

# Murphy's Law contextualised in a Cloud Education

**Luis Garcia**

Universidade Portucalense  
Porto, Portugal  
luisgarcia@marcadagua.com

**Maria João Ferreira**

Universidade Portucalense  
Porto, Portugal  
mjoao@uportu.pt

**Abstract—** Murphy's Law states that "what can go wrong, will go wrong". However, this law is potentiated when influenced by technological factor modifying its scope and allowing for it to be stated as "what can go wrong, will go wrong, but faster and in greater proportions when computers are involved". Though being an evidence pointed out by the authors we cannot neglect that the use of computers as well as all the technology involved is now a reality and has created new challenges as well as opportunities we cannot ignore in the context of education.

**Keywords—**cloud; education; digital natives; murphy's law

## I. INTRODUCTION

The so-called "Digital Natives" [1] show great interest in mobile technologies and social environments. They use them daily to connect and communicate, essentially playful content, however the high rate of expansion of these technologies requires a reflection and investigation of its potential exploitation in an educational context. Garcia and Ferreira (2014) analyse in the article "The impact of chaos and connectivism in the Collaborative/Cooperative learning" [2] the implications of the Chaos Theory and of Connectivism in the teaching/learning process, investigating its potential in the context of a greater decentralization of this process, eliminating hierarchies within the school but simultaneously offering the teacher a tool that may prove important in collaborative/cooperative learning [3].

Given the current mobility needs, in which both teachers and students are involved, it is necessary to create mechanisms that enable the non-interruption of the teaching/learning process, even if these are outside the classroom or school [4]. In this context the concept of Cloud Education [5], term that derives from Cloud Computing [6], is characterised by being a dynamic computing, highlighting a form of storage, sharing and creation of files, regardless of operating system or hardware [4]. Cloud Education is characterised by low cost of financial and computing resources, an increase in the efficiency of data processing, accessibility to educational data by people without enough financial resources to buy a personal computer, since any device such as a smartphone, a gaming console or any other device with internet access may connect the user to the cloud [7].

The concepts of Computing and Cloud Education have been gaining consistence due to the globalisation and technological evolution that characterises the current network society [8] and as a result a new social structure is prescribed, one that interacts in a "virtual world" a new social structure [9], whose most visible face is the current so called social networks, community or network of people who share interests [10]. This structure comprises generations that we shall name, in the context of this investigation, Digitals (X, Y and Z) [11].

Digital Generations can benefit from the fact that Wi-Fi represents, for the user, a service with very low costs, sometimes even free, of greater flexibility when compared to Wired Networks [12]. Mobile Internet traffic has grown largely when compared to fixed Internet due precisely to the proliferation of Wi-Fi accesses (hotspot's) which reveals usage trends are continually changing [13]. Proof of this is also the fact that according to Withby (2012), if you exclude individuals from a higher age group you can notice that every day in the whole world 84 million under 17 youngsters are online with special incidence in this last decade in which the average age for a child to access Internet were 9 years old having dropped down nowadays to five years old [14].

According to a study developed in Claro Institute [5], mobility as well as concurrency in collaboration between actors in the teaching learning process emerges as the most important actor in the operationalization of a Cloud Education, as you can ascertain from table 1. Given this possibility of constant connection, as well as mobile Internet, it seems important to assess the advantages of a Cloud Education [15] for the so called Digital Generations. [16].

TABLE 1 – ADVANTAGE OF A CLOUD EDUCATION (ADAPTADED FROM [SOUZA & TEIXEIRA, 2013])

	What is the greater advantage of studying in a cloud?
36,36%	Allows for a greater mobility when accessing documents for both teachers and students
30,30%	Allows for collaborative and simultaneous work
18,18%	Reduces costs with hardware, software and system maintenance
15,15%	Do not use for lack of Internet access at school

We intend to verify if the freedom that seems to emerge in the context of the teaching/learning process, inherent to the use of the Cloud, can in the interaction between teacher and students positively influence the achieving of the objectives set at the beginning of this same process, guiding us to an appropriation/adaptation of Murphy's Law that allows us to state "what the Digital Generations can learn, will learn". We are certain that the advantages for both teacher and students outweigh any disadvantages of using the Cloud as a platform of tools support that we intend to become friendly enough to bring the two actors in the teaching/learning process close.

The paper is organised as follows: section 2 presents and discusses the concept of Cloud Computing; section 3 makes an approach to the Digital Generations, section 4 analyses the implications of the Cloud in the teaching/learning process of the Digital Generations; finally, section 5 presents the conclusions and future work.

## II. CLOUD COMPUTING

The term Cloud Computing [6] emerged in 1961 from an idea of John McCarthy, professor of Artificial Intelligence in the Massachusetts Institute of Technology who, in a rudimentary way, presented a model of computing available as a service in line with the service of electrical power distribution [17]. Therefore, we can infer that the applications based in Cloud Computing are not processed in a single computer as it happens with traditional data process models but divided into parts that will be processed and stored on multiple computers that are an integral part of the Cloud [6] without having a single location or propriety [17].

Technically the Cloud [6] is synonymous to network, specially of Internet [18]. This association may, however, be reductive since this concept is much broader because it covers applications and services remotely stored or processed in Data Centers using computer networks as a communication infrastructure [18].



FIGURE 1 – CLOUD COMPUTING (ADAPTED FROM [NASR & OUF, 2011])

Corporate entity pioneer in the Cloud concept – Google [13] developed in 2002 the software for text editing, spreadsheet, e-mail and calendar without the need for installation or local storage as was with Microsoft's Word, Excel and Outlook, for example [13].

There are therefore several Cloud-based solutions that are implemented with a balanced cost-benefit ratio and without interruptions in the activity of users. The Cloud allows a quick and without maintenance service startup, eliminating the need for use of specialized technicians [13].

Choosing a solution to migrate data to the Cloud is not an easy task, since there are different types of offers, giving the user the flexibility to select the service that best suits their needs. The priorities of the user as well as the security requirements desired determine the level of use of the Cloud, ie choosing the most suitable layer to the claims of the user [19].

### A. Cloud Computing Layers

The Cloud and its image emerge from telecommunications and was subsequently adopted as a metaphor to describe the Internet in network diagrams [6]. According to the author [6], Cloud Computing can be considered as the interconnection of computer systems in an organisation, defining a framework of dynamic resources, achieved through hardware virtualization. These resources, as can be seen from the analysis of figure 2, are available as infrastructure for the development of applications, called "Infrastructure as a Service" (IaaS) from a cloud development platform with the name of "Platform as a Service" (PaaS), and also from cloud software known as "software as a Service" (SaaS) [19].

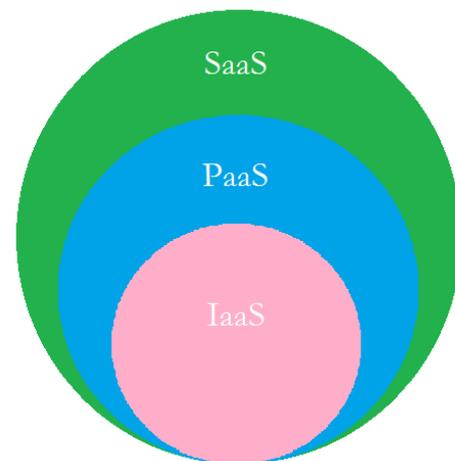


FIGURE 2 – LAYERS OF CLOUD COMPUTING (ADAPTED FROM [NASR & OUF, 2011])

To use the services provided by the Cloud, users only need to have on their devices, an operating system, a browser and Internet access [20]. All computing resources are available and therefore the access devices do not require high prerequisites, which contributes to the decrease in the cost of acquiring them. All hardware can be used to perform tasks that are appropriate to their processing power.

New hardware features can be added in order to increase processing power as well as to collaborate with existing features [20].

The infrastructure of the cloud computing environment consists generally of a large number of physical devices connected through a network (see Figure 3).

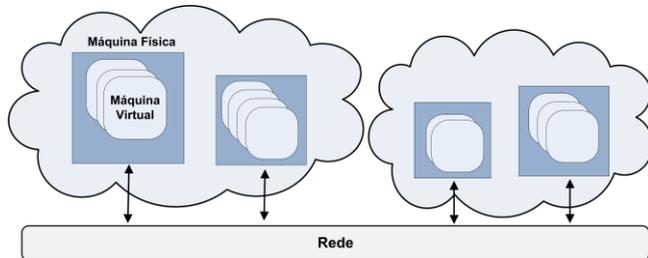


FIGURE 3 – CLOUD COMPUTING ENVIRONMENT (ADAPTED FROM [SOUSA ET. AL., 2009])

Each physical equipment has the same settings to the software level, but may have variations on the hardware, specifically the processor level, RAM, and disk storage. On each physical equipment there is a variable number of virtual machines running, according to the hardware capability [20], being its provision feasible according to the three models already mentioned IaaS, PaaS and SaaS.

#### I. Infrastructure as a Service

Refers to the delivery of the computing infrastructure, largely based in virtualised environments, as a service. For example, instead of the need to purchase new servers and other network equipment, idle available resources are used and new virtual servers are made available to the existing infrastructure in a dynamic way [21].

#### II. Platform as a Service

Running applications model without the need for hardware maintenance and software infrastructure, i.e., consists of lodging and hardware implementation services as well as software to use and access applications over the Internet [6].

#### III. Software as a Service

It is related to the commercialisation of applications in which the consumer pays for the personal use of the resources in the cloud. In this model the software supplier takes responsibility for all the necessary infrastructure for the provision of the environment, i.e., servers, other network equipment and security policies. In this context, the user pays a value related to the software usage that is truly needed [5]. The software available in the cloud is, in some cases, free and access may be made, regardless of location, which can lead to information available on the network, accessible without boundaries of space and time, and also potentially free of any ownership [13].

#### B. Mobility of information in the Cloud

The informativeness of each individual grows, according to a study conducted by the Technical

University of Darmstadt, Germany, in proportion to the number of users who come within range of the platform [13]. This may mean a radical new breakthrough in the decentralized flow of information exchange, which can be an advantage for teachers and students in the operation of the teaching / learning process [13]. Communication between people is natural and will not cease to be [22]. As you increase the ability to distribute and deliver content in data communication and voice terminals, such as a smartphone, for example, the conditions are being created so that the experience of those who have access to data improves increasingly [13].

It is the development of the technological infrastructure and the low, or no price, of the software, including the Cloud, that offer users in general the capacity and work tools that only large companies had in the past [13]. The quality / cost of this technology may represent an added value to the teaching / learning process, in that it may allow for students and teachers the use of a space essentially characterized by mobility, freedom and, simultaneously representing for them, the need for a low investment, or in some cases total lack of costs.

#### I. The Cloud as a new support for the teaching/learning process

The Cloud arises in this context of mobility, as a new support for the teaching/learning process that enables to amplify the importance of technology in education, particularly in what is now attributed to the use of Information and Communication Technology (ICT). In this sense it is commonly accepted that education requires that the teacher should not ignore ICT in educational practice and a researcher of its own practices as well as of other problematic that may appear in educational scenario [23]. With regard to the use of ICT in school, teachers can be grouped into four groups: those who do not want and do not know; those who know and do not want; those who do not know and want and those who do know and want. Thus, the school should take advantage of the two last groups and work with them to evidence to attract other users [23] as well as to expedite the emergence of new proposals on the concept of the teaching/learning process, specifically access to the Cloud.

According to Moura (2011) anyone who can currently read and write and has Internet access can learn, work and communicate in a way that was not possible in the recent past, before the spread of ICT. We live in a time in which digital is a key factor in an era in which the constantly changing and permanent construction, resulting from the work of all actively contribute to the emergence of a collective intelligence [24]. Educating is also to interact and talk, so we can acquire and enhance skills interacting and learn collaborating [25]. Educating students for the future is to educate them to change, to be able to create their own leads and learn, lifelong, using their own network [26].

According to Downes (2006) it is essential to think of education as a social network [27], since we learn and teach in a network. The interactions that are established and developed have led to the creation of learning communities that support its members who criticize and reflect together [23]. Therefore, all learning is an opening time, being physical networks more limited in time and space, social networks are allowing for the globalisation and overthrow of the spatiotemporal wall [23]. In this sense it is important to analyse the access to the cloud from the point of view of the users of three different digital generations.

### III. DIGITAL GENERATIONS

Today we are witnessing a consensus that Information and Communication Technologies (ICT) can expand our communication skills, collaboration, knowledge sharing and, consequently, our ability to research and innovation [24]. With the emergence of new forms of wireless communication, we are experiencing profound changes in the urban space, social forms and practices of cyber culture. The development of Wi-Fi technology is offering other dynamic access and use of the network, in particular with regard to time and space (here and now), in daily life, to a large number of users [28], as well as the content shared by these, as mentioned before.

This behaviour led to the emergence of a new concept, with links to Web Marketing, which can characterize by its immediacy, termed Nowism [29]. Main feature of this concept is the value of now as well as an urgent need for content producers to match this reality [29]. In this sense, nowadays consumers of contents are focused on instant gratification leading to the expectation of an also instant response [29].

In the context of education the teacher must adapt to these faster and faster cycles and should learn to think and respond in real-time [29], even if that brings with it some disadvantages, the main of which being the possibility of leading to some mistakes that, even if subsequently solved, can occur. This is a key factor since several times, at work or in life, the strategies to be followed are not well known. This is probably because the one who leads does not know the way clearly enough. Knowing why you do things is of vital importance. Any doubt, as reasonable as it is, must be cleared and solved [30], only then the relationship between teacher and student can develop into a symbiosis based on trust, surpassing the immediacy inherent in today's society. This concept clearly points to a paradigm shift in the positioning of the user before the information, focusing on the present rather than the past or future as can be seen in figure 4.

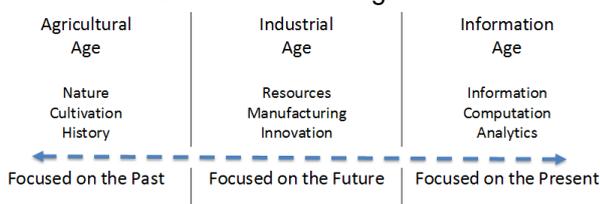


FIGURE 4 - THE NOWISM AND THE ERA OF INFORMATION (ADAPTED FROM [SPIVACK, 2013])

Given this focus on meeting the needs of new content by consumers, but also of care which teachers should be aware, we will proceed to the analysis of the three intervening generations in today's digital world.

#### A. X Generation

Generation X, also known as Digital Immigrants, refers to a generation born between 1960 and 1979, with an age between 35 and 54 years in 2014 [31]. This generation has learned that to follow rules and regulations is the safest way to keep a job [11]. This is a generation that seeks a regular basis to maintain a balance between work and family life.

Digital immigrants are focused on the concept of career and try to improve their skills to achieve higher standards in business [11]. Individualistic in nature [32], they are also essentially sceptics [33], they look for recognition, specially professional and social [34], they adapt to the new technologies and they prefer immediate feedback as a response to their actions [34].

#### B. Y Generation

Also known as the Millennials, and born between 1980 and 2000 [35], it is known that the members of Y Generation are more collaborative and optimistic than the preceding generation. This comes from the fact that most of its members have a high educational level [36]. These individuals prefer a more casual workplace and expect their leaders to be concerned about their personal well-being. They have a high level of tolerance towards diversity, age, ethnicity and sexual orientation because they understand the world as a place where everyone is supposed to live with equal opportunities [37].

Members of Generation Y employees are great and have a burning desire to accomplish teamwork [34]. They prefer to follow directions that allow them flexibility in realizing their projects [37]. This is a generation that is characterized by also focusing on their personal career [34], they are optimistic, [37], diversified in their activities [37] showing willingness and ease in handling technology [34]. Essentially informal [37], they enjoy fun [35] which they balance with work and personal life. They value recognition as well as the reward inherent to work when well done [35].

Generation Y puts emphasis on a crucial point, which is a constant Internet connection, either through personal computers, laptops, tablets or smartphones. Thus, in this generation access to the Cloud is characterized primarily by an expectation on the part of students to use their own devices, the BYOD (Bring Your own Device) [38], both for ludic and pedagogical tasks, which can bring advantages [16], although also some disadvantages to the teaching/learning process.

#### C. Z Generation

Born in a fully digital world [39] Generation Z is proficient as well as reliant on technology, making this

a critical part of how they interact, play and learn [40]. Formed by individuals constantly connected via mobile devices, Generation Z has not exactly a definite start date, although many authors suggest a date from the year 2001[41].

Z comes from Zapping [41], i.e., changing the TV channels quickly and steadily with a remote control, looking for something that is interesting to see or hear, or by simple habit. Zap in English means doing something very fast but also energy or enthusiasm [41].

Immediate content consumers, protagonists of Nowism [29], this generation is characterized by being dynamic and innovative [42]. Its members deal naturally with technology [40], do different tasks at the same time, are immediate, critical and change opinion regularly [41]. Concerned with environmental questions they will be more demanding, versatile and flexible professionals [41].

#### *II. Bring your own device in the teaching/learning process*

The BYOD is the possibility of, for example, students and teachers using their own mobile devices in educational space [16]. According to Norris and Soloway (2011) in 2015, all high school students in the United States will have access to a mobile device for use with curricular purposes. For schools this scenario will be an operationalized reality since these will have adopted a policy of BYOD, i.e. explicit conduct for students, but also teachers, to use their own devices in the classroom.

Currently, Portuguese school cannot purchase and provide equipment for each student. Therefore, it will be these, expectedly in their majority, to purchase their own devices, probably for fun but also for communication and, of course, education which will allow for the school budget support students who can't purchase their own equipment. The adoption of BYOD may not, however, be made without taking into account some characteristics (see Table 2) inherent to this concept [38]:

TABLE 2 – CHARACTERISTICS OF THE BYOD (ADAPTED FROM [NORRIS & SOLOWAY, 2011])

Characteristic	Description
Functionality	The school should ensure that all mobile devices have a configuration that ensures a minimum functionality that goes beyond the mere use of a text-based environment. Thus each student will need a device that ensures the creation and manipulation of a media.
Equity	Schools will need to provide devices to students with weaker economic resources that do not have a device with the minimum functionalities required.

Responsibility	Currently there are schools where BYOD is already a reality, however these schools apply a strict policy regarding network that students can use to access the Internet. These rules may lead to situations where offenders lose the right to use the respective device. In this sense the schools should reflect seriously on what students can or cannot do with their devices within the school.
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Widespread BYOD will bring, however, some issues that we cannot ignore, and on which it is worth reflecting, in this sense Cyberbullying will be considered [43], or even smaller issues, but not less important, as virus prevention and use of filters in Internet access [14]. Cyberbullying is defined by a deliberate and purposeful repeated victimization, through an electronic means, of a more or less helpless person. Unlike traditional bullying, cyberbullying can occur at any time of day or night and quickly reach a wide public [14].

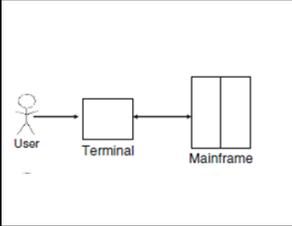
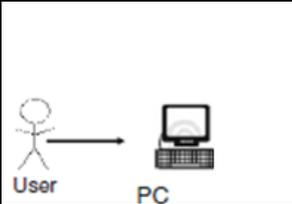
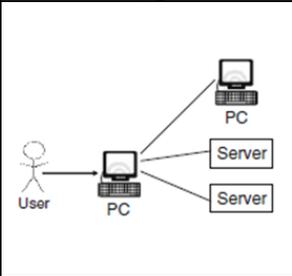
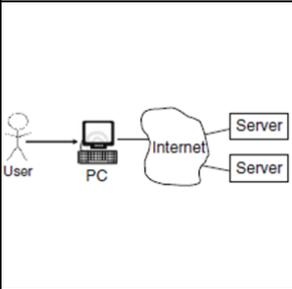
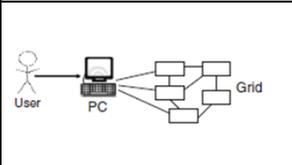
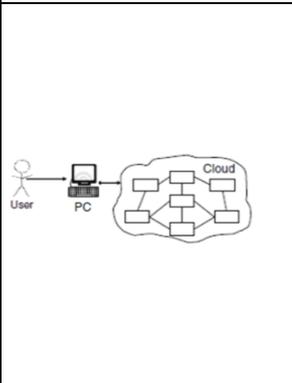
While it may still be a somewhat controversial topic it should not be these issues to prevent the BYOD from becoming a reality in the classroom, in a very near future while fostering the mobility of the teaching / learning process beyond the physical space of the classroom enhancing the so called Education in the Cloud [7].

#### **IV. IMPLICATIONS OF THE CLOUD IN THE TEACHING/LEARNING PROCESS OF DIGITAL GENERATIONS**

Under Murphy's Law it has already been mentioned that "what can go wrong, will go wrong" and an even greater negative impact will be felt if, to this equation, we add the computational factor that will lead to a probable negative result, faster and in a larger scale. We think, however, that an appropriation of Murphy's Law can, using the cloud computing in education will present itself as an added value in the teaching/learning process. Even so we can't still forget that with Cloud Computing and especially its application to education are relatively new paradigms; possibilities, limitations, advantages and disadvantages of it are still issues that need further investigation [7]. It is not our intention to only analyse the advantages of the Cloud in Education, however, it seems important to reformulate Murphy's Law in this context to make sure that what the Digital Generations can learn, will learn.

Even though Cloud Computing is thought of as a current revolution it is, in fact, the culmination of 6 (six) stages of evolution in the context of computational paradigms [44]. Table 3 relates digital generations (X, Y and Z) to the six stages of the computational paradigms [45].

TABLE 3 – THE DIGITAL GENERATIONS AND THE 6 COMPUTATIONAL PARADIGMS [VOAS & ZHANG, 2009], [FURHT & ESCALANTE, 2010]

	<p><b>Stage 1 – Mainframe Computing</b>                  Several users shared systems called mainframes, using simple terminals to perform the tasks that they intended to perform.</p>	Generation X
	<p><b>Stage 2 – PC Computing</b>                  The personal computer, while isolated equipment, has become a powerful device to fill the needs of most users.</p>	
	<p><b>Stage 3 – Network Computing</b>                  Personal computers, laptops and servers were connected via local networks to share resources and improve performance in carrying out tasks required by users.</p>	
	<p><b>Stage 4 – Internet Computing</b>                  LANs are connected to other LANs to form a global network in order to provide the user with use of remote applications. We can point out the Internet as a practical example of this stage.</p>	Generation Y
	<p><b>Stage 5 – Grid Computing</b>                  Grid computing provides shared computing as well as storage through distributed computing.</p>	
	<p><b>Stage 6 – Cloud Computing</b>                  Cloud computing is creating a framework for dynamic resources, implementing the concept of computer virtualization, representing an efficient way to obtain the best advantage both in economic terms and in terms of efficiency of computational resources available.</p>	Generation Z

We can thus consider that although currently the dominant paradigm is Cloud Computing [6], the three digital generations integrate, as far as their origin is concerned, in different stages of the computational paradigms, however, it is in the age of Cloud Computing and Nowism that they really need to interact. Access to the Cloud is in this context of

mobility and immediacy of great importance and the BYOD can't be ignored since apart from raising ethical [14], security and overload of the network in the educational space, it offers its users freedom to use their favourite devices to carry out educational tasks [16] which can increase the chances of interaction and promote collaboration in the teaching/learning process.

Nowadays, most students belong to Generations Y and Z. Therefore, we can consider that many of the teachers still in the active belong to the so called generation X, although it should be considered that part of generation Y has already made its way from the role of student to the one of teacher [35]. There is no intention of putting into question the role of School, but to propose alternatives that will enable teaching and learning to happen, in which cooperation will not require a meeting room in the sense that mobility is changing cooperation since accessibility, portability and flexibility are simultaneously offered by the Cloud and improved by it. With the exponential growth of hotspot's Wi-Fi [12] joining mobility and the Cloud allows for people to work when they want, when they want, where they want, i.e., an operationalization of the BYOD [16] in the teaching/learning process.

The Cloud can facilitate collaboration since it allows to shift the focus of the teaching/learning of information to conversation [11], allowing to meet the needs of people to cooperate when and how they need. Collaborate can happen between any individual on any device any content sharing. Cooperate becomes more mobile, more social, more visual, more virtual. The Cloud allows for a set of connections that we have already analysed previously through the examples of software being available as a service, in the case of our investigation Facebook and the Google ecosystem, that can potentiate the quality of the teaching/learning process of the Digital Generations [11]. The Cloud, in conjunction with the BYOD, can increase the satisfaction level of collaboration between stakeholders in this process, contributing to the reduction in absenteeism, lowering costs, reeducating discrimination, reducing relationship problems in the school space as well as the levels of stress coming from activities that can become tiresome as are teaching and learning [13].

## V. CONCLUSION AND FUTURE WORK

It became a habit (questionable or not) to access Facebook with some frequency during school or work hours [46]. This apparent subversion seems to indicate that people have fun working or studying when they are allowed to think freely and without restrictions [13]. In this sense we are led to believe that students and teachers may withdraw the added value from the freedom to create links that the Cloud and the BYOD can provide them.

Making connections for recognising opportunities and challenges as well as coordinating suitable answers are attributes of the Cloud but also of a social network. However, the type of connection that teachers and students need to be effective and

efficient depends on their value proposal, their objectives and the nature of their action [47]. Currently, at this point, Facebook represents collaborative potential that cannot be ignored since according to Quaresma and Gonçalves (2013) we can verify how quickly the number of interactions can multiply basing ourselves in the number of members who effectively collaborate, i.e., these interactions are precipitated by connections that stakeholders in the teaching/learning process can establish among them [13].

In the operationalization of a teaching/learning process that does not derive from Connectivism [26] the role of the teacher as an individual actor comes from the lack of an alternative framework, i.e., there's simply no different lens through which we can connect individual efforts and collective action [47]. Connections, in the context of these networks, allow the teacher and the students to build a personalized learning environment [48], freed from hierarchies [49] and centred in the most concrete point of the teaching/learning process, i.e., leading the student to the acquisition of knowledge and skills [50].

According to Cross & Thomas (2010) formal structures, such as school, do not take into consideration the existence of an informal invisible organisation. This does not need to be considered as opposed to the formal organisation, but rather as a response to the inevitable limitations of a formal structure [47]. By nature, work and innovation are interactive efforts, but as the need for collaboration increases, the demand for people's time is also incremented [47]. Knowledge moves forward at an unprecedented pace leveraged by this "Darwinian Collective Intelligence" [24] which is visible, at full, in the start of the so called Generation Z. Thus, it seems that the answer will not be creating more and more layers in a matrix structure or to invest only in technology, but in recognizing that our minds may be being modified by the nature of the Internet [24].

In a sense, to understand the gains inherent in sharing and cooperation, we must consider a new space, free of hierarchies [49] that may enhance everyday people to offer innovative solutions and approaches to problems that previously were only available to a few privileged [24]. We emphasize, however, the fact that freedom of hierarchies does not mean the absolute absence of them. At this point it is important to consider communication as extremely sensitive to the concept of hierarchy, i.e., the teacher must know how to communicate, however should even more know how to listen [30]. Freedom does not eliminate the role of the teacher but rather reformulates it.

At a time when the generations X, Y and Z are within school, as teachers and students, "the smartest person in the room is increasingly the room itself" [26], which indicates that collaboration earns even more emphasis in this context [24]. Our investigation aims to use the potential of Facebook as well as the Google ecosystem (designation which we intend to stand for

the set of tools and services provided by Google) for example, to support an environment that unites people and ideas in the room, but also the individuals who are outside it [24] and not being students or teachers wish to contribute (voluntarily or involuntarily) to the process of teaching/learning, allowing for the construction of meaning as well as the occurrence of learning in the context of the connections that are being built [48].

Simple changes in the approaches of integration and interaction within school could have a substantial impact on the productivity of students, providing potentially speedy construction of a network of relationships and trust, in that it will become a convivial atmosphere among three generations that though distinct, will have to share the same space and time, in the evolution of our society. The teachers mainly members of the X Generation, but also of the Y Generation, can create value and increase the levels of motivation in the students, some of the Y Generation, most of the Z Generation, occupying spaces that these already occupy, e.g. social networks [14].

As future work we intend to develop a b-learning model that that supports our appropriation of Murphy's Law "what the Digital Generations can learn will learn", that allows the implementation of an environment conducive to the teaching / learning of Generations X, Y and Z, using the Cloud, specifically Facebook, YouTube, GDrive and Calendar, as an area of Collaborative Learning / Cooperative designed to respond to the immediacy [38] and mobility [13] inherent to the current generations of teachers and students.

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