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Learning Assessment in On-Line Training

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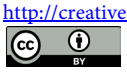

Abstract

This is a study in the field of learning assessment. It has made a typology of assessment tools in online training while determining their functions. To reach that goal the study is based on the connectivism and the instrumental approach as conceptual frameworks. It's a qualitative study referring to literature review and direct observation. The results have shown that there is a diversity of online assessment instruments that have various advantages at instrumental, organizational, financial and social levels. Thus, connectivism considers that computer processes as a mean of successful learning process achievement and a great opportunity for humanity. However, the choice of the tools depends on the subjects, the objectives and the capacities of the users to handle them. Despite these advantages, online assessment showed shortcomings, essentially of an instrumental nature, which vary from the lack of mastery of computer devices to the digital divide. The study also showed that, though the new paradigm era, the social and pedagogical functions of assessment still exist and they are even reinforced with interactions through network considerations in online training.

Keywords

Assessment, E-Learning, Digital, On-Line Training, Connectivism, Instrumental Approach

1. Introduction

The social and economic changes of the third millennium have brought new challenges in education field. Education systems are now more demanding on how to achieve quality education for all, as advocated by the Sustainable Development Goals 4 (SDG4), included in the 2030 Agenda. Evaluation was at the centre of this quality approach, which scrutinises all aspects of the functioning of education system. This "evaluative inflation" (Guimard, 2010: pp. 11-14) is cer-

tainly dependent on advances in scientific research in education, whose theoretical frameworks constitute the reference points for the design and validation of the various evaluation tools (Guimard, 2010: pp. 11-14). E-learning is one of those scientific advances in education that have led to digital assessment.

In E-learning as for any training process, assessment is a central activity. At each point in the course of the training there is a specific type of assessment with a well-defined function. Teachers used to face current difficulties in conventional assessment systems such as dysfunctioning in the forms, the contents and the conditions of assessment. That situation has led to a question about distance learning assessment in terms of typology and functioning. Thus, this study has provided an overview of the types of digital evaluation in e-learning, while identifying its functions and tools. For a better lightening of the phenomenon, the study has referred to the connectivism and the instrumental theories as conceptual frameworks.

Indeed, according to Duplàa & Talaat (2011: pp. 541-564), connectivism was developed by George Siemens and Stephen Downes. In that perspective, connectivism is a model that revisits the issue of learning in the digital era, that is, in a networked world. This model is intended as an alternative to the traditional paradigms backed by behaviorism, cognitivism, constructivism or socio-constructivism. Along with that, Duplàa and Talaat (2011) pointed out the rapid development of digital technology that profoundly changed our relationship to knowledge and our way of learning. We now learn through interactions and interconnected networks. Learning is thus conceived as a social act co-constructed from exchanges produced on social networks. The study and performance of e-learning would no longer focus on the knowledge built by students, but on the state and transformations of the student's network measurable through connections that would be nothing more than exchanges through communication tools (Duplàa & Talaat, 2011). In other words, in addition to the traditional method of learning assessment, that new paradigm now takes into account the context of connection (state, flow and quality of interactions) as assessment criteria.

Throughout connectivism, Siemens (2005) has proposed several techniques, which are used to:

- provide students with resources to extend their learning after classes;
- direct learners to blogs and forums;
- create blogs for the class and compile the work into an aggregator to bring together everything the students have produced;
- use collaborative learning activities;
- open its own resources to collaboration and sharing.

All those techniques made it possible to strive a successful teaching/learning process.

According to instrumental approach man is surrounded by culturally constituted artifacts and technologies that they can mobilise in the course of their activity to reach their goal. In so doing those artifacts become instruments (Nogry,

Decortis, Sort, & Heurtier, 2013: p. 2). In those authors' view, the instrument as a mediator of the relationship between subject and object of the activity can, in turn, make it possible to transform the latter (pragmatic mediation) or build knowledge about it (epistemic mediation) or even regulate the individual's own activity (reflexive mediation), or support communication and collaboration between the actors of the activity (interpersonal mediation).

Moreover, the conceptual framework also defined the key concepts of assessment, digital, e-learning, typology and tool. The assessment of learning refers to four processes: measurement, meaning, evolution and value (MENFP, 2014: p. 1). Measurement is the action of determining the value of certain quantities by comparison with a constant value of the same species. Meaning is the linking (comparison) of meaning and interpretation. Evolution is the improvement of action or decision-making. Value is the attribution, disclosure and questioning of values. According to the Société canadienne d'évaluation (2015: p. 1), assessment is the systematic measure of the design, implementation or outcomes of an initiative for learning or decision-making purposes.

Digital is the result of the relationship between man and the machine. It's everything that has to do with computer processing, computation, dematerialization. Digital refers to communication through intangible media, to digital technologies, to various networks (Tuto's me Pro, 2023: p. 1). In other words, digital is an extremely heterogeneous (Baron, 2005: p. 2) and proteiform (which can take different forms) construct that can be an image or a database.

The hypothesis of the present study is that assessment on-line favors a better assessment practice from a pedagogical view, it is time saving on managing consideration and advantageous on socio-economical view. The study intended to enrich and improve teaching practices in digital assessment through e-learning. To reach that goal our analysis of assessment in on-line training was guided by the following relevant questions: 1) what are the different assessment tools in on-line training? 2) What are the functions of assessment tools in on-line training? 3) How do digital instruments affect on-line training? 4) How do online assessment tools enhance pedagogical functions of learning? 5) How far is connectivism relevant to the improvement of online training? 6) How do on-line assessment instruments improve interaction in online training? 7) Why is the diversity of on-line assessment instruments so important?

2. Methodology

2.1. Data Collection

This is a qualitative study based primarily on literature review and direct observation. According to N'da (2002: p. 75), the literature review covers pre-existing accessible sources of information. These materials may therefore be audio, visual, audio-visual, written or objects. Its tool is the Document Review Grid, which allows the documentalist to identify all the documents reviewed, classify them according to the type of information and make a summary of them available for

the study. Themes, sources, key ideas and comments appear on the grid.

This study used a systematic literature review, specifically, meta-synthesis approach that is based on non-statistical techniques. Throughout that procedure, the researcher integrates, assesses and interprets the results of multiple qualitative studies (John, 2011). As part of this study, the literature review identified and synthesized literature on assessment in general and on-line assessment especially.

According to Martineau (2004: p. 6), observation is a technique of data collection in which the researcher becomes a witness of the behaviors of individuals and practices within groups by staying in the real places where they take place. A distinction is made between non-participant direct observation, where the investigator does not participate in the life of the observed group, and participatory observation, where the investigator participates in the life of the observed group.

The observation grid is used as a tool for direct observation. So, Martineau (2004: p. 8) distinguishes between the approach grid and the systematic grid. According to him, the approach grid serves to mark the physical space by indicating the characteristics of an observation site or the key moments in a community. The systematic grid is an observational program that means it identifies the dimensions or elements of the phenomenon to be observed. This study used the systematic grid to identify the practice of on-line assessment.

2.2. Data Analysis

This study was based on connectivism and instrumental approach as theoretical frameworks. Connectivism highlighted the rational behind the computer use in education while the second indicated the scientific procedure of the use of tools namely computer devices. The study is based on the instrumental approach developed by Rabardel (1995) that highlighted the process of "Instrumental Genesis", which is the process by which a material artefact gradually becomes an instrument. This instrumental genesis simultaneously combines two different forms of transformation: instrumentalization and instrumentation.

Instrumentalization refers to the movement of adjustment of the artifact by the user to reach its goal. It assigns new properties to it by acting on its structure and its functioning. Instrumentation is a process of differentiation of artefacts, focusing both on their contents (files, software installed in computers), and on the parts of the artefact mobilized by the subject. In this case, the computer can be considered as a set of artifacts (hardware object, operating system offering different functionalities, applications), each of which can be instrumentalized. This is the case, for example, with the setting of the smartphone, an artifact mostly used by teachers and learners as part of their activities. Thus, instrumentation refers to the "adjustment" of the user to the artifact. In other words, the user adapts, develops new abilities, new skills, transforms his activity; in this way he establishes new organization of activity, new patterns by recomposing existing patterns, by creating new patterns or by appropriating socially shared pat-

terns. Vergnaud (2006) highlighted this aspect when he stated that "users of software, and instruments in general, develop new resources with the instruments they are expected to use, even if these resources are not foreseen at the outset".

3. Results

The results of this study are divided into five sections: the typology and the tools of conventional assessments and online assessments, the functions and the shortcomings of on-line assessments.

3.1. Different Types of Conventional Assessments

Evaluations are classified according to their implementation periods and objectives. Literature review in this field essentially distinguishes four types: diagnostic, formative , summative and peer assessments.

3.1.1. Predictive or Diagnostic Assessment

Also known as diagnostic-prognostic assessment, it is the procedure of determining the abilities required to begin learning or to group students by level. It often comes into play when students are being directed to the various courses and is then part of the social function of assessment. It can also be linked to the pedagogical function when it comes to determining students' achievements at the beginning of the year or at the beginning of a learning sequence by various means such as tests and questionnaires… Before creating a training, it is essential to know what type of students it is intended for. Your goal is to know their strengths, weaknesses, knowledge and abilities before they begin. You will then be able to create your training based on the data collected (Easy LMS; s.d.).

3.1.2. Formative Assessment

Formative assessment is used during the first training attempt. Its objective is to monitor student learning and obtain feedback in order to identify teaching gaps. This feedback allows you to know what to focus on to continue training (Easy LMS, s.d.). Formative assessment is an integral part of the learning process and aims to regulate learning, and it takes place periodically during learning (MENES Maroc, 2011: p. 27). It is a question of assessing their level of mastery of resources, but also and above all their level of mastery of skills or their levels in order to remedy their difficulties (MENES Maroc, 2011: p. 70).

3.1.3. Summative Assessment

The purpose of the summative assessment is to assess whether the most important knowledge has been acquired at the end of the training. It also evaluates much more than that, since it measures learning effectiveness, student feedback about training, and long-term benefits (which can be determined by tracking students who have participated in your training or test). This allows you to see how they have used their skills and knowledge (Easy LMS, s.d.).

It makes it possible to take decisions on whether to move to a higher class,

whether to award a certificate or a diploma at the end of studies (MENES Maroc, 2011: p. 28). Its function is to determine whether the student has acquired the necessary skills to move on to higher education (MENES Maroc, 2011: p. 70).

3.1.4. Peer Assessment

In e-learning, the number of learners is often very high, as in the case of some MOOCs, which can admit more than 1000 learners. The teaching team alone will not be able to evaluate the productions of all these listeners. In such a case, the system leaves it up to the learners themselves to react to the output of their counterparts. This evaluation varies and may be summative or formative. It has a dual purpose. On the one hand, it enables the tutor to assess the learner's assessment abilities of the group, and on the other hand, it also allows the tutor to judge the learner's output, through the assessment made by the group.

3.2. Conventional Learning Assessment Tools

The literature makes it possible to distinguish between approaches to evaluation: those based on selection questions and those based on reproduction questions.

3.2.1. Selection Issues

Selection questions, known as quizzes, are closed, specific and more objective than open-ended questions. They offer options to the learner who has to choose the right answer. They highlight its ability to store and store information. Correction is easier and can be done without human intervention in a digital environment. This category includes the most frequently asked questions from Prat (2015) in the list below.

- Multiple-choice question: it consists of choosing among several possible answers, the only correct one. Example: Which of the following personalities discovered America? Check the correct box:

Savorgna De Brazza
Samory Touré
Christopher Colomb

- Multi-answer question: it consists of choosing all the right answers from several possibilities. The others are false leads, distracting for the learner.

  Example: Which of the following personalities has been President of their country? Check the right answers.

Félix Houphoüet Boigny
Alpha Blondy
Sékou Touré
John Fitzgerald Kennedy Jr.
Faure Eyadéma

- The dichotomous choice question: it consists in making a choice of the True/False type; Yes/No.

  Example: Check the correct answer.

  Water boils at 100˚. True/false

  Are you a democrat? Yes/no

- The matching or association issue: this exercise proposes to match and link a series of items from different lists.

  Example: Linking each capital city to its country.

Capitals	a. Paris	b. Abidjan	c. Conakry	d. Accra	e. Lome	f. Bamako
Countries	1. Guinea	2. Ghana	3. Togo	3. France	4. Côte d'Ivoire	
Answers: 1/c	**2/…**	**3/…**	**4/…**	**5/…**		

- The question of scheduling: presenting a series of proposals (facts, dates, steps of a process) in a random order to the learner and asking him to put them in the required order.

  Example: Order the planter's activities:

  Selling, Watering, Planting, Harvesting, Weeding, Fishing

  1).....

  2).....

  3).....

  4).....

  5).....

This type of exercise seeks to test the learner's procedural intelligence, that means his/her ability to arrange facts and steps in a process, following a certain logic.

3.2.2. Reproduction Issues.

These are open and subjective questions that make it possible to express ideas, to construct a thought with arguments, taking into account the rules of grammar, spelling and syntax. Prat (2015) classifies the following exercises under this category of assessment tools.

- **Short text**: this exercise presents a blank text to be filled in by the learner.

  Example: please complete the next paragraph with the words on the list.

  Bulletin, understand, school, letter.

  In a year… (1)…, college or high school, you will receive three… (2)…, one for each term. Instead of planning a whole ploy to receive it before your parents, read this article, we will give you our tips for… (3)… that piece of paper that can be so scary.

- **Short answer question**: in this exercise, the learner must either answer the question very briefly or complete a statement.

  Example: Please answer briefly the following questions:

  1) What is your name? …My name is Kabore.

  2) What is your favorite pastime? …I prefer swimming.

3) When are you going to Abidjan?… I'm leaving for Abidjan this Monday.
4) Who is the main character of the text?… the main character is Wangrin.

- **The long-answer question**: the learner is expected to give a detailed answer to an open-ended question. The answer may be the size of a paragraph or several chapters.

Example: What do you think about illegal immigration? Please, argue.

This category of assessment tools allows the learner to develop other transversal competences. Correcting this type of question raises a question for the proofreader: should we correct the specific competence only, or should we correct the specific competence in combination with other competences?

3.3. Digital Learning Assessment Instruments

The Ed Tech (Education Software) industry offers a wide range of tools, both free and paid. The choice made in this text presents just the most widely used tools in our e-learning context. It also proposes tools that could be adapted to this context, as well as tools that open up innovative perspectives in the field of evaluation.

3.3.1. Moodle

The Moodle e-learning platform, used by most providers of e-learning, offers a wide range of assessment tools as follows:

- **Quiz:** multiple choice, true/false, numerical answer, drag-and-drop, with many settings: timing, display of questions, random question, weighting of the score.
- **Test**: this activity requires students to provide digitally developed productions. Metadata informs the teacher (tutor) of the filing, date, author, delays, etc.
- **Workshop**: The purpose of the Moodle Workshop activity is to provide a peer review activity. Learners present their work in text form via an online tool with the possibility of attachments. There are two assessments for a learner: their own work assessments and their peers' assessments. The workshop supports: self-assessment, multiple assessment strategies (cumulative assessment with scores and comments, criteria, number of errors, comments), templates for the evaluation of the practice, manual, random or scheduled pairing for peer review.
- **Interactive video** (via the H5P plugin): this option allows you to create a variety of interactive activities directly from Moodle. The "Interactive Video" option allows you to create rich videos with built-in MCQ (multiple choice, drag-and-drop, text with holes, etc.).

3.3.2. Hot Potatoes

Hot Potatoes is a free tool for public education and non-commercial use. Very practical, it is an all-in-one tool that offers five modules (gap texts, QMCs, crosswords, association exercises, scheduling exercises) to carry out a variety of

activities. A sixth module provides the opportunity to create a single activity by including the five modules presented. It gives the possibility to manage the feed-back.

3.3.3. Learning Apps

Learning Apps is a Web 2.0 application designed to support teaching and learning processes. It allows its users to create online playful exercises in the form of applications. Without their own educational purpose, the applications are made available to Internet users for private use or for their integration into a teaching sequence (Edutech, 2021). It allows you to create small interactive modules. The goal is to assemble reusable modules and make them accessible to all. The types of interactive activities offered are (**Table 1**).

3.3.4. Formative

This tool allows you to create online assessments, quizzes and questionnaires for learners. In addition, it provides teachers with the opportunity to track their answers and provide feedback on-line. It allows you to ask questions of various types. It provides access to the following types of questions:

- Multiple choices
- Multiple selection
- True or false
- Short answer
- Development

With the exception of developmental issues, questions may self-correct. You enter the correct answer when you write the question, and Formative automatically corrects students' answers (Rhéaume, 2018).

3.3.5. Evalbox

It is an assessment platform that manages MCQ tests online. This free and easy-to-use tool has an automatic correction mechanism for tests and questionnaires. MCQs are generated simply by drawing lots from question banks, or manually by teacher selection. The tool allows you to schedule exam sessions, and candidates can take exams online. Its monitoring console allows you to monitor exams in real time, and alerts the teacher, thanks to advanced anti-cheating algorithms, when a student engages in suspicious behaviour.

3.3.6. Google Drive

Forms

Using Google Drive's forms service, teachers can create an online quiz or test in seconds. Afterwards, they can share it by email or post it on a blog or classroom site. To automatically rate and correct the tests, simply add the Floobaroo script to the Google spreadsheet.

Collaboration on a Shared File

The Google Drive service also allows multiple users to simultaneously log in to a shared document and edit its data in real time. The changes made by each participant are indicated by different colours.

Table 1. Interactive activities' types.

Types	Examples
Sort by pair	Ethics and deontology: definitions
Interactive video	The Montessori School
Memory	Letters that make a pair
Game of the hangman	The flowered hangman
Sorting puzzle	The zoo in madness

Source: Learing Apps (23 june 2021). Edutech wiki. https://edutechwiki.unige.ch/fr/LearningApps.

3.3.7. Simulation

It allows you to forge a rich experience with tasks, real activities in a specific context, accompanied by contextual feedback and gives you access to other resources. This type of exercise, very practical, is suitable for training courses whose practice presents a risk (airplane piloting, driving school, etc.).

3.3.8. Game Based Learning

These are role-playing games, simulation games, to enhance the learner's experience. All kinds of games can be found here: adventure/action games, strategy games, reality games, quiz games, etc.

3.3.9. Virtual World

These new types of interactive applications are gradually emerging and will have a major impact on the creation of e-learning modules. Multimedia online role-playing games are very successful. These games reduce the distance between the real world in which the learner lives on a daily basis and the virtual world which, thanks to technology, increasingly resembles the real world. E-learning is strongly influenced by these new concepts of playful and participatory interfaces. In these new applications, the learner finds himself immersed in a 3D world, a world in which he will build his learning and share his experience. E-learning is increasingly impacted by these new technologies that bring more collaboration and cooperation.

The typology of the instruments guided us to sort out a their utility as follow (**Table 2**).

3.4. The Function of On-Line Assessment

Traditional or conventional evaluation fulfils two types of function, namely the pedagogical function (enhancing learning and teaching) and the social function (the influence of the socio-economic and political environment on the education system in terms of content, methods and evaluation) (Petitjean, 1984: p. 6). According to LaMotte (2017), e-learning offers many advantages that are not offered by traditional system of learning as followed:

- **temporal expansion function**: the course can be followed in asynchronous

Table 2. Classification of digital learning assessment instruments.

Instruments	Utility
Moodle • Quiz • Test • Workshop • Interactive video	Moodle e-learning platform Questions/answer activities Digitally developed productions Peer review activities Interactive video built-in MCQ activities
Hot potatoes	Feedback management
Learning Apps	Playfull reusable exercises made by the user
Formative	Answer trucking and feedback making
Evalbox	Assessment monitoring and schedule
Google Drive • Forms • Collaboration on a shared file	Quiz and test making and their correction Collaboration work on a document production
Simulation	Contextual activities and feedback for risky activities
Game based learning	Enhancing the learner's experience
Virtual world	Collaboration and cooperation work

Source: Literature review 2023.

or synchronous mode. Traditionally, e-learning is rather asynchronous. This means that there is no predefined time at which learners must complete the module. Everyone can follow it whenever they want, at their own pace. The learner can take his time to assimilate the concepts. However, synchronous e-learning options such as web conferencing and chat are now available in distance training or teaching-learning process.

- **spatial expansion function**: the course has a global reach. By hosting e-learning modules on the web, people from all over the world can access them without travel costs and without the need for remote meetings across multiple time zones.
- **instrumental decentralization function**: digital technology extends to several types of devices. Online modules can also be playable on a computer than on mobile devices, such as smartphones or tablets.
- **utility function**: the course is available when the need arises. Today, authoring tools are so easy to use that you can create, publish and share a module in a matter of hours. So you can provide your employees with the training they need when they really need it.
- **quality feature**: e-assessment is more effective because it makes it possible to create an e-learning module and easily share it with thousands of learners instead of organizing face-to-face training sessions whenever a need arises.

- **interactive feature**: Linking evaluation activities with computer and multimedia processes provides more interactivity, diversifies the offer and energizes the entire evaluation system. As far as the insight of interaction is concerned, the experience of media education during the COVID-19 pandemic is a clear illustration. In Ivory Coast for instance a large governmental program allowed millions of students to be connected to their teachers and classmates twenty hours per day through digital platforms. That program was called "my school at home". That full interaction was conditioned by the access to internet connection, computer, television set and radio. Formative assessment was done online, but summative ones were done physically.
- **pedagogical function improvement**: In a conventional pedagogical triangle, we distinguish the teacher, the learner and the knowledge. The three components are inter-related. Assessment contributes to the process of learning by making feedbacks on the past lessons and making adjustments. That pedagogical function is more emphasised in on-line training by the permanent access to the feedbacks, keeping in tooch with the teacher and having more opportunity to compare additional digital documents related to the lesson. Thus, students are in a permanent learning environment.

According to Kone (2021), "media education promoted differentiated pedagogy and Montessorian pedagogy. They are teaching approaches that meet the specific needs of the learners facing learning difficulties. Although legitimate, the implementation of those new pedagogies in the conventional school system has always met difficulties related to classroom management and school knowledge sequences. Media education is proposing a way out". As for media education, on-line assessment system provides a great opportunity for promoting good pedagogical practices.

3.5. Limits of Online Evaluation

According to Tricot (sd), digital technology facilitates access to knowledge and task media. However, it does not guarantee the intrinsic quality of teaching and learning. It sometimes uses more complex media to the detriment of learning, thus requiring new skills. That difficulty is an Instrumental shortcoming that could negatively affect the learning process. The learner would need extra time for a correct use of the media. The teacher also needs extra time of training on digital and media instruments. That is to say the teaching-learning process time would be lengthened for a mere result that could be better in conventional learning process.

Elsewhere, digital divide and poor connectivity (Poor connectivity is the discontinuity of the internet connection) are the major shortcomings of on-line assessment, namely in African countries where connectivity rate is very low as the estimates of UNESCO mentioned it. 56 million learners live in areas not covered by mobile networks, almost half of them in sub-Saharan Africa, where 89 per cent of learners don't have access to family computers and 82 per cent don't

Table 3. Advantages and shortcomings of on-line assessment.

One-line assessment	
Advantages	**shortcomings**
-better organization; -centralization of evaluation activities; -immediate responses; -immediate scores; -reliability of answers; -Process security by digitizing and encrypting data; -possibility of quick self-assessment; -development of the learner's metacognition; -provision of individualized feedback; -reduction of evaluation costs; -reduction of correction efforts; -saving of evaluation time; -saving of correction time; -reduction of evaluation bias linked to the evaluator; -traceability and history of the results and rankings of each student; -possibility to verify the specific results of a student; -possibility to map the learner's progress over time; -possibility to choose the synchronous or asynchronous evaluation mode; -micro-certification; -mobile learning; -easy access to results and statistics	-lack of assurance of the quality of education; -lack of quality assurance in apprenticeships; -use of complex media; -use of new skills; -learning difficulties related to the use of complex media; -digital divide; -malfunction of the software; -electricity failure; -high cost of software; -risk of fraud

Source: LaMotte, A. (2017). Qu'est-ce que le e-learning? Dans Les essentiels du e-learning. https://blogs.articulate.com/les-essentiels-du-elearning/questce-le-e-learning/Citédans Henri, F. et Plante, P. (2018). Qu'est-ce que le e-learning? Un collage de définitions. TED 1272: Les TIC et l'apprentissage en milieu de travail. Université TÉLUQ. pp. 5-6. Tricot (sd). Apports et limites des outils numériques pour les apprentissages académiques: le rôle de l'attention.

have access to the Internet (UNESCO, 2020). According to other estimates, in Africa, most students don't have the means for regular connection. In sub-Saharan Africa, only 20 per cent or less of households have neither access to internet connection nor to a computer (UNESCO, 2020). Besides, Kone's study (2021) showed that 98.78 per cent of the learners surveyed admitted that they had already been

victims of poor connectivity although the connection was prepaid (**Table 3**).

4. Discussion

Relatively to George Siemens and Stephen Downes' connectivism, on-line courses are considered as an alternative to traditional learning models based on behaviorism, cognitivism, constructivism or socio-constructivism (Duplàa & Talaat 2011: pp. 541-564). From this perspective, Duplàa and Talaat (2011) thought that this new paradigm would profoundly alter our relationship to knowledge and the way we learn. Thus, we are now in a network learning process whose performance is based on the transformation of the student's social relations through communication tools. Guité (2004) has highlighted the optimization of the value of networks and the ability to reconfigure education through connectivism. In the same vein, Anderson and Dron (2011) have established the link between connectivism and the understanding of learner decision-making, thus showing the effect of the e-learning system on the learner's behavior. That fact reflected both a cognitive and a behavioral aspect of the phenomenon.

In addition to the traditional functions of assessment (the pedagogical and social functions) that are reflected in those authors' analyses, the instrumental function has remained an essential part of successful learning. Indeed, according to Rabardel's (1995) instrumental approach, "Instrumental Genesis" is the process by which a material artefact gradually becomes an instrument. Our results have corroborated this aspect through instrumental decentralization which reflects the multiplicity of electronic and digital instruments used in online courses. The on-line assessment functions identified in this study are the result of this instrumental approach, which gives a prominent place to the instrumentation device. Difficulties of handling the tools are a step of readjustment in Vergnaud's (2006) instrumental approach that refers to instrumentation as the ability of the user to adapt to the instrument. That approach also provides, as a solution, instrumentalization that is the adaptation of the instrument to the specific needs of the user. In our study, that adaptation would occur throughout a formal training process that continuously leads the leaner's toward a better use of the e-learning instruments.

Concerning the impact of the diversity of on-line assessment instruments the teaching practice was reinforced with various instruments. Eval box, game based learning, formative, collaborative on a shared file are some examples of those instruments that aim at promoting collaborative work and ensuring the learner's autonomy through activities that allow him or her to initiate his own activities. The learning process is also led throughout games and videos that are more attractive for learners namely for young generations. That is the case for the virtual world and game based learning. The new paradigm offers more opportunities to the learners when compared with the traditional model of selection and reproduction issues.

Notwithstanding the advantages of Siemens and Downes' connectivism, its

institution as a scientific subject has been rejected by Verhagen (2006) reproaching it with a luck of real learning process component. Along with that, Kerr (2007) has qualified it as the continuity of distributed cognition. For him, the primacy of the media over the content advocated by Siemens is unacceptable (Duplàa & Talaat, 2011: pp. 541-564). The present study surely goes along with Kerr's perception as far as it brings a balance to the excessive use of the machine at the expense of man that has remained right now, the main actor of education fact. Since assessment is a measure, an evaluation, a meaning and a value, the instrument of measurement is necessary as well as the instrument that gives meaning to that measure, hence human contribution.

The relevance of connectivism to the improvement of online training was based on the Siemens' (2005) framework that proposed several techniques to handle digital learning successfully. Those techniques are its advantages as well. Those principles are based on learning resources extension after class, compilation of students' works and promotion of collaborative learning. The assessment guided by those principles may be more benefic to students and teachers for the reason that students would take part into the learning process.

5. Conclusion

The study showed a multitude of on-line instruments that are beneficial for digital users. Those advantages included instrumental, organizational, financial and social benefits. However, the choice of the instrument depends on the subject, objectives and users' ability to use them. Despite these advantages, one-line assessment showed shortcomings, mainly of instrumental nature, ranging from lack of control of devices to the digital divide.

Teachers now have the choice between traditional physical and on-line assessments. The pedagogical and social function of assessment still exist one-line. Thereby, one-line assessment improves the learning process and takes into account the socio-economic and political environment. It integrates the interaction and networking dimension into e-learning. Given the different contexts, it is up to teachers and policy makers to apply the right kind of assessment, bearing in mind that we are now moving decisively towards a virtual world. For the poorest African countries, isn't it a great opportunity to solve their education systems' dysfunctionings in terms of infrastructure deficit and exorbitant wage bill denounced by international institutions?

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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