Policy Paper

School on the Cloud: Towards Unity not Uniformity in Education

ABSTRACT

This paper, in examining the issues that underline the reality of the European pedagogical system, shows that in order for the system to provide the two fundamental concepts in today's education, namely unity(all schools to have equal opportunities, recourses and possibilities) without uniformity (avoiding "typical" common teaching and learning practices),there is: a need to work within a susceptible to present conditions educational paradigm; to have an appropriate instrument to be able to do so; and a suitable educational environment to apply these concepts. The solutions for fulfilling these needs are presented in the form of three unconventional, but necessary propositions for education to move forward ~~2013~~. The first suggests that we are in an era of a new network-centred education paradigm.The second is that Cloud Computing is the main instrument of this new paradigm. The third one proposes a new School,the School on the Cloud.

Keywords: Cloud based Education, School on the Cloud, Cloud Computing

1. INTRODUCTION

The purpose of education is to successfully prepare students for the future, and therefore we cannot continue educating them in ways that address education needs of the past (Fullan & Langworthy, 2013). As Wellman (2015) has said "At this point we appear to have a 19th century curriculum,20th century buildings and organizations and 21st century students facing an undefined future". That is, the world has changed in ways that we have not always been able to understand and accept, but nevertheless weneed to prepare students to face these changes. Thus, a new, fresh, a uthenticand unbounded educational approach is required to educate students for the complex and challenging future (Gialamas et.al.,2013). This implies that there is a need for changes in the ways of teaching and learning, which can be expressed in two clear and unambiguous questions: what education system should there be? And how can we go about determining it?

It should be self-evident that in order to establish the right approachin answering these questions, it is necessary to understand the issues that underline the reality of the European pedagogical system. This suggests there is a need to firstly discern the existing education system in order to detect theimportant issues requiring attention and then provide answer sas well as sugges tpossible solutions. This approach will be followed in this paper.

In examining the European educational system the first issue that needs to be considered is: which are the basic concepts related to teaching and learning, in order to address the required changes. Even a cursory review of the innumerable reports and policy decisions, including those by the European Commission, which has adopted a strategy for ”Unleashing the Potential of Cloud Computing in Europe”,shows: on the one hand there is a need to find a way in designing an environment of engagement with creativity and innovation, which should be the educational norm for all educational institutions, or on the other hand provide the necessary educational unity so that all schools will have equal treatment.In this respect all academic institutions have to be provided with equal educational opportunities and experiences in order for the education process to shift in ways that can ~~catalyse~~catalyze innovative approaches tolearning.In other words, we should design a system that has a normof what should be available to all education institutions or creates a form of pedagogic unity in order for the European educational environment to become efficient.

This positionis based on the notion that the way to the future and progress in education is only achieved through an efficient educational system determined and operating within a global neo-liberal economy (Friedman 2005). And it is towards this economic theory that the European Union exhorts education stakeholders, mobilize them, justifies investment in new technologies as well as rationalizes curriculum decisions. There are two forms of discourse to that position: from those who accept the neo- liberal economy and consider technology-enhanced learning as an essential modernizing tool for education (Negroponte 1996; Lego, quoted in Jenson2006; Prensky 2005; Heppell 2009), but who themselves are subject to critique from the sociology of the future(Bell 1997; Adam&Groves 2007), from critical studiesin education (Gough 2000; Robertson *et al.* 2007), and from economists (Stiglitz 2006). The other and more important criticism comes from those who are concerned with resisting the uniformity of imperialism leading to inevitable and universal educational approaches to the present and the future. That is to say, the idea of a uniform, singular and inevitable trajectory in the face of which education stakeholders in association with local conditions have no role to play, has been the subject of critique from various fields. By testifying to the need of diverse alternative trajectories (the end goal remains common, but the way to achieve it changes) now and in the future, many researchers who contribute to the field of educational technology are arguing for non-uniform approaches in the future (for example, Gee *et al.* 1996; Apple 1997).

On the other hand, there is a need to create an educational system which can inspire all school units to develop the means to transform their own identity into a powerful tool for designing their teaching and learning practices or curriculum structures.This will be an identity which is expressed by each educational institution's own needs and expectations and is determined by the language, the culture, the particular conceptual structures of education and other factors which can be found among the diverse ethnic, cultural and regional groups that inhabit the European continent. In other words, there is a need to find the ways todesign the individuals' personal and communal learning space based on their identity,in order to move away from homogenization and aninneffective educational environment. An environment that represents the driving force that presently shapes (actually it is intensified with policies such as the Bologna accord),the European university, for the time been, education scheme.

Therefore, the idea of education, as a singular, inevitable trajectory in the face of which educational stakeholders including identity factors have no role, is not acceptable by a growing number of scientists working on present and future education studies (Beare & Slaughter 2001; Inayatullah 2008). Moreover, the notion of empowering education stakeholders and communities to envisage and take action to build alternative and identity desirable futures, has started to have many supporters. A characteristic example is the initiative of the Massachusetts Institute of Technology Fab Lab (http://fab.cba.mit.edu/) that aims to create the means to build new educational futures in the hands of communities, learners and educators. This position can

become clear by paraphrasing Abracham Lincoln that "the best way to predict the future is to invent it, by taking into account identity factors".

The second issue is: what is the conceptual basis upon which these two fundamental needs and their attendant changes can be attained. In response to that, it should pointed outthatnowadays the Networked Information Society, which has been interposed in education in the form of the Network Centered Knowing paradigm (Koutsopoulos&Kotsanis, 2014),is unleashing two powerful forces on teaching and learning. Both of these are available to practically every educational institution and are related to theiraccess to high-speed networks. The first force empowers education stakeholders of any school, anywhere, to have easy access to and use of ICT in the form of Cloud Computing. As a result ,all education stakeholders can discover, consume and produce information, resources and services and thus the educational system can provide the necessary unity in teaching and learning. The second force provides ubiquitous access to open content and standards as well as techniques for virtualization, making it possible to leverage education through identity-related programs in unprecedented ways. What appears to be emerging isan education system where its stakeholders have at their disposal teaching techniques, learning practices and many educational related services which allow them to design their own programs, negatingthe need for educational uniformity.

The third issue is related to the means required to achieve, within the networked information society and educational paradigm, the proposed concept of unity without uniformity. It is suggested that Cloud Computing, which is the fundamental instrument in a Cloud based educational environment, can fulfill all the earlier mentioned educational requirements. Indeed Cloud Computing represents a fundamental change in the way computing power is generated and distributed. The literature (Johnson, 2012; Bradshaw et al., 2012)indicates that this technology can be a powerful way to apply a new educational approach. Moreover, as Microsoft (2012) has declared “with cloud computing in education, you get powerful software and massive computing resources where and when you need them (and we may add in any way you desire), in order to apply new educational approaches ... Cloud services can be used to combine on-demand computing and storage, familiar experience with on-demand scalability and online services for anywhere, anytime access to powerful web-based tools”. This suggests it can support an educational system providing Cloud based-education to educational stakeholders, with all the attendant benefits.

Finally,the last issue raised is: what is the educational environment within which to work or how to practically apply to the classroom the concepts presented previously? The results of several Cloud based education projects(Donert &Bonanou, 2015;Malmierca. et. al., 2015)indicate that these objectives are achievable in a new school, the School on Cloud(SoC).The reason is that as learning becomes increasingly digital, online access becomes the necessary vehicle for the emerging Cloud-based developments (Donert, 2013) and thus offers an educational system,which is not only efficient(provides unity), but also effective (evades uniformity) way to access and administer education. That is to say, the new School on the Cloud provides an approach that aligns with the way we should think, share, learn and collaborate as it is determined by anetworked information approach that nowadays determines many aspects of our activities including education. In other words, the new School on the Cloud offers an opportunity to transform the role of education stakeholders, as they help young people to access any learning at any place and any time from any teacher with the right expertise**,** but within an identity determined framework.

From this examination it should be evident that in order to achieve the major goals ~~concepts~~ of education, namely unity without uniformity, there is: a need to work within a susceptible to present educational paradigm ~~to present the right conditions~~; to have the appropriate instrument to be able to do so; and the suitable educational setting toapply them. These needs and their characteristics (shown schematically on Fig.1) are examined in the next sections of this paper.

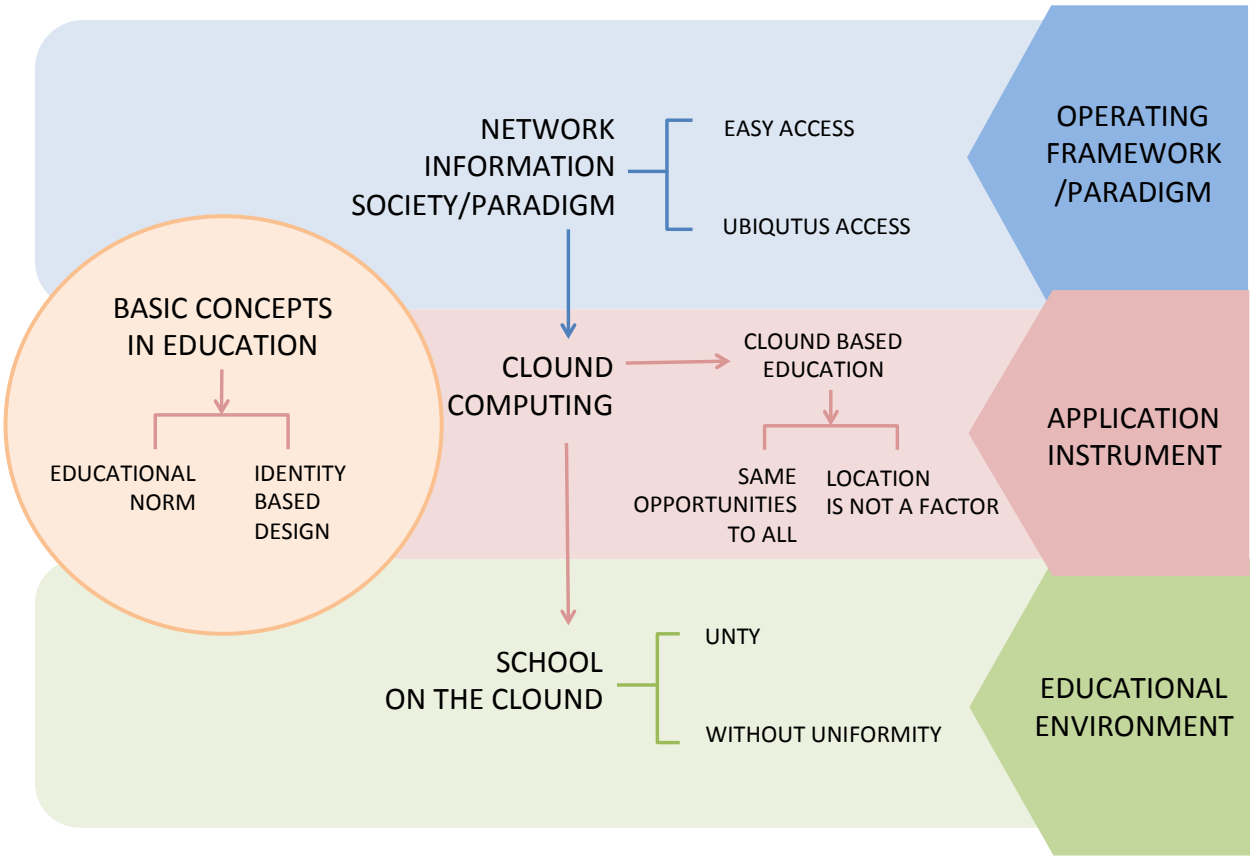

Fig 1 : The Education System

1.1 The Network Centered Knowing Paradigm

At the onset,it should be declared that today the concept of *unity without uniformity* should be at the centre of the pedagogic approach towards teaching and learning .But this leads to the position (Koutsopoulos, 2015b) that not only is the traditional *Teacher Centred instructing paradigm* representing an instructing approach,as well as the much herald present approaches to education, defined as the *Student Centered learning paradigm* focused on a constructivism based learning, are now absolute. ~~and we~~ We thus find ourselves in the period of the *Network Centred knowingparadigm*where knowledgeis achieved through *integration* and is based on *Cloud Computing*.~~More specific~~, ~~I~~it is therefore suggested that in the last few years teaching and learning has, through two parallel changes in the way education is perceived and is investigated, gone through two paradigm shifts (Fig. 2), as considered by Kuhn (1962)., These are briefly examined next.

For a long time the traditional *Teacher Centred instructing paradigm* was the exclusive environment within which the education system operated. This paradigm was characterized by a *monodisciplinary*environment (education was the exclusive realm of educators) within which a *"fragmented"* approach to educational needs and obligations was prevalent and where the teacher alone transmitted information to students who passively listened and acquired facts from the simple transmission of an *instruction* based curriculum.

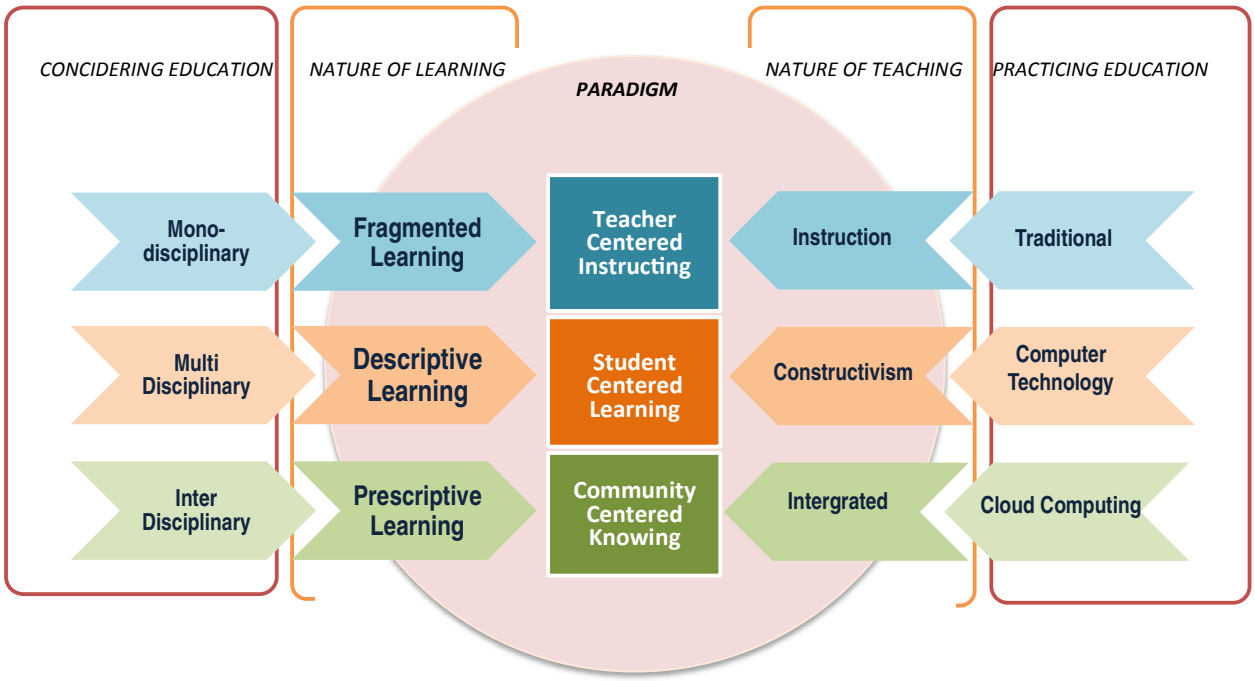

Fig. 2 Paradigm shifts in education

This paradigm has been replaced (the first paradigm shift) by a*Student Centeredlearningparadigm,* representing today's prevailing educational environment. In this paradigm learningis expressed in the form of a set of separaterelations, interdependences and interactions leading to a *multidisciplinary* framework in education, which is focused, as previously, in a *descriptive* way on both individual learners and on learning itself. But this notion of a descriptive-multidimensional education requires*computer technology*which is based in a world of computers and interactive software (Dede, 2008), leading toa *constructivist* approach in practicing teaching and learning.

Both these approaches cannot satisfy the complex and challenging conditions prevailing in the present day education environment(Koutsopoulos&Kotsanis, 2014;Koutsopoulos, 2011~~15b~~).As a result,nowadays a new *Network Centeredknowing* approach is needed(the second paradigm shift), which requires an *interdisciplinary*approach leading towards the integration of all possible learning actors and approaches in order to overcome the compartmentalization of knowledge. However, such a vision of teaching and learning establishes an holisticeducation that implies *prescriptive* learning (the way students should learn) as well as encompasses all stakeholders in different ways, with the use of *CloudComputing*.

This necessary conditions for today's Network Centered knowing paradigm, which promotes Cloud based education,represents a framework which can successfully serve and support with the same resources and the same opportunities as well as provide the means to design all education institutions according to local needs and conditions . Therefore, it qualifies as an ideal environment for *educational unity without uniformity*.

1.2 CloudComputing

In order to appreciate the Network centered knowingparadigm's contribution towards unity without uniformity in educationthe concept of cloud computing needs to be to fully understood as well as realize how its components can be utilized in the operation of such an educational approach. There seems to be many definitions of Cloud Computing around. The global management

consulting firm,McKinsey, found that there are 22 possible separate definitions of Cloud Computing, none of them dealing with educational concerns. In fact, no common standard or definition for Cloud Computing seems to exist (Grossman, 2009; Voas and Zhang, 2009; Fadil, 2015). However, despite the many definitions and the various terms suggested by computer experts and Cloud users, the concept of Cloud Computing can be described as an ICT technology that can be fully representedas a three dimensional space consisting of the *characteristics axis,* that includes: On demand service, Network access, Resource pooling, Rapid elasticity and Measured service;*the type of service* axis, that includes: Infrastructure, Platform and Software*;* and the *form of deployment* axis, that includes: Private, Community, Public and Hybrid*.* (NIST, U.S Department of Commerce, 2013; Koutsopoulos &Kotsanis, 2014) (Fig. 3).Creating in this way a framework whose axes are an integral part of an educational system which can be designed to offer unity without the constraints of uniformity, as they are briefly presented next.

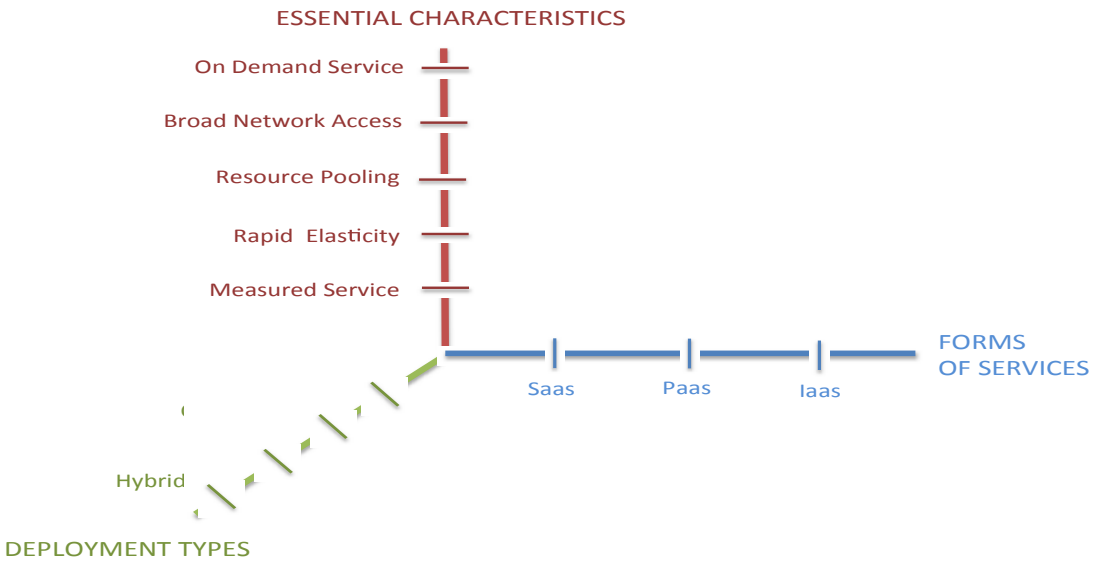

Figure 3: Cloud Computing Framework

1.2.1 Cloud Computing Provides Unity

Cloud Computingrepresents aninstrumentwhich can successfully serve and support:multitasking, flexibility, the ability to handle a large number of applications and to meet changing demands, as well asaccess to stored files, e-mails, databases and other applications from anywhere at request.It representsa familiar and appropriate tool for today's education participants (the first generation to grow up within the digital technology era). Moreover,it can support with the same resources as well as provide the same opportunitiesto all major education stakeholders(students, teachers and administrators)no matter where they are located,thus qualifying as an ideal environment for*educational unity*.

1.2.2 Cloud computing Avoids Uniformity

Cloud Computing offersunimaginable capacity, among others, in using technology to connect people across vast distancesand store and share information in ways that provide access virtually from anywhere (Ferrari 2015; Donert and Bonanou2014). This paper in examining Cloud Computing, without ignoring the existence of sizeable attendant issues (i.e. cost, security, law issues etc.) that must be addressed, it focuses on the issue of location as it relates to education.

More specifically, the fact that “the Cloud” refers to machines located in large data centers, raises a host of interesting questions about the role of locationinshaping the impactof Cloud Computing and the level of services available to education stakeholders located at any education institution (either in a school at the centre of a city, in a remote village or in a Roma reservation area). Cloud Computing,bycentralizing information and computing resources (quite contrary to the imagery that the name "Cloud" evokes),transcends location constraints imposed by users o the Cloud itself.Moreover,Cloud-based educationalthough situated on the opposite end of the *distance education* spectrum with Moore's Theory of Transactional Distance(Moore, 1991),and avoids most of its shortcomings(Hill et al., 2009), it shares the basic principle that cognitive space,functioning to overcome physical distancebetween learners and instructors, or teaching/learning methodsor materials, or curriculum etc. is an acceptableand beneficial approach to education. As a result, the unusual combination of the great abilities offered byCloud Computing and the ubiquity in providing Cloud based education,negates the necessity for physical closeness of the educationalfactors and the need for locally available educational resourses,thus raising serious questions about the universal value and utility of location in education.

For a balanced approach, however, the issue of location in education should be considered in terms of the dictum "Geography matters but not Distance". More specifically, on the one handas ICT developments, in the form of Cloud Computing, are diminishing the "need for presence" in remote interactions and such interactions are developing not onlybetween families, friends and co-workers, but also between education stakeholders. The notion of being ‘together apart’ is becoming a familiar aspect of working, interacting and entertaining as well as in educating ourselves. That is to say, the separation of ‘information resources’ from physical locations with the coming of Cloud computing has become "natural", resulting in the diminution of the importance of location.

On the other hand,Geography still matters because Geography will continue to influence the access of individuals and groups to digital networks, for locationwill continue to determine in most cases their pricing, infrastructure, legal constraints and regulation. Moreover, the "face to face" interaction will retain its importance, especially in terms of the social aspects of our lives, because physical proximity is paramount for most of us. For example, people will continue to use "place" and physical location as a marker for identity, which as it was shown itplays an important role in education among other areas of human endeavors .

To summarise, when someone familiar with Cloud Computing will be asked a question about the role of location in education, he will surely chuckle and reply something akin to: “The location of the Cloud user and of the Cloud itselfare irrelevant. Anyone is able to tap into the power of the cloud, located at any place, from anywhere”. This answer, while technically and empirically accurate, misses an important issue,namely: Cloud Computing negates the necessity of considering location as a factor to reckon with, at least when considering "non typical" (i.e. rural and remote schools) and consequently the need to impose upon them a *uniformity* in teaching and learning practices or curriculum structures that developed centrally and applied in "typical" urban schools.

1.3 The Schoolonthe Cloud

The basic principle that *“Technology changes, Education survives”* signifies the role of education as a societal necessity and the need to explore their potential implications to education. It has shown that ICT changes, in the form of Cloud-based technologies(Pallis,2010;Koutsopoulos, 2015a), provide the power to fundamentally change how education should be approached and practiced, substantiating the effort to institute unity without uniformity in education.

As a result, in order to achieve such goals,the newSchool on the Cloud has to address the following two key questions: How should education respond to cloud-based technologies? What is the impact, now and in the future, on education stakeholders and teachers?Results from

applications of Cloud technologies inthe classroom, including the most recentones (Donert and Bonanou,2015)indicate that inanswering these two questions in essence theirworkreaffirms the need for the proposed concept of unity without conformity and create the foundations in applying it.The reason is simple: The School on the Cloud educational approach brings many benefits to education as well as accelerating trends and developments at the interface of Cloud Computing and education(Armbrust et. al., 2010;Malmiera et al., 2015).This in turn increases the ability of stakeholders to adjust or alter their educational objectives. In this way, the benefits to education substantiate the existence and need for *unity* and the trends emerging from developments in society, in technology and mainly in educationhighlight the abilityof innovations toeliminatethe need for*uniformity* in education.

1.3.1 School on the Cloud Characteristics Supporting a Unifying education System

Experience and the literature (Bradshaw et al., 2012) shows that there is a range of resources and services available to enable Cloud based education, among which are: infrastructure, services, solutions, the introduction of new processes etc. The School on the Cloud,as a Cloud-based approach, provides the conditions for every educational institution to have equal opportunities, resourses and possibilities (norms in education). In other words, the much sought*unity* can be easily achieved, because the School on the Cloud provides the following unifying promoting conditions:

1.3.1.1 Affordability

Cloud based processes promotein general and in education in particular a cost effective use of ITC resources, thus reduce their cost and make them affordable to all units and all stakeholders (equalizepossibilities).

1.3.1.2 Flexibility

Cloud-based teaching and learning can prevent individual investments in equipment, programs etc.,because the infrastructures of Cloud Computing are centralized and thus promote flexibility in various ways(IBM, 2010)(equalizes resources).

1.3.1.3 Efficiency

Cloud based approaches by promoting the exchange between teachers and students and the participationof their social networks and the parents, leads to creating educational norms by determining: firstly, the appropriate to the stage of education information and tools and secondly theappropriate and efficientlearning and teaching process (Tuncay, 2010)(equalizes treatment).

1.3.1.4 Sharing

Cloud-based techniques provide the means in every institution to avoid the duplication of resources that exist elsewhere. Hence skills, good practices, applications, teaching content and infrastructures can be pooled andshared, thus avoiding educational inequalities between institutions (equalizes opportunities).

1.3.2 School on the Cloud Characteristics Eliminating Uniformity in Education

The School on the Cloud, by be ingat the forefront of Cloud Computing technology, provides to education a series of innovations which offers tothe teaching and learning system the ability to be adjusted,altered or revisedusing factors of identity.This enables us to design the way in which education institutions, students and teachers are able to use equipment, applications and subject content.In other words, the new School on Cloud provides the following innovations,which in turn offer identity related or individualized to institution and stakeholders applications to teaching and learningin overcoming *uniformity* constraints (IBM,2010):

1.3.2.1 Intelligent Classroom

Cloud-based education, by providing the recourses for a set of tools and applications(access to courses, syllabus subject contents,etc.) can contribute in creating a classroom with accepted

quality and effectiveness of teaching that can be considered intelligent, but which avoid the pitfalls of uniformity.

.1.3.2.2 Virtual Classroom

Cloud based education,by providing the necessarycommunication and collaboration tools, can help bring down the walls of the classroom and give rise to the virtual classroom,which enables:

- ✓ Students of the same age located in distant institutions, towns or countries toshare in the experience of any class being taught online.
- ✓ Teachers in a certain location to teach classes in a different school, town, country or even continent, complete with the required material.
- ✓ Researchers can have instant access to research and discoveries from any parallel or linked center around the world.

That is, it allows education stakeholders to achieve unity by breaking all forms of barrier orwithout the problems of uniformity.

1.3.2.3 Virtual Lab

Cloud-based education by offering the resources for processing, calculating and simulating can contribute in creating virtual labs. More specifically, students and teachers can carry out, in a virtual form, the simulations or experiments they need or want in any subject (chemistry, physics, social sciences, economics, etc.), and with any degree of difficulty (from the simplest to the most complex), all in accordance to their specific design and requirements, overcoming any uniformity constrains.

1.3.2.4 Virtual Content

Cloud-based education by providingDigital IWB's (Interactive Whiteboards), it can help create a virtual reference system of content that remains in the public domain and thus avoiding the pitfalls of using nothing but the costly commercial content. But mainly such a system can provide teachers with the choice of using a content as is, alter it to meet their needs, adapt it to the local conditions, or finally use it to supplement their own and in generalavoid uniformity.

As a result, the School on the Cloud offers to its students a series of very important competences which allows them to face the concepts of unity without uniformity:

1.3.2.5 Digitalization

Refers to their ability to efficiently, confidently and critically use the new ICT technologiesin order to search, sift, organize, manage and evaluate information in an efficient and targeted totheir individual needs.

1.3.2.6 Learning

Is related to students' ability for learning to learn. That is, students are motivated to pursue their own learning progress and knowing how to process information, assigning meaning to it and converting it into knowledge.

1.3.2.7 Understanding

Is associated with students' globalunderstanding**.** That is, by overcoming uniformity constraints they canacquire the competence of understanding in order to be able to analyze the surrounding world, be social and part of the universal society.

1.3.2.8 Collaborating

Corresponds to a crucial skill that needs to be learned and practiced from early on in education, and Cloud based education can support it. That is, students need to learn to: listen, respect, negotiate and even accept ideas expressed by others, understand and work in teams and different roles, and finally participate in communal activities.

1.3.2.9 Updating

This skill refers to the ability of students to use the resourses of the Cloud in order to be better preparedfor thecontinuous changes and developments, as well as continued updating of such skills as: autonomy, lifelong learning, flexibility, innovation, creativity etc.

1.3.2.10 Communicating

The use of Cloud Computingin terms of learning and practicing foreign languages helps students put an emphasis on using it as a means for communication with other people and not on grammatical or syntactical correctness per se.

In closing, it should be noted that the proposed School on the Cloud is not anymore a novice application of Cloud Computing to education, which promises to deliver many exciting things. It is already a reality and there are many successful implementations of it (Johnson, 2012; Bradshaw et al., 2012; Malmierca, 2015; Donert and Bonanou, 2014).The School on the Cloud is a new and different school that has been born, is partly operating now and is going to stay with us at least in the foreseeable future, for it is characterized by *unity without uniformity*

4. CONCLUSIONS

The way education is perceived and is practiced nowadays does not correspond to the needs and their very nature of the education stakeholders. On the contrary, the education paradigm in use can only create confusion and difficulties to students. ~~that deprive present day students of the tools they need most to master the skills and dexterities that they will require both in today's and tomorrow's world.~~ As a result, the existing system:

- deprives *many*studentsof the tools they need most to master the necessary skills and dexterities (the necessary *unity* in the education system)
- forces *all* of them to follow a predetermined path to achieve them (not avoiding the barriers of *uniformity)*

Contrary to these,this paper has demonstrated that we should move towards the new network centered paradigm,which in essence forces Cloud Computing to be the main educational tool.An instrument which provides to *all*the present day,generation Z (students born in the 21st century) not only the required skills and dexterities, but in a uniformity free environment.

The final question, which is related and to the issuesposed in the beginning of this paper, has to be: is the School on the Cloud just another education fad or the only way to deal with the basic issuesfacing education? Considering them merely either as a fad or the ultimate education truth, however, misses the deeper contribution of the School on the Cloud as the true base upon which to develop, construct and apply the new Network centered knowing paradigm in educating students in a holistic way for the complex and challenging future.

In conclusion,the proposed School on the Cloud is creating a unified education system(all schools to have equal opportunities, resourses and possibilities), avoiding at the same time uniformity (the need to follow "typical" teaching and learning practices). Thus, leading to the dictum, which it is about time for all of us to embrace and wholeheartedly support:

In education all flowers (schools) can bloom as long as they can find the appropriate "cloud" to grow upon.

REFERENCES

Adam B, and Groves C. FutureMatters: Action, Knowledge and Ethics. Brill, Leiden & Boston, MA;2007.

Armbrust, M., et. al. A View of Cloud Computing communications.Association for Computing Machinery.2010:539(40):50-58.

Bell S; Bradsaw, D. et. al. Quantitative Estimates of the Demand for Cloud Computing in Europe and the Likely Barriers to Up-take. Final Report, IDC Analyze the Future, 2012.Accessed 4

461 march2016.Available :http://ec.europa.eu/digital-agenda/futurium/en/content/quantitative-
462 estimates-demand-cloud-computing-europe-and-likely-barriers-take.
463 Dede, C. A.Seismic shift in epistemology. *EDUCAUSE Review*,2008; 43(3),:80–81.Accessed 4
464 Jan 2016.Available :http://net.educause.edu/ir/library/pdf/ERM0837.pdf.
465 Donert, K.. Lifelong learning Programme Application Form, KA3_MN_EL_SoC. Brussels:
466 European Commission. 2013
467 Donert, K., &Bonanou, H. editors. *Education on the Cloud 2014: State of the*
468 *Art.*Report,Deliverable 2.1 for The School on Cloud: Connecting education to the Cloud for
469 digital citizenship network (SoC);2014.Accessed 4 Jan
470 2016.Available:http://schoolonthecloud.eu/
471 Fadil, O. et al. Cloud computing and its Role in Education in Morocco.Journal of Engineering
472 Science and Research. 2015;2;51-59
473 Ferrari, S. et al. Needs AnalysisReport, Deliverable for Rural School Cloud: Cloud Computing for
474 School Networking.Accessed 4 Jan 2016.Available:http://rsc-project.eu/index.php/products/
475 Friedman, T. The World Is Flat: a Brief History of The Twenty-First Century. Farrar, Strauss and
476 Giroux, New York;2005.
477 Fullan, M. &Langworthy, M. *Towards a New End: New Pedagogies for Deep Learning.*2013.
478 Aaccessed4Jan.2016.Available:http://www.newpedagogies.info/wpcontent/uploads/2014/01/N
479 ew_Pedagogies_for_Deep%20Learning_Whitepaper.pdf
480 Gee, Jim; et al(). A pedagogy of multiliteracies: Designing Social Future *Harvard Educational*
481 *Review.*1996;66(1);60-74
482 Gialamas S., Pelonis P. &Medeirod, S. Metamorphosis: a collaborative leadership model to
483 promote educational change, Thoughtful Mind. Institute for Innovation and Creativity, ACS,
484 Athens.2013.Accessed 4 Jan. 2016. Available
485 :http://issuu.com/acsathens/docs/final_publicity_book_2012/23.
486 Gough, N. Locating curriuclum studies in the global village. Journal of Curriculum
487 Studies.2000;32;329–342.
488 Heppell, S. () Towards a new media literacy. In 8 Essays –The Knowledge Exchange
489 Programme: A collaboration between BBC R&D and the Arts and Humanities Research
490 Council, BBC/AHRB.2009.
491 Hill J. R., Song L., & West R. E. Social Learning Theory and Web-Based Learning
492 Environments: A Review of Research and Discussion of Implications. American Journal of
493 Distance Education.2009;23 (2);88-103
494 Johnson, L., Adams, S., Cummins, M. The NMC Horizon Report: Higher education edition.
495 Austin, TX 2012..
496 IBM Global Technology Services.Applying the cloud in education: An innovative approach to
497 IT.2013.Acessed 4 Jan. 2016.Available :http://www-935.ibm.com/services/be/en/cloud-
498 computing/cloud_edu_en.pdf.
499 Koutsopoulos, C. K. What's European about European geography? The case of Geoinformatics
500 in Europeanization. J*ournal of Geography in Higher Education.,*2008;32 (1);7-15.
501 Koutsopoulos, C. K. *Changing Paradigms of Geography. European Journal of Geography. 2011;*
502 *2 (1);54-75*Koutsopoulos, C. K.,&Kotsanis Y. School on Cloud:Towards a paradigm shift.
503 *Themes in science and technology education.*2014;7(1);47-62.
504 Koutsopoulos, C. K. *A review of cloud based futures and methodologies.*Report,Deliverable 5.1
505 for The School on Cloud: Connecting education to the Cloud for digital citizenship network
506 (SoC). 2015a.Accessed 4 Jan. 2016. Available :http://schoolonthecloud.eu/.
507 Koutsopoulos, C.K.School on Cloud: Transforming Education.). Journal of Elementary
508 Education.2015b;4(2);16-24
509 Kuhn, S. T. The structure of scientific revolutions.Chicago.University of Chicago Press.1962
510 Malmierca. R. M. et. al. Teaching and Learning in the Cloud.Report, Deliverable for Rural School
511 Cloud: Cloud Computing for School Networking.2015.Accessed 4 Jan. 2016Available:
512 http://rsc-project.eu/index.php/products/.
513 Moore, M. G. (1991). Distance Education Theory. The American Journal of Distance.1996;
514 5(3);13-21
515 Negroponte, N. Foreword. The Connected Family:Bridging the Digital Generation In S. Papert
516 editor. pp. i–xi. Longstreet Press, Atlanta, GA.1996.

Prensky, C. (Don't Bother Me, Mom – I'm Learning.Paragon House, NewYork.2005.
Robertson S., et. al. (2007) *Globalization, Education and Development: Ideas*. Actors and Dynamics, DFID,London.
Stiglitz, J. Making Globalisation Work.W.WNorton & Co., NewYork & London. 2006.
Tuncay, E.Effective use of cloud computing in educational institutions.Procedia Social and Behavioral Sciences.2010; 2; 938–942.