

Policy Paper
School on 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 nowadays education, namely unity(all school 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 them. The solutions in fulfilling these needs are presented in the form of three unconventional, but necessary for education to move forward propositions. The first suggests that we are in the era of the 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 be able to understand and accept, but nevertheless we need to prepare students to face these changes. Thus, a new, fresh, authentic and 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 the education system should be? And how can we go about determining it?

It should be self-evident that in order to establish the right approach in answering these questions, it is necessary to understand the issues that underline the reality of the European pedagogical system. That is, there is a need to first discern the existing education system in order to detect the important issues requiring attention and then provide answers as well as suggest possible 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

47 changes. Even a cursory review of the innumerable reports and policy decisions, including those
48 by the European commission, which has adopted a strategy for "Unleashing the Potential of
49 Cloud Computing in Europe", shows: on the one hand there is a need to find a way in designing
50 an environment of engagement with creativity and innovation, which should be the educational
51 norm for all educational institutions, or provide the necessary educational unity so that all schools
52 will have equal treatment. That is, all academic institutions have to be provided with equal
53 educational opportunities and experiences in order for the education process to shift in ways that
54 alter the approaches we catalyze learning and innovation. In other words, to design a system that
55 has a norm of what should be available to all education institutions or create a pedagogic unity in
56 order for the European educational environment to become efficient.

57
58 This position, however, is based on the notion that the way to the future and progress in
59 education is only towards an efficient educational system determined and operating within a
60 global neo-liberal economy (Friedman 2005). And it is towards this economic theory that the
61 European Union exhorts education stakeholders, mobilize them, justify investment in new
62 technologies as well as rationalize curriculum decisions. There are two forms of discourses to
63 that position: from those who accept the neo-liberal economy and consider technology-
64 enhanced learning as an essential modernizing tool for education (Negroponte 1996; Lego,
65 quoted in Jenson 2006; Prensky 2005; Heppell 2009), but who themselves are subject to critique
66 from the sociology of the future (Bell 1997; Adam & Groves 2007), from critical studies in
67 education (Gough 2000; Robertson *et al.* 2007), and from economists (Stiglitz 2006). The other
68 and more important criticism comes from those who are concerned with resisting the uniformity
69 imperialism leading to inevitable and universal educational approaches to the present and the
70 future. That is, the idea of a uniform, singular and inevitable trajectory in the face of which
71 education stakeholders in association with local conditions have no role to play, has been the
72 subject of critique from various fields. By testifying to the need of diverse alternative trajectories
73 (the end goal remains common, but the way to achieve changes) now and in the future, many
74 researchers who contribute to the educational technology field are arguing for a non uniformity
75 approaches to the future (for example, Gee *et al.* 1996; Apple 1997).

76
77 On the other hand, there is a need in creating an educational system which can inspire all school
78 units to develop the means to transform their own identity into a powerful tool in designing their
79 teaching and learning practices or curriculum structures. An identity which is expressed by each
80 educational institution's needs and expectations and is determined by the language, the culture,
81 the particular conceptual structures of education and other factors which can be found among
82 the diverse ethnic, cultural and regional groups that inhabit the European continent. In other
83 words, there is a need to find the ways to design the individuals' personal and communal
84 learning space based on their identity, in order to move away from homogenization and a non
85 effective educational environment. An environment that represents the driving force that presently
86 shapes (actually it is intensified with policies such as the Bologna accord), the European
87 education scheme.

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89 Therefore, the idea of education as a singular, inevitable trajectory in the face of which
90 educational stakeholders including identity factors have no role, is not acceptable by a growing
91 number of scientists working on present and future education studies (Beare & Slaughter 2001;
92 Inayatullah 2008). Moreover, the notion of empowering education stakeholders and communities
93 to envisage and take action to build alternative and identity desirable futures, has started to have
94 many supporters. A characteristic example is the initiative of the Massachusetts Institute of
95 Technology fablab that aims to create the means to build new educational futures in the hands of
96 communities, learners and educators. This position can become clear by paraphrasing Lincoln
97 that "the best way to predict the future is to invent it, by taking into account identity factors".

98
99 The second issue is: what is the conceptual basis upon which these two fundamental needs and
100 their attendant changes can be attained. In response to that, it should be pointed out that nowadays

101 the Networked Information society, which has been interposed in education in the form of the
102 Network Centered Knowing paradigm (Koutsopoulos & Kotsanis, 2014), is unleashing two
103 powerful forces on teaching and learning. Both of these are available to practically every
104 educational institution and are related to their access to high-speed networks. The first force
105 empowers education stakeholders of any school, anywhere, to have an easy access and use of
106 ICT in the form of Cloud Computing. As a result, all education stakeholders can discover,
107 consume and produce information resources and services and thus the educational system can
108 provide the needed unity in teaching and learning. The second force provides ubiquitous access
109 to open content and standards as well as techniques for virtualization, making it possible to
110 leverage education through identity related programs in unprecedented ways. What appears to
111 be emerging is an education system where its stakeholders have at their disposal teaching
112 techniques, learning practices and many educational related services which allow them to design
113 their own programs, negating the need for educational uniformity.

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

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

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

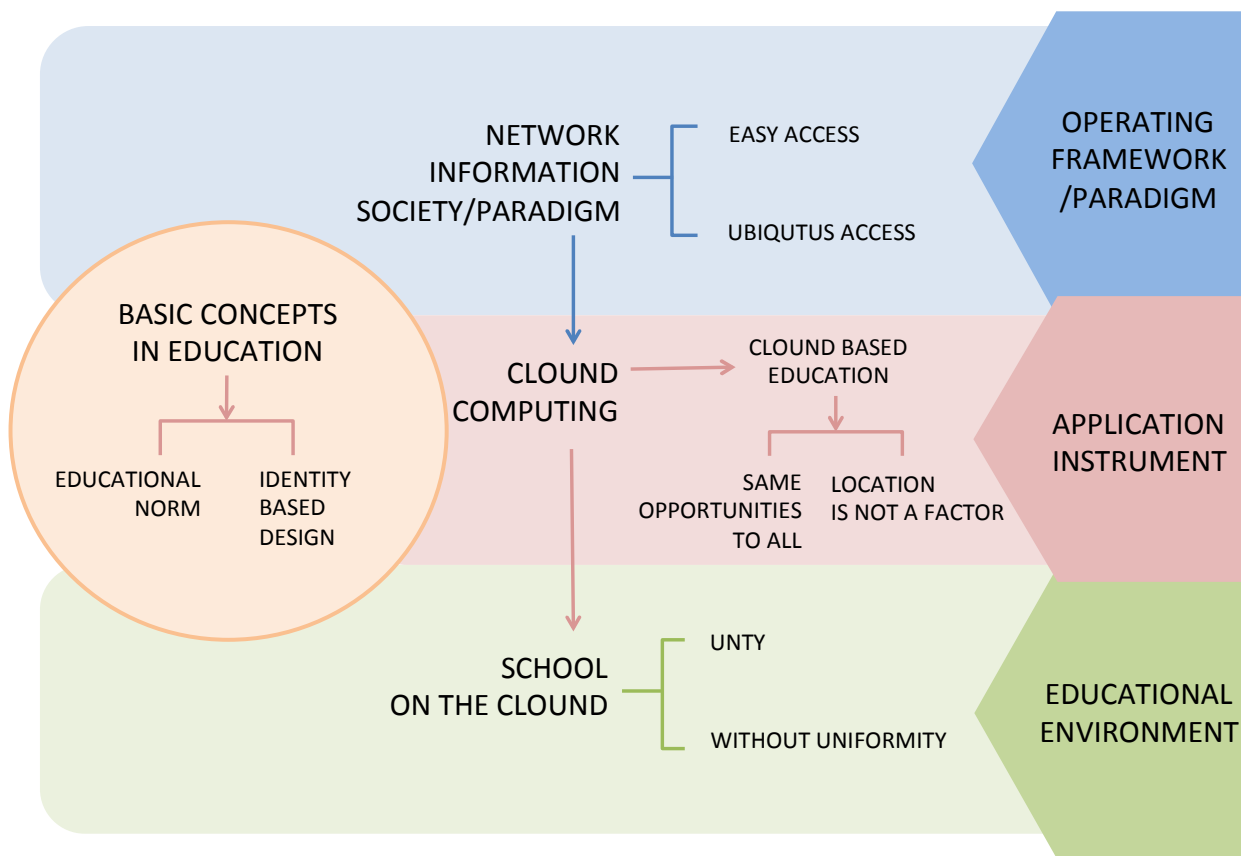


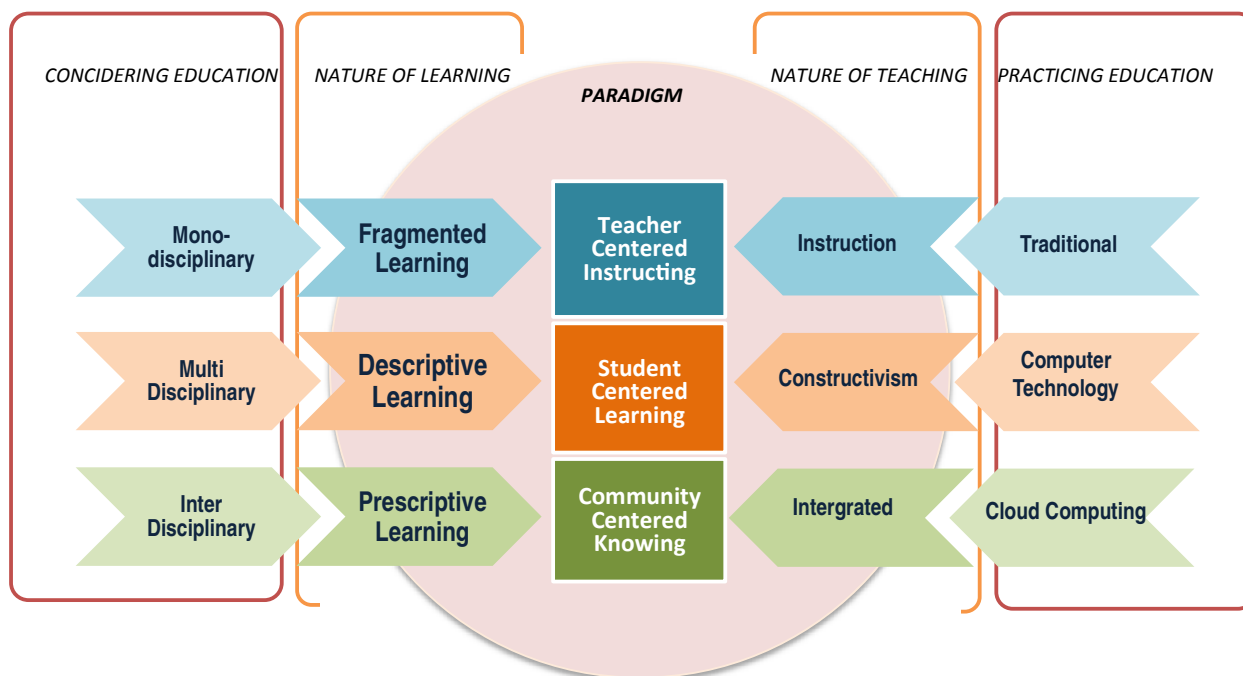
Fig 1 : The Education System

1.1 The Network Centered Knowing Paradigm

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

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173 **Fig. 2 Paradigm shifts in education**
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176 This paradigm has been replaced (the first paradigm shift) by the *Student Centered learning*
177 *paradigm* representing the prevailing nowadays educational environment. In this paradigm
178 learning is expressed in the form of a set of separate relations, interdependences and interactions
179 leading to a *multidisciplinary* framework in education, which is focused, as previously, in a
180 *descriptive* way on both individual learners and on learning itself. But this notion of a descriptive-
181 multidimensional education requires *computer technology* which is based in a world of computers
182 and interactive software (Dede, 2008), leading to a *constructivism* approach in practicing teaching
183 and learning.
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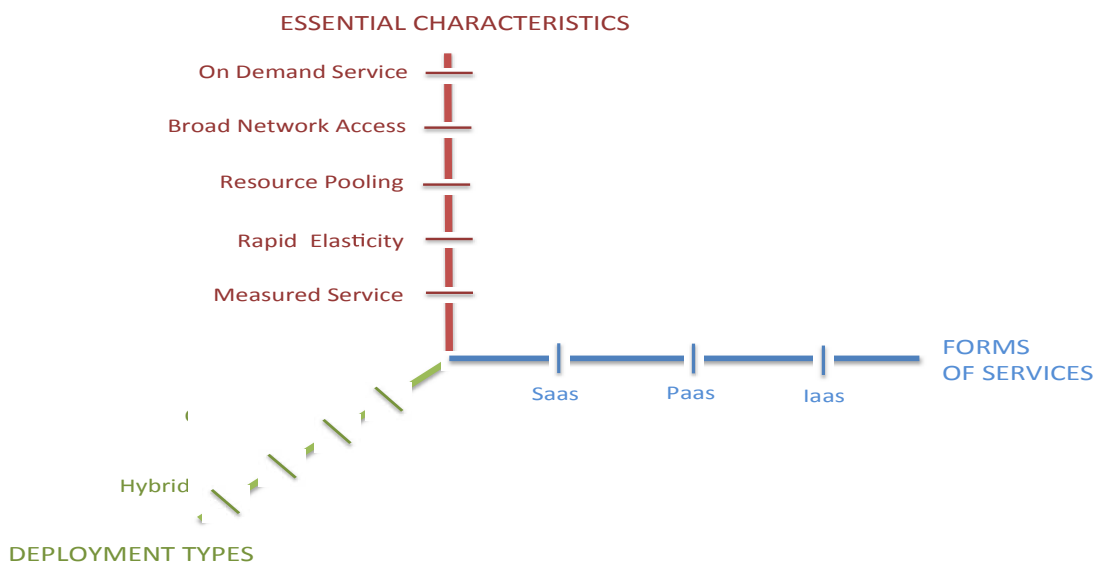
185 Both these approaches cannot satisfy the complex and challenging conditions prevailing in the
186 present day education environment (Koutsopoulos & kotsanis, 2014; Koutsopoulos, 2015b). As a
187 result, nowadays a new *Network Centered knowing* approach is needed (the second paradigm
188 shift), which requires an *interdisciplinary* approach leading towards the integration of all possible
189 learning actors and approaches in order to overcome the compartmentalization of knowledge.
190 However, such a regard of teaching and learning establishes a holistic education which requires
191 *prescriptive* learning (the way students should learn) as well as encompasses all stakeholders in
192 different ways, with the use of *Cloud Computing*.
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194 This necessary for today's conditions *Network Centered knowing* paradigm, which promotes
195 *Cloud based education*, represents a framework which can successfully serve and support with
196 the same resources and the same opportunities as well as provide the means to design
197 according to local needs and conditions all education institutions. Therefore, it qualifies as an
198 ideal environment of *educational unity without uniformity*.
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200 **1.2 Cloud Computing**

201 In order to appreciate the *Network centered knowing* paradigm's contribution towards unity
202 without uniformity in education the concept of cloud computing needs to be fully understood as
203 well as realize how its components can be utilized in the operation of such an educational
204 approach. There seems to be many definitions of cloud computing around. The global

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

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 224 **1.2.1 Cloud computing Provides Unity**

225 Cloud computing represents an instrument which can successfully serve and support:
 226 multitasking, flexibility, the ability to handle a large number of applications and to meet changing
 227 demands, as well as access to stored files, e-mails, databases and other applications from
 228 anywhere at request. That is, it represents a familiar and appropriate tool for today's education
 229 participants (the first generation to grow up within the digital technology era). Moreover, it can
 230 support with the same resources as well as provide the same opportunities to all major education
 231 stakeholders (students, teachers and administrators) no matter where they are located and thus
 232 qualifying as an ideal environment of *educational unity*.

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 234 **1.2.2 Cloud computing Avoids Uniformity**

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 236 Cloud Computing offers unimaginable capacity, among others, in using technology to connect
 237 people across vast distances and store and share information in ways that provide access
 238 virtually from anywhere (Ferrari 2015; Donert and Bonanou 2014). This paper in examining Cloud
 239 Computing, without ignoring the existence of sizeable attendant issues (i.e. cost, security, law
 240 issues etc.) that must be addressed, it focuses on the issue of location as it relates to education.

241 More specifically, the fact that “the cloud” refers to machines located in large data centers, raises
242 a host of interesting questions about the role of location in shaping the impact of Cloud
243 Computing and the level of services available to education stakeholders located at any education
244 institution (either in a school at the centre of a city, in a remote village or in a Roma reservation
245 area). That is, Cloud Computing by centralizing information and computing resources (quite
246 contrary to the imagery that the name “Cloud” evokes) transects location constraints imposed by
247 users and the Cloud itself. Moreover, Cloud based education although situated on the opposite
248 end of the *distance education* spectrum with Moore's Theory of Transactional Distance(Moore,
249 1991), and avoids most of its shortcomings(Hill et al., 2009), it shares the basic principle that
250 cognitive space, functioning to overcome physical distance between learners and instructors, or
251 teaching/learning methods or materials, or curriculum etc. is an acceptable and beneficial
252 approach to education. As a result, the unusual combination of the great abilities offered by Cloud
253 computing and the ubiquity in providing Cloud based education, negate the necessity for physical
254 closeness of the educational factors and the need for locally available educational recourses,
255 thus raising serious questions about the universal value and utility of location in education.
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257 For a balanced approach, however, the issue of location in education should be considered in
258 terms of the dictum “Geography matters but not Distance”. More specifically, on the one hand as
259 ICT developments, in the form of Cloud Computing, are diminishing the “need of presence” in
260 remote interactions and such interactions are developing not only between families, friends and
261 co-workers, but also between education stakeholders. The notion of being ‘together apart’ is
262 becoming a familiar aspect of working, interacting and entertaining as well as in educating
263 ourselves. That is, the separation of ‘information resources’ from physical locations with the
264 coming of Cloud computing has become “natural”, resulting in the diminution of the importance of
265 location.
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267 On the other hand, Geography still matters because Geography will continue to influence the
268 access of individuals and groups to digital networks, for location will continue determining in most
269 cases their pricing, infrastructure, legal constraints and regulation. Moreover, the “face to face”
270 interaction will retain its importance, especially in terms of the social aspects of our lives, because
271 physical proximity is paramount for most of us. For example, people will continue to use “place”
272 and physical location as a marker for identity, which as it was shown it plays an important role in
273 education among other areas of human endeavors .
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275 In sum, when someone familiar with Cloud Computing will be asked the question of the role of
276 location in education, he will surely chuckle and reply something akin to: “The location of the
277 Cloud user and of the Cloud itself are irrelevant. Anyone is able to tap into the power of the cloud,
278 located at any place, from anywhere”. This answer, while technically and empirically accurate,
279 misses an important issue, namely: Cloud computing negates the necessity of considering
280 location as a factor to reckon with, at least when considering “non typical” (i.e. rural and remote
281 schools) and consequently the need to imposed upon them a *uniformity* in teaching and learning
282 practices or curriculum structures that developed centrally and applied in “typical” urban schools.
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284 **1.3 The School on the Cloud**

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286 The basic principle that “*Technology changes, Education survives*” signifies the role of education
287 as a societal necessity and the need to explore their potential implications to education. It has
288 shown that ICT changes, in the form of Cloud-based technologies(Pallis,2010;Koutsopoulos,
289 2015a), provide the power to fundamentally change how education should be approached and
290 practiced, substantiating the effort to institute unity without uniformity in education.
291

292 As a result, the new School on the Cloud in order to achieve such goals has to address the
293 following two key questions: How should education respond to cloud-based technologies? What
294 is the impact, now and in the future, on education stakeholders and teachers? Results from
295 applications of cloud technologies in the classroom, including the most recent ones (Donert and
296 Bonanou, 2015) indicate that in answering these two questions in essence their work reaffirms

297 the need for the proposed concept of unity without conformity and create the foundations in
298 applying it. The reason is simple: The School on the Cloud educational approach brings many
299 benefits to education as well as accelerates trends and developments at the interface of Cloud
300 computing and education (Armbrust et. al., 2010; Malmiera et al., 2015), which in turn increase
301 the ability of stakeholders to adjust or alter their educational objectives. In this way, the benefits to
302 education substantiate the existence and need for *unity* and the trends emerging from
303 developments in society, in technology and mainly in education highlight the ability of innovations
304 to eliminate the need for *uniformity* in education.

305 306 **1.3.1 School on the Cloud Characteristics Supporting a Unifying education System** 307

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

315 316 **1.3.1.1 Affordability**

317 Cloud based processes promote in general and in education in particular a cost effective use of
318 ITC resources, thus reduce their cost and make them affordable to all units and all stakeholders
319 (equalize possibilities).

320 321 **1.3.1.2 Flexibility**

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

325 326 **1.3.1.3 Efficiency**

327 Cloud based approaches by promoting the exchange between teachers and students and the
328 participation of their social networks and the parents, leads into creating educational norms by
329 determining: first, the appropriate to the stage of education information and tools and second the
330 appropriate and efficient learning and teaching process (Tuncay, 2010)(equalize treatment).

331 332 **1.3.1.4 Sharing**

333 Cloud based techniques provide the means in every institution to avoid the duplication of
334 resources that exist elsewhere. That is, skills, good practices, applications, teaching content and
335 infrastructures can be pooled and shared, thus avoiding educational inequalities between
336 institutions (equalize opportunities).

337 338 **1.3.2 School on the Cloud Characteristics Eliminating Uniformity in Education**

339 The School on the Cloud by been on the forefront of Cloud computing technology provides to
340 education a series of innovations which offers to the teaching and learning system the ability to
341 be adjusted, altered or revised using identity factors. That is, to design the way in which
342 education institutions, students and teachers are able to use equipment, applications and
343 subjects' content. In other words, the new School on Cloud provides the following innovations
344 which in turn offer identity related or individualized to institution and stakeholders applications to
345 teaching and learning in overcoming *uniformity* constraints (IBM,2010):

346 347 **1.3.2.1 Intelligent Classroom**

348 Cloud based education by providing the recourses for a set of tools and applications (access to
349 courses, syllabus subject contents, etc.) can contribute in creating a classroom with accepted
350 quality and effectiveness of teaching that can be considered intelligent, but which avoid the
351 pitfalls of uniformity

352 **.1.3.2.2 Virtual Classroom**
 353 Cloud based education by providing the necessary communication and collaboration tools can
 354 help bring down the walls of the classroom and give rise to the virtual classroom, which enables:
 355 ✓ Students of the same age located in distant institutions, towns or countries to share in the
 356 experience of any class being taught online.
 357 ✓ Teachers in a certain location to teach classes in a different school, town, country or even
 358 continent, complete with the required material.
 359 ✓ Researchers can have instant access to research and discoveries from any parallel or
 360 linked center around the world.
 361 That is, it allows education stakeholders to achieve unity by braking all forms of barriers or
 362 without the problems of uniformity.
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364 **1.3.2.3 Virtual Lab**
 365 Cloud based education by offering the resources for processing, calculating and simulating can
 366 contribute in creating virtual labs. More specifically, students and teachers can carry out, in a
 367 virtual form, the simulations or experiments they need or want in any subject (chemistry, physics,
 368 social sciences, economics, etc.), and in any degree of difficulty (from the simplest to the most
 369 complex), all in accordance to their specific design and requirements, overcoming any uniformity
 370 constrains.
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372 **1.3.2.4 Virtual Content**
 373 Cloud based education by providing Digital IWB's (Interactive Whiteboards), it can help create a
 374 virtual reference system of content that remains in the public domain and thus avoiding the pitfalls
 375 of using nothing but the costly commercial content. But mainly such a system can provide
 376 teachers with the choice of using a content as is, alter it to meet their needs, adapt it to the local
 377 conditions, or finally use it to supplement their own and in general avoid uniformity.

378 As a result, the School on cloud offers to its students a series of very important competences
 379 which allows them to face the concepts of unity without uniformity:
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381 **1.3.2.5 Digitalization**
 382 Refers to their ability to efficiently, confidently and critically use the new ICT technologies in order
 383 to search, sift, organize, manage and evaluate information in an efficient and targeted to their
 384 individual needs.
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386 **1.3.2.6 Learning**
 387 Is related to students' ability for learning to learn. That is, students are motivated to pursue their
 388 own learning progress and knowing how to process information, assigning meaning to it and
 389 converting it into knowledge.
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391 **1.3.2.7 Understanding**
 392 Is associated with students' global understanding. That is, by overcoming uniformity constraints
 393 they can acquire the competence of understanding in order to be able to analyze the surrounding
 394 world, be social and part of the universal society.
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396 **1.3.2.8 Collaborating**
 397 Corresponds to a crucial skill that needs to be learned and practiced from early on in education,
 398 and Cloud based education can support it. That is, students need to learn to: listen, respect,
 399 negotiate and even accept ideas express by others, understand and work in teams and different
 400 roles, and finally participate in communal activities.
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402 **1.3.2.9 Updating**
 403 This skill refers to the ability of students to use the recourses of the Cloud in order to be prepared
 404 for the continuous changes and developments, as well as continue updating such skills as:
 405 autonomy, lifelong learning, flexibility, innovation, creativity etc.
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407 **1.3.2.10 Communicating**

408 The use of Cloud computing in terms of learning and practicing foreign languages helps students
 409 put emphasis on using them as a means for communication with other people and not on
 410 grammatical or syntactical correctness per se.

411
 412 Closing, it should be noted that the proposed School on the Cloud is not anymore a novice
 413 application of Cloud computing to education, which promises to deliver many exciting things. It is
 414 already a reality and there are many successful implementations (Johnson, 2012; Bradshaw et
 415 al., 2012; Malmierca, 2015; Donert and Bonanou, 2014). That is, the School on the Cloud is a
 416 new and different school that has been born, is partly operating now and is going to stay with us
 417 at least in the foreseeable future, for it is characterized by *unity without uniformity*

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419 **4. CONCLUSIONS**

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

- 426 • Deprive *many* students of the tools they need most to master the necessary skills and
 427 dexterities (the necessary *unity* in the education system)
- 428 • Force *all* of them to follow a predetermined path to achieve them (not avoiding the
 429 barriers of *uniformity*)

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

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

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

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

446 **REFERENCES**

447

448 Adam B, and Groves C. Future Matters: Action, Knowledge and Ethics. Brill, Leiden & Boston,
 449 MA;2007.

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

452 Bell S; Bradsaw, D. et. al. Quantitative Estimates of the Demand for Cloud Computing in Europe
 453 and the Likely Barriers to Up-take. Final Report, IDC Analyze the Future, 2012. Accessed 4
 454 march 2016. Available :<http://ec.europa.eu/digital-agenda/futurium/en/content/quantitative-estimates-demand-cloud-computing-europe-and-likely-barriers-take>.

455
 456 Dede, C. A. Seismic shift in epistemology. *EDUCAUSE Review*, 2008; 43(3),:80–81. Accessed 4
 457 Jan 2016. Available :<http://net.educause.edu/ir/library/pdf/ERM0837.pdf>.

- 458 Donert, K., & Bonanou, H. editorss. *Education on the Cloud 2014: State of the Art*. Report,
459 Deliverable 2.1 for The School on Cloud: Connecting education to the Cloud for digital
460 citizenship network (SoC); 2014. Accessed 4 Jan 2016. Available: <http://schoolonthecloud.eu/>
461 Fadil, O. et al. Cloud computing and its Role in Education in Morocco. *Journal of Engineering*
462 *Science and Research*. 2015; 2;51-59
- 463 Ferrari, S. et al. Needs Analysis Report, Deliverable for Rural School Cloud: Cloud Computing for
464 School Networking. Accessed 4 Jan 2016. Available: <http://rsc-project.eu/index.php/products/>
465 Friedman, T. *The World Is Flat: a Brief History of The Twenty-First Century*. Farrar, Strauss and
466 Giroux, New York;2005.
- 467 Fullan, M. & Langworthy, M. *Towards a New End: New Pedagogies for Deep Learning*. 2013.
468 Accessed4Jan.2016. Available: [http://www.newpedagogies.info/wpcontent/uploads/2014/01/N](http://www.newpedagogies.info/wpcontent/uploads/2014/01/New_Pedagogies_for_Deep%20Learning_Whitepaper.pdf)
469 [ew_Pedagogies_for_Deep%20Learning_Whitepaper.pdf](http://www.newpedagogies.info/wpcontent/uploads/2014/01/New_Pedagogies_for_Deep%20Learning_Whitepaper.pdf)
- 470 Gee, Jim; et al(). A pedagogy of multiliteracies: Designing Social Future *Harvard Educational*
471 *Review*. 1996; 66(1);60-74
- 472 Gialamas S., Pelonis P. & Medeirod, S. Metamorphosis: a collaborative leadership model to
473 promote educational change, Thoughtful Mind. Institute for Innovation and Creativity, ACS,
474 Athens. 2013. Accessed 4 Jan. 2016. Available
475 [:http://issuu.com/acsathens/docs/final_publicity_book_2012/23](http://issuu.com/acsathens/docs/final_publicity_book_2012/23).
- 476 Gough, N. Locating curriuclum studies in the global village. *Journal of Curriculum Studies*. 2000;
477 32;329–342.
- 478 Heppell, S. () Towards a new media literacy. In 8 Essays –The Knowledge Exchange
479 Programme: A collaboration between BBC R&D and the Arts and Humanities Research
480 Council, BBC/AHRB. 2009.
- 481 Hill J. R., Song L., & West R. E. Social Learning Theory and Web-Based Learning
482 Environments: A Review of Research and Discussion of Implications. *American Journal of*
483 *Distance Education*. 2009; 23 (2); 88-103
- 484 Johnson, L., Adams, S., Cummins, M. *The NMC Horizon Report: Higher education edition*.
485 Austin, TX 2012..
- 486 IBM Global Technology Services. Applying the cloud in education: An innovative approach to IT.
487 2013. Accessed 4 Jan. 2016. Available [:http://www-935.ibm.com/services/be/en/cloud-](http://www-935.ibm.com/services/be/en/cloud-computing/cloud_edu_en.pdf)
488 [computing/cloud_edu_en.pdf](http://www-935.ibm.com/services/be/en/cloud-computing/cloud_edu_en.pdf).
- 489 Koutsopoulos, C. K. What's European about European geography? The case of Geoinformatics
490 in Europeanization. *Journal of Geography in Higher Education*., 2008; 32 (1);7-15.
- 491 Koutsopoulos, C. K., & Kotsanis Y. School on Cloud: Towards a paradigm shift. *Themes in*
492 *science and technology education*. 2014; 7(1);47-62.
- 493 Koutsopoulos, C. K. *A review of cloud based futures and methodologies*. Report, Deliverable 5.1
494 for The School on Cloud: Connecting education to the Cloud for digital citizenship network
495 (SoC). 2015a. Accessed 4 Jan. 2016. Available [:http://schoolonthecloud.eu/](http://schoolonthecloud.eu/).
- 496 Koutsopoulos, C. K. School on Cloud: Transforming Education.). *Journal of Elementary*
497 *Education*.2015b; 4(2);16-24
- 498 Kuhn, S. T. *The structure of scientific revolutions*. Chicago. University of Chicago Press. 1962
- 499 Malmierca. R. M. et. al. Teaching and Learning in the Cloud. Report, Deliverable for Rural School
500 Cloud: Cloud Computing for School Networking. 2015. Accessed 4 Jan. 2016 Available:
501 <http://rsc-project.eu/index.php/products/>.
- 502 Moore, M. G. (1991). *Distance Education Theory*. *The American Journal of Distance*. 1996;
503 5(3);13-21
- 504 Negroponte, N. Foreword. *The Connected Family: Bridging the Digital Generation* In S. Papert
505 editor. pp. i–xi. Longstreet Press, Atlanta, GA.1996.
- 506 Prensky, C. (*Don't Bother Me, Mom – I'm Learning*.Paragon House, NewYork. 2005.
- 507 Robertson S., et. al. (2007) *Globalization, Education and Development: Ideas*. Actors and
508 Dynamics, DFID, London.
- 509 Stiglitz, J. *Making Globalisation Work*. W.W Norton & Co., New York & London. 2006.
- 510 Tuncay, E. Effective use of cloud computing in educational institutions. *Procedia Social and*
511 *Behavioral Sciences*. 2010; 2; 938–942.
- 512