second Generation	Television Video Tapes	Behaviourist Approach	Audiovisual	Weak interaction between the learner and the tutor
Third Generation	Video conference Web discussions Floppy disks CD	Constructivist Approach	Interactive Technologies	Interaction between learner and tutor Collaborative Learning Auto-evaluation Ease of access to information
Fourth Generation	e-learning	Constructivist Approach	Interactive Technologies	synchronous and asynchronous Learning Ease of access to information Existence of virtual communities

1.3 Distinction between the traditional learning, e-learning and the blended learning

As we have just clarified above, e-learning is a teaching innovation founded on the use of Internet and Multimedia technologies, which allow the learner to acquire, store, distribute, share information / knowledge and to interact with other learners and teachers. On the other hand, the conventional learning is defined as a face to face model which supposes that the learners shall be in the same classroom facing a teacher (Ben Abid – Zarrouk, 2010).

The blended learning corresponds to the combination of the two above quoted methods. It presumes at the same time the direct contact and the learning via new information and communication technologies.

Indeed, several tens of meta-analyses have been carried out in order to compare groups of distance learners compared to groups of face to face learners (Fenouillet and Déro, 2006). Within this framework, the authors stipulate that these meta-analyses showed that the tutorials or the teaching software make it possible to slightly improve the learners' performances but in less time compared to face to face learning. And best of all, the authors add that the conclusions drawn from these meta-analyses join their conclusion which considers that e-learning is more effective than face to face teaching.

In order to better clarify the differences between the three teaching models, it appears useful to present the following table of comparison:

Table 3: Distinction among the three learning models

Characteristics	**Learning Models**
	Conventional learning
Centre of interest	- Importance of the physical presence of the teacher.
The learner's role	- Passive
Interactivity	- Direct interaction between the learner and the trainer
Learning process	- Constant, static, fix etc. - A content fixed from the outset by the teacher - Direct information exchange
Personalization of learning	- The learning content is designed for all the learners
Flexibility of the learner's time and space	- Time and space represent a constraint for the learner. - The time is fixed according to a timetable - Space: classroom
Technology	- Absence of technology
Characteristics	**E-learning**
Centre of interest	- Importance of the learner
The learner's role	- Active
Interactivity	- Interaction through IT tools. We are talking about interaction through a machine.

<table>
<tr><td>Learning process</td><td colspan="2">- Dynamic, active etc.
- Easily updated content.
- Information exchange via IT tools.</td></tr>
<tr><td>Personalization of learning</td><td colspan="2">- Personalized content according to the learners' needs.</td></tr>
<tr><td></td><td colspan="2">- Autonomy in the organization of the learning time and space.</td></tr>
<tr><td rowspan="4">Technology
Adapted by Zairi (2006)</td><td colspan="2">Asynchronous (e-mails, discussion forum, mailing list etc.)</td></tr>
<tr><td>Advantages</td><td>Disadvantages</td></tr>
<tr><td>- The rapidity of obtaining several information concerning various subjects
- Broad information flow.
- Knowledge Enrichment.
- Communication Flexibility.
- Assistance of the tutor/s.
- Spaciotemporal independence.</td><td>- Additional burden in drafting messages to make sure of being understood by the other learners and tutors.
- The very long latency leads to the disinterestedness of the learners.</td></tr>
<tr><td colspan="2">Synchronous (Chat, Videoconference, Audio conference, etc.)</td></tr>
<tr><td>Advantages</td><td>Disadvantages</td></tr>
<tr><td>- Enables easy communication in real time.
- Spontaneous and dynamic communication, as well as participation equality.
- To benefit from the interventions of the others.
- Facility to make contact with the professor, the tutor or the peers for the shy people.
- To eliminate the learner's isolation.
- Communication mode allowing an equal participation for all the participants.</td><td>- Real time interventions are brief.
- Obligation to set appointments before certain sessions.</td></tr>
<tr><td>Characteristics</td><td colspan="2">Blended learning</td></tr>
<tr><td>Centre of interest</td><td colspan="2">- Importance of the learner and the teacher in class and of the tutor on-line.</td></tr>
<tr><td>The learner's role</td><td colspan="2">- Active</td></tr>
<tr><td>Interactivity</td><td colspan="2">- Interaction through IT tools.
- Direct interaction between the learner and the trainer.</td></tr>
<tr><td>Learning process</td><td colspan="2">- Dynamic, active etc.
- Easily updated content.
- Information exchange via IT tools.</td></tr>
<tr><td>Personalization of learning</td><td colspan="2">- Accessible content for all the learners while taking into account the individual needs of each learner.</td></tr>
<tr><td>Flexibility of the learner's time and space</td><td colspan="2">- The number of hours fixed for the course in class and that managed online depends on a calendar fixed by the trainer.
- Space: in class and open</td></tr>
<tr><td>Technology</td><td colspan="2">- Information and communication technologies</td></tr>
</table>

1.4 The actors in e-learning

According to Paquette and al. (1997), there are five actors in the learning process, namely the Learner, the trainer, the author, the manager and the advisor. In turn, Houze and Meissonier (2005) consider three main actors in the learning process, namely: the Learner, the tutor and institution where the e-learning proceeds. However, the learner remains always the center of interest of e-learning (Piccoli and al. 2001). In turn, Sabbagh (2001) argues that the number of the actors intervening in the device of e-learning varies according to the platform. By referring to these researchers; we present a synthesis of e-learning actors.

1.4.1 The Administrator

The administrator refers to the author who deals with the software maintenance. Indeed, he ensures the management of the accounts of the other actors playing a role in the e-learning. Also, he maintains in good working order, the learning system which integrates new information and communication technologies.

1.4.2 The Course Creator

He is the manager and the advisor as assigned by Paquette et al. (1997). The course creator has the role of course development through using the platform tools, according to the teaching objectives. Also, he introduces changes according to the learners' and the tutors' reactions. Indeed, he facilitates learning by managing the actors and the events in order to ensure the good progress of the learning process.

1.4.3 The Learner

While referring to Paquette and al. (1997) and Sabbagh (2001), the learner can be defined as a student or an employee in a learning situation which uses a platform to acquire information and to transform them into knowledge. Indeed, the learner is evaluated. He prepares reports, projects, and takes part in discussion forums (Sabbagh, 2001).

In turn, Houze and Meissonier (2004) have focussed on the role of the trainers which proves to be insufficient to suffice or to overshadow certain individual characteristics of the learners in a learning environment. Indeed, the author refers to several researchers to present these characteristics. It is about: the motivation, the fear or frustration, and the desire to learn. The authors add that the learners shall develop an active behavior, interact with the contents, adapt the contents, get committed, and be autonomous for a successful e-learning.

In a similar vein, Ben Romdhane (2010) used research in education science and information system to identify the components of the learner's environment in an e-learning device. Within this framework, the author proposed three environments; the individual, the organizational and the technological environment.

While referring to Ben Romdhane (2010), we present in what follows a table which synthesizes the components of the three environments.

Table 4: Synthesis of the learner's environments

<table>
<tr><td>Characteristics</td><td colspan="6">Environments</td></tr>
<tr><td></td><td colspan="6">Individual Environment of the learner</td></tr>
<tr><td>The individual characteristics</td><td colspan="6">- The desire to learn
- Individual Effectiveness
- Risk acceptance
- Creativity
- Self understanding
- Risk-taking
- Self-regulation
- Learning styles: the reflectors (data collection, observation), the activists (transfer of new knowledge and consequences release), theorists (root their learning on a rational and analytical approach), and the pragmatics (empirical and practical approach).
- The cognitive styles:
According to Flessas and Lussier (1995) we distinguish four cognitive styles, namely:
- <u>Sequential verbal behaviour:</u> memorizing the series (figures, letter, words, etc.), perception and discrimination of the sound, logical sequence and chronology of the ideas, fluidity in elocution.
- <u>Sequential nonverbal behaviour:</u> memorizing the series (gestures, musical notes, etc.), perception and discrimination of the details, logical and chronological sequence of the execution stages, and fluidity in the sequence of gestures.
- <u>Simultaneous verbal</u>: synthesis of multiple information, mental representation of the built images starting from verbal statements, comprehension of the graphic symbols, use of analogy and metaphors
- <u>Simultaneous nonverbal</u>: Perceptual synthesis of the visual gestures, mental evocation of forms, objects, place, face, comprehension of the space reports with 2 or 3 dimensions, creation by analogy or induction based on the experience.
- The socio-demographic characteristics: age, gender, statute, educational level.</td></tr>
<tr><td>The previous knowledge and experience in IT</td><td colspan="6">- The learners' Familiarity level with IT</td></tr>
<tr><td>Characteristics</td><td colspan="6">Organizational Environment of the learners</td></tr>
<tr><td>organizational Implication</td><td colspan="6">- Technical assistance
- The commitment level of the tutors
- Interaction :
According to Moore (1989) there are three interaction types, namely: learner - content interactions, learner - tutor interactions, and learner - learner interactions</td></tr>
<tr><td>characteristics</td><td colspan="6">Technological Environment of the learners</td></tr>
<tr><td rowspan="5">Interactivity Person / pedagogic support
Adapted from Chomienne (2002)</td><td colspan="6">Computer-based popularized through IT tools. We speak about an interaction through a machine.</td></tr>
<tr><td>symbolic Systems</td><td>Perception</td><td>Transactional</td><td>cognitive</td><td>Pedagogic</td><td>Evaluation</td></tr>
<tr><td>Sounds: words, music, texts readings, oral expression</td><td>hearing</td><td>Multimedia Navigation</td><td>Explain, amplify, clarify</td><td rowspan="2">Fix the pedagogic objectives,
Present the content and the activities,
Define and explain the learning strategies, etc…</td><td rowspan="3">Progress Evaluation</td></tr>
<tr><td>Texts (character attributes: police, style)
Colour, etc.</td><td></td><td></td><td>Define, detail, specify,
Indicate a section, a module, a unit</td></tr>
<tr><td>Image (icons, drawings, photograph, animations, etc.)</td><td>Vision</td><td>Invite to click.</td><td></td><td>Attract attention, combine the media effects.</td></tr>
</table>

1.4.4. The Tutor

a. Definition

According to Teutsch and al. (2004), tutoring is part of a pedagogical support activity for the learner. In this framework Legendre (1993, in Teutsch and al. 2004) defines the tutor as an intervention for one or more learners aiming at their personal and social development, through inviting him to assume his

responsibilities in relation to his own learning. In addition, the tutor's mission is the monitoring and the supervision of the learners throughout their e-learning. Thus, the tutor provides assistance to the learners. Indeed, Des chênes (2004) argues that supervision is a fundamental dimension of learning to the extent that the tutor provides educational assistance to the learner corrects the work and provides him feedback.

The author adds that practitioners and e-learning researchers give importance to the supervision of the learners and tutoring. Indeed, educational assistance and learner - tutor interaction prove to be an essential step in the minimization of failure that procures the "Bandwidth".

Following the same reasoning, Hood and Leroux (2003) consider that learning, the learner and the tutor are linked by knowledge of construction activity mediated by IT tools to eliminate the constraints related to distance. Furthermore, the e- learning system is more sophisticated; learners will need more assistance and educational support (Glikman, 2002).

For Teutsch et al. (2004, p.1) interactions are generally asynchronous. In this context, the authors define the tutor as *"the implementation of a modelling relationship built for and with the learner, which creates a real problematic in terms of the interaction opportunities and the communication of the mediatised devices."*

b. The role of the tutor

The main role of tutor is the support that provides to the learner in the e-learning process (Teutsch et al. 2004). Indeed, the tutor plays the role of learning stimulator (Teutsch et al. 2004). The authors consider that this role is difficult to define because of multiple terminologies governing this learning actor. Thus, the authors refer to this actor: companion, consultant, evaluator, facilitator, guide, interim, mentor, facilitator, monitor, referrer, and tutor. Moreover, this terminological variation shows that the mission of the tutor changes depending on the activities and the technological and the pedagogical contexts of learning (Paquette et al. 1997). Teutsh et al. (2004) describe tutoring as unstable and complex. In turn, Denis (2000) considers that the tutor is a favoured interlocutor for the learner. Denis (2000) argues that the tutor's role varies according to the epistemological variation of the learning device, on the one hand and according to the authors who approach this subject. In addition, Denis (2000) established a tutor profile that considers seven functions. Which are:

- The reception, the launch of learning actions
- The technical support
- The methodological support
- Self-regulation and meta-cognition
- The evaluation
- Devoted resource person

Better yet, Teutsch et al. (2004) combine these functions into four roles governing the tutor's intervention. Referring to these authors we make explicit the different roles of the tutor.

- **The role of the resource person:** the tutor acts as a content expert to meet the learners' needs. The tutor plays the role of resource in responding to the learners' questions. Considering the learning device, which can offer somehow sophisticated services, the tutor seeks to make the learners comfortable with the technical system and subsequently make the technical instrument clearer.
- **Role of animation:** the role of the tutor is to encourage the interactions among the learners in order to reduce the sense of isolation in which the latter can be found. Further, the tutor plays the animation role to the extent that it opens a thematic forum, connects the learners and thereafter selects the interesting publications following the discussion.
- **Parity role:** push, induce, repress, motivate. The authors consider that the learners' motivation is fundamental to involve them in learning. Indeed, the authors add that this framework seeks to engage the learner in learning. This stage is realized through feedback, motivation, congratulations to the learner. Further, the tutor acts as a parity to the extent that it helps the learners to figure out learning strategies.
- **Regulation Role:** The role of the tutor at this level is to explain, help learners to find solutions to their challenges and shortcomings and subsequently progress in learning.

The authors consider that online tutoring is a new learning modality that aims at supporting the learners and responding to their expectations.

Hereinafter, it will be interesting to illustrate the functions and roles of the different actors in learning in Table 5 below:

Table 5: The actors in learning and their role

Actors	Roles
Learner	- Navigator in the Learning Platform - Explore internal and external information resources - Problems Resolver - Self-evaluator - Social Actor - Information Communicator - Discussions moderator
Tutor	- -Diagnostic Director - Consultant - Evaluator of the learners works - Facilitator - Groups or teams Animator - Monitor «Coatch»
Director	- Analysis of learning needs - Knowledge Modeller - Educational Screenwriter - Editor of the Learning systems quotation - Quotation Simulator - Director of educational tools - Designer of the implementation plan of the learning system - Producer and director
Course Creator	- Scheduler - Decision maker - Inspector - Director of Broadcast Operations - Teams or Groups Organizer - Director of Learning Evaluation - Network Administrator - Information Presenter - Content Classifier - knowledge-profile manager - Document Analyzer

2. FIELDS OF IMPLEMENTING E-LEARNING THROUGH THE USE OF NEW INFORMATION AND COMMUNICATIONS TECHNOLOGIES

In light of this, we propose to highlight the areas of application of e-learning through new information and communications technologies.

2.1. The Learning Theories

2.1.1. The behaviourist approach

Pavlov, Watson, Skinner and Tolman have been the forerunners in the analysis of individual learning. Thus, Pavlov highlighted the conditioned reflex, where human behaviour reflects a mechanistic scheme, a conditioning (Pavlov's experiment), which does not give the individual any special feature.

In turn, Watson talks about the behavioural change through external conditioning. In this context, the individual is only a reflection of his community. Skinner speaks of operant conditioning where we act on the subject's behaviour by the reward mechanism. In this context, the learner can learn from his mistakes (Zairi and Jallouli, 2004). The authors add that learners direct their behaviour by negative feedback. In addition, positive corrections affect the learner's motivation (Zairi and Jallouli, 2004).

For Tolman, learners must be within a learning situation in order for latent learning to take place. To explain this phenomenon, Tolman focuses on the cognitive map of the **learners.**

2.1.2. The Cognitive Approach

The cognitive approach is considered as an extension of the constructivist approach (Zhang et al. 2006). According to this approach, learners use different mental strategies to learn (Jallouli and Zairi, 2004). In this context, Fillol (2004) adds that learning is the result of a change of mental representations of the individual. Thus, the transition from the concrete to its symbolic representation is shaped through the cognitive stage, the sensor motor stage, the preparatory stage, the concrete operations stage and the formal operations stage (Zairi and Jallouli, 2004).

Subsequently, according to this approach learners receive and store information through focusing on the cognitive processes in learning. This allows the processing of information already integrated to the development and the change of the mental models and the previous knowledge (Zairi and Jallouli, 2004). Therefore, learners are able to solve the faced problems (Zhang et al, 2006).

2.1.3. The constructivist approach

This approach is derived from the behaviourist approach and particularly the work of Piaget. According to this approach, knowledge is not verbally transmitted, but it must be constructed by the learner. Indeed, knowledge is built through the internal representations of his mind (Zhang et al. 2006).

Moreover, the constructivist approach refers to the active role of the learner in the construction of their own knowledge (Zhang et al. 2006). In this light, Jallouli and Zairi (2004) state that the knowledge acquisition is the result of the learner's interaction with the environment.

In this context, the learner tries to solve the problems alone, otherwise he asks for help from his peers and his teacher who plays the role of the facilitator.

In this perspective, this approach focuses on *"the zone of proximal development* " (Zairi and Jallouli, 2004, p.6). Further, the authors suggest that this zone reflects the difference between "the ability of a learner to solve a problem alone or with a tutor. The difference between the two zones; that of the current development and the level of potential development should not be big rather proximal in order not to lead the learner to failure and depression" (Zairi and Jallouli, 2004, p.6).

2.2. The different forms of learning

According to Romiszowski (2003), there are two major learning categories covering e-learning. These are: the autonomous and collaborative learning and on-line or off-line learning. E-learning is the combination of these two forms (Fenouiellet and Déro, 2006). In this context, independent or collaborative learning can take place either through synchronous online communication or through an asynchronous offline communication.

Thus, independent learning is a learning process where the learners work without cooperating with other learners. Moreover, this form of learning offers a workspace where the learner interacts with technology and with the tutor, at the same time.

In this framework the tutor can ask the learner to download information from a site for local use. We speak at this level of offline learning or asynchronous (Fenouillet and Déro, 2006). Also, the tutor can ask the learner to access a site containing interesting information for learning. We speak in this context of online learning or synchronous (Fenouillet and Déro, 2006).

Indeed, collaborative learning involves interaction between the learner and other learners on the one hand, and between the learner and the tutor, on the other hand. This method requires the cooperation and the collaboration among the learners to create value and to solve problems. Further, this kind of cooperation enriches the social relationships between the learners and reduces the sense of isolation. Collaborative learning allows success for the learner and facilitates knowledge transfer (Catroux, 2006). Better yet, the authors add that interactions enable learners to verbalize, reformulate ideas, confront, discuss and compare their ways of learning (Cartoux, 2006, p. 56). Furthermore, the tutor can arrange synchronous learning sessions through videoconferencing device, audio conferencing, and chat rooms, etc. (Fenouillet and Déro, 2006). It can also organize asynchronous learning sessions through forums and email.

Hereinafter, we present a synthesis learning types that covers e-learning in the following Table 6:

Table 6: The different types of e-learning

	Independent Learning	Collaborative Learning
e- Learning real-time/synchronous communication	Surf the Internet Access to sites containing useful information for learning.	Chat rooms with or without video Audio Conferencing / Visio Conferencing
Offline Learning asynchronous communication	Download objects for local use	asynchronous communication by email, forum via platforms

***Source**: adapted from Romiszowski (2003, p.1)*

2.3. Technology Influence on Learning

Many authors believe that the technology does not seem to affect learning (Clark, 1994; Joy and Garcia, 2000). In this context, Clark (1994) argues that the quality of learning is closely related to the educational process built into technology. In other words, education is fundamental for a successful learning. Fenouillet and Déro (2006) think that learning process considers several steps are required for these different types.

In this perspective, the authors add that the types of learning are independent from the media which is a simple mediator advancing learning through methods and educational content, which incorporates. In addition, Joy and Garcia (2000) show that the influence of technology on the learning success is linked to the theoretical conceptions of the latter.

Indeed, the learning theories consider the learning process as more important than the technologies (Fenouillet and Déro, 2006). The authors add that technology will never be vital to learning but rather a simple process vehicle resulting in learning. Therefore, a technology does employ the theory to create a learning (and Déro Fenouillet, 2006).

On the other hand, Cavanaugh (2001) shows that the various form of technology positively influence learning. For their part, Fenouillet and Déro (2006) argue that this result does not affect the previous results considering the lack of effect between technology and learning. The authors explain that it is the quality of the educational integration in technology that proves the cause of learning success, and not the technology alone.

3. THE CHALLENGES OF E- LEARNING EFFECTIVENESS

Many researchers have focused on e- learning effectiveness (Fenouillet and Déro, 2006; Simonian, 2008; Ben Abid-Zarrouk, 2010). Indeed, the analysis of e- learning effectiveness is achieved compared to traditional learning (Fenouillet and Déro, 2006; Ben Abid -Zarrouk, 2010). At this level, the literature results prove to be contradictory.

Indeed, many researchers have shown that there is no difference between the method of face to face teaching and e-learning (Clark 1994, Fenouillet and Déro, 2006). In this context, Fenouillet and Déro (2006) identified key North American studies on the effectiveness of e-learning since 1994 and concluded that there is no real difference in results between the face to face learning and e-learning. Moreover, this conclusion has focused on research into the extent of learners' satisfaction and on the comparison of success rates in examinations of learners who have followed face to face learning or e-learning (Ben Abid -Zarrouk, 2010).

In addition, other researchers have found that the introduction of new information and communication technologies in learning positively influences its effectiveness (Ben Abid -Zarrouk, 2010).

Ben Abid -Zarrouk (2010) considers that the definition of effectiveness is difficult because it corresponds more to the measure used than the consideration of this concept in its entirety. In addition, the author distinguishes two types of efficiency; the external efficiency which meets the objectives of the society or the educational institution. Indeed, it joins the measure of the ability of a learning system to prepare students for their future roles in society. In addition, it is measured through the measurement of employment opportunities and learner gains. Moreover, the second internal efficiency which appreciates the educational inputs and the learning outcomes in terms of rates of success or failure in examinations (Ben -Zarrouk, 2010). Also, the measure of effectiveness can be achieved through the measurement of learners' abilities for one or more skills on the one hand, and through the measurement of his satisfaction, on the other hand (Fenouillet and Déro 2006). Better yet, our literature review allowed us to note that many researchers (Quinones, 1995; Tracey and al 2001; Lim and al 2007) have considered the reaction of learners, learning and transfer as key

measures of efficiency. While pursuing the same reasoning, Fenouiell and Déro (2006) consider that the measure of learning efficiency pretends the assessment of the skills that the learner must acquire in order to undergo this learning such as mastering the IT tools, information research skills, and work organization. The authors add that these skills are not identical in the different types of learning, which refers to the adopted pedagogy. Similarly, Simonian (2008) suggests the need to adapt teaching models to information technologies. Indeed, the author considers that the adopted pedagogy differs from a learning situation to another.

In this context, considering the work of Graham (2000) and Simonian (2008), we offer a table forging the conditions of e- learning efficiency. Indeed, the authors consider seven essential criteria to e- learning effectiveness: Access, interaction, communication, content, pedagogical approach, resources, and technical sustainability.

Table 7: Conditions of e- learning effectiveness

effectiveness Conditions	**Characteristics**
Access	- Easy and simple access to the platform administered online. - Friendly and attractive navigation through the online managed platform.
interaction / communication	- Frequent interaction between the learner and the tutor. - Frequent interaction between the learner and peers online. - Availability of synchronous and asynchronous communication tools
Content	- Validation of the content by experts in the field. - Content that meets the needs of learners. - Content that is considered applicable in face to face learning. - Evaluation method allows learners to attain similar skills to face to face learning. - Content with specific and clear objectives and goals.
Pedagogical approach	- A device promoting the active participation of the learners. - Cooperation and collaboration among learners - A device that encourages individual learning. - A device that supports learner motivation (feeling of self-efficiency in IT tools, feeling of competence and relatedness).
Resources	- Large amount of resources - Variety of resources (documents, video, websites, etc.)
support	- Technical and educational support for the learners. - Technical and educational support for the tutors. - Learning of the trainers - Awareness of the learners with the challenges of e- learning. - Detailed schedule of the course conduct available to the learner. - Methodological approach proposed to the learner.
Durability and aesthetics	- Continuous assessment - Aesthetic aspects and intellectual rights taken into account in developing the device.

Source: Adapted from Simonian (2008, p. 5)

4. CONCLUSION

We have tried, first, to clarify the concept of e-learning through a literature review that fits into two streams of research i.e. the education of science and information systems. Thus, e-learning is an educational innovation based on the use of Internet and multimedia technologies enabling learners to acquire, store, distribute, share information / knowledge and interact with other learners, teachers and tutors.

Second, we have discussed the fields of e-learning application through the use of new information and communications technologies. At this level, we have focused on the learning theories and different forms thereof.

Third, we have addressed the challenges of learning efficiency. In this context, we have, first, treated, the challenge of measuring learning through literature. Second, we have shed light on the conditions of its effectiveness.

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