

## School on the Cloud: Connecting Education to the Cloud for Digital Citizenship

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### Abstract

*Cloud computing is one of the hottest education trends. It represents a fundamental change in the way computing power is generated and distributed, transforms the delivery of ICT tools and products into elastic, on demand services.*

*Many schools and educational organisations are considering migrating their activities to the Cloud, and this for a variety of reasons: lowers computer costs, higher accessibility, improved performance, cheaper software, storage capacity...*

*Cloud-based developments offer a new dynamic way to educate that aligns with the way we think, share, learn and collaborate outside of the classroom. It offers an opportunity to transform the role of educators and pedagogy with services tailored to teachers' needs in individual classrooms.*

*To explore the potential of the Cloud in education, the network 'School on Cloud' (SoC) has been created, consisting of 57 partners from 18 European countries and with 4 working groups:*

- 1. Transition from ground to Cloud: infrastructure, mentality, innovation and change - iManager*
- 2. iTeacher: the role of the teacher, teacher training*
- 3. Integrating the Cloud: personalised learning, formal and informal education, special needs - iLearner*
- 4. Future prospects: visions on open education, interactivity, impact and communicating the Cloud - iFutures*

### 1. Introduction. The cloud in education: a European perspective

In the ICT cluster report "Learning, Innovation and ICT", Van den Brande et.al. [1] reported on lessons learned through the Lifelong Learning Programme up until 2010. They identified i) digital leadership, ii) placing the learner at the centre; iii) a change of mind set in teacher training and iv) reinforcing the evidence base and research on use and impact of ICT for learning as most important features. Six future actions for the future of learning in Europe were recommended:

1. Leadership and institutional change for a renewed strategy on learning
2. Digital competences and new transversal skills as core life and employability skills
3. Towards a new learning paradigm
4. Professional development – the teacher as learner at the centre
5. Research on learning in a digital society
6. Envisioning the future of learning in a digital society

The EC's new strategy for "Unleashing the potential of *Cloud Computing* in Europe" outlines actions to deliver a net gain of 2.5 million new European jobs, and an annual boost of EUR 160 billion to EU GDP (around 1%), by 2020. It is designed to speed up and increase the use of *Cloud Computing* in private and public sectors across the economy [2]. The Strategy also urges action in areas where government stakeholders can act, like education.



School on the Cloud created an extended survey 'Education on the Cloud 2014: State of the Art' [3], indicating how different European countries are making their transition to using the Cloud in education. It is made with the input of all network participants. The survey looked for answers on following questions: i) how about cloud policy and education, ii) who is promoting the cloud, iii) who is using the cloud for education.

We can divide the countries into two groups. On the one hand we have those countries that have already implemented one way or the other an education cloud policy. This is the case for Austria, Bulgaria, Greece, Ireland, Italy, Poland, Portugal, Switzerland and the United Kingdom. Some of these countries go already very far, like Greece that has witnessed significant progress in introducing Cloud initiatives into its educational system, both in the public and private sectors. As a result the Cloud is quite well known among most teachers and educators. Also Ireland is a good example. One of the deliverables in the National Digital Strategy is Education and Learning. "Strand 3 – Education & eLearning: to Utilise ICT to its Full Potential Across the Educational System Including the Use of the Internet in Learning." Some of the actions include the inclusion of e-learning opportunities for both teachers and pupils, connectivity with all post primary schools to broadband Internet, teacher support. Other countries, like Belgium (Flanders), Cyprus or the Czech Republic – although already taking actions on the use of the cloud in domains like government – do not have a clear existing or on-going official education Cloud policy.

In all cases most countries relay on outsourced global services from Google, Microsoft, etc. To promote the Cloud.

## 2. Cloudy benefits

Many schools and educational organisations are considering migrating their activities to the Cloud, and this for a variety of reasons.

First there's the financial impact. Using Clouds and apps in education lowers computer costs, makes them highly accessible and device independent. The Cloud also brings improved performance, cheaper software costs. Web-based apps are instantly and automatically updated and there are few problems with compatibility. The Cloud offers large storage capacity with increased data reliability. Cloud computing is also a comparatively data-safe computing environment. It encourages group collaboration and sharing through the ability to share and edit documents in real time between multiple users.

Second, cloud-based developments offer a new dynamic way to educate that aligns with the way we think, share, learn and collaborate outside of the classroom. The Cloud allows teachers and trainers to bring learning to life with dynamic, interactive, multimedia, learning activities. They can track individuals and groups and assess how a topic or lesson has been received. Students are able to work in teams, collect shared data, and organize information – regardless of their time, day or physical location. Content editing and sharing on the Cloud enables resources to be distributed in a range of formats. Through collaboration and presenting, Cloud-based learning helps pupils learn valuable workflow skills for the 21st century workplace like teamwork.

Third, cloud computing offers an opportunity to transform the role of educators and pedagogy with services tailored to teachers' needs in individual classrooms. The Cloud can deliver services such as remote access to learning tools in a cost effective manner to educational systems struggling with reductions in local and state funding. Students/pupils can access lesson activities on a laptop, tablet or phone from any location and use the resources freely. At the same time, learners can ask and answer questions and share knowledge to help others.

So if the Cloud offers all these benefits, what could be blocking schools to make the transition? The School on the Cloud: connecting education to the Cloud for digital citizenship network will address three key questions:

- i) How should education respond to the potential of Cloud-based tools and technologies;
- ii) What is the impact on education stakeholders, and



iii) What might the situation be like in the future?

Before the work can get started, some concepts and the vision of the partners must be clarified first.

#### 4. Vision of the Cloud and education

Defining the Cloud, Cloud computing and personalising learning is not very simple, as has been proven by a questionnaire among all 57 partners of the network.

The question 'What is the cloud' (Figure 1) offered 6 possible aspects: 1) Allocation of space to users on demand, 2) Computers connected through the Internet, 3) Hosted Internet space, 4) Services offered online, 5) Sharing of computer space and 6) Virtualisation of computers.

For most partners it was seen solely as hosted Internet space.

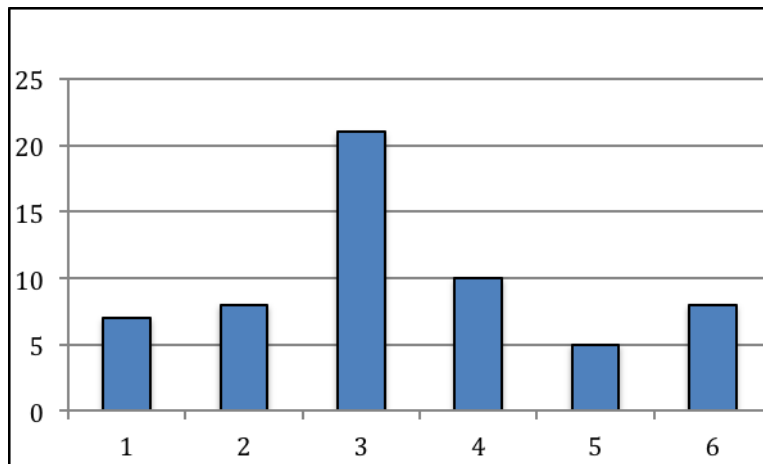


Figure 1: Defining the Cloud, number of respondents per aspect

The question 'Which of these characteristics does the Cloud offer for education?' (Figure 2) showed 9 characteristics,

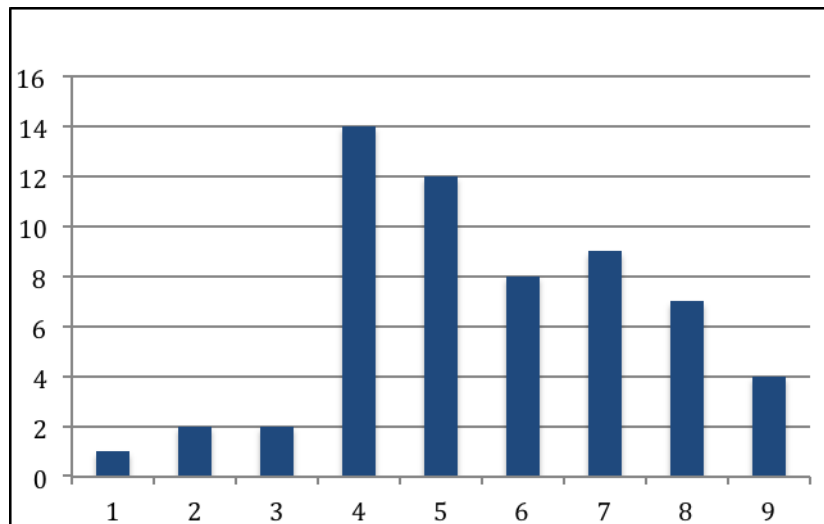


Figure 2: Cloud characteristics, number of respondents per characteristic

1 Ability to share resources and information, 2 Great speed, makes IT operations faster, 3 Improved accessibility, 4 Increased capacity, 5 Independence of location, 6 More capability (opportunities), 7 Reduced costs, 8 Safety for users, 9 Security of information

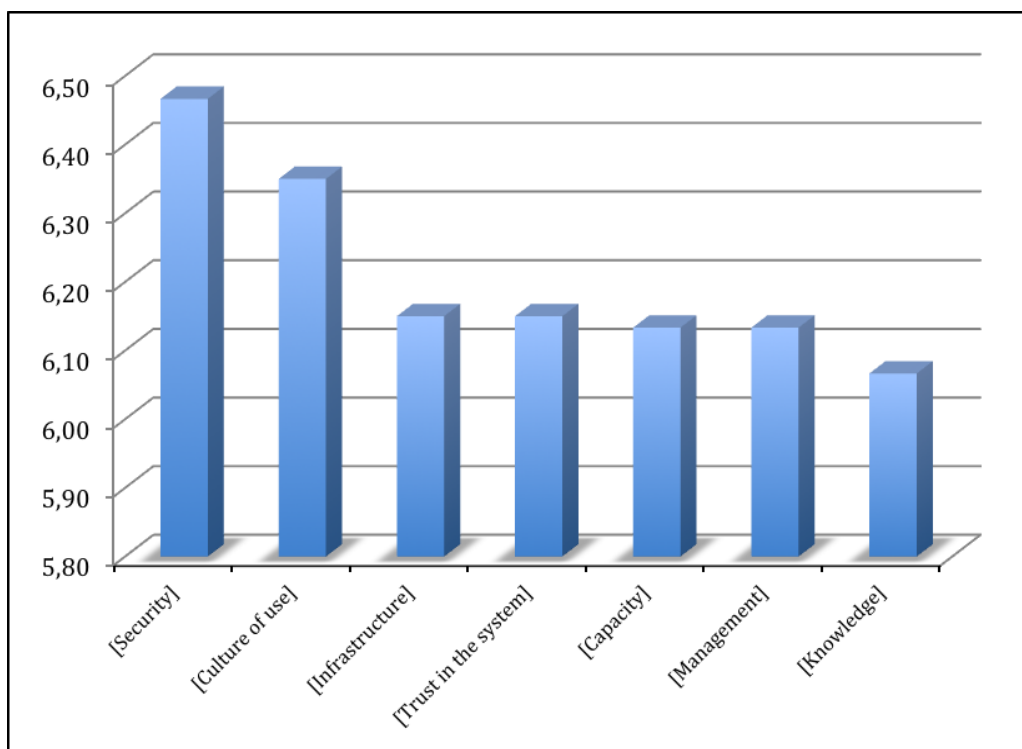
Another question was 'What impact does Cloud-based education have on the role of teachers and trainers in education? What becomes more important and which less?' (Figure 3).

The result is that the partners themselves see Cloud-based education as adding more work, as the role of the teachers are considered to become more important.

Role of teachers importance	a lot more	a bit more	the same	a bit less	a lot less
1. Resource Provider	X				
2. Classroom didactics		X			
3. Lecturer			X		
4. Curriculum Specialist		X			
5. Classroom Supporter		X			
6. Learning Facilitator	X				
7. Mentor / coach	X				
8. Assessor		X			
9. School Leader		X			
10. Information manager	X				
11. Catalyst for Change	X				
12. Learner	X				

Figure 3: Degree of impact of Cloud-based education

On a scale of 0-9, consider the relative importance of these possible issues in influencing the take up of the Cloud for education in the own organization (9= very important, 0 = unimportant), the partners put the emphasis on security and culture of use. The question whether or not the Cloud gives little evidence of benefits is not important.



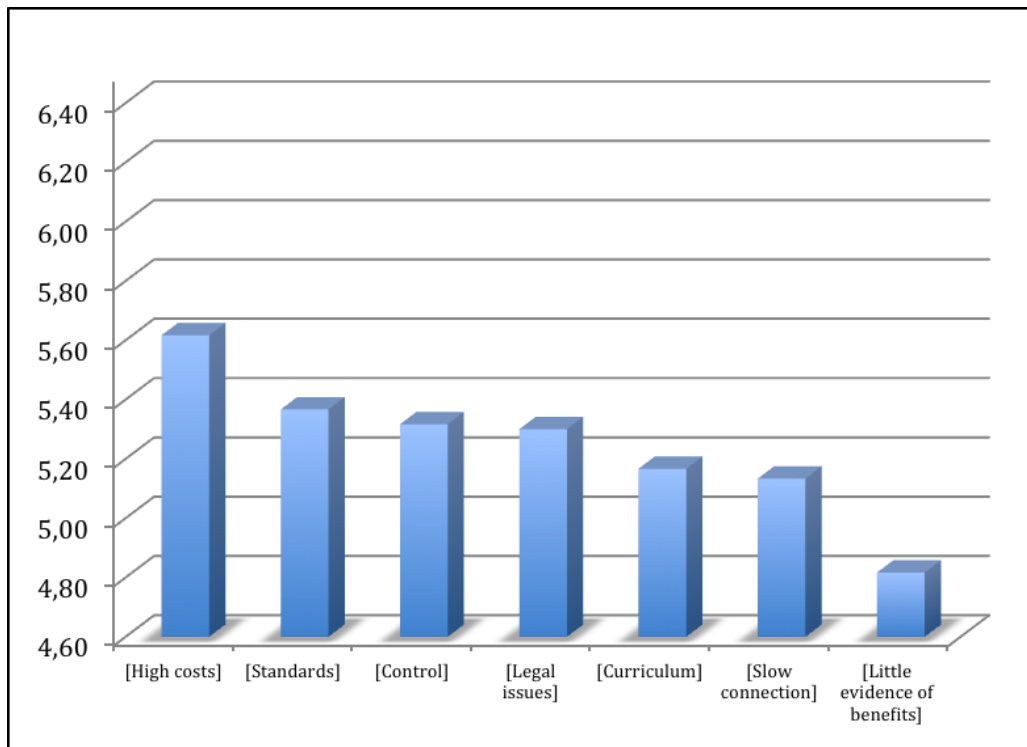


Figure 4: issues in influencing the take up of the Cloud

## 5. Define personalized learning

Personalized learning has been defined in different ways. Using a summarized chronological list [4] the partners was asked which definition they agreed with (Figure 5). Here again no real uniformity in the answers, although the majority accepts the Project method of Kilpatrick, seeing personalized learning as being child-centred, problem solving oriented, with the teacher acting more as a facilitator.

Personalized learning is .....	Agree?
each student can program his or her curriculum in order to meet his or her needs, interests and abilities; (Parkhurst and the Dalton Plan, 19th century)	32 / 57
expand educational focus to creative activities and emotional and social development, Washburne: Self-government and the Winnetka Plan (first years of '900)	24
schoolchild should have the opportunity to freely choose a series of activities, already predisposed by the teacher (Claparède E., L'École sur mesure, Genève, Payot, 1920)	26
a method whereby students are not advanced to a subsequent learning objective until they demonstrate proficiency with the current one (Bloom and the Mastery learning ('50s-'60s)	11
instruction on the base of the students' requirements allowing them to work on course modules independently. It is an individually paced mastery oriented teaching method. (Keller within the Personalized System of Instruction ('60s)	27
problem solving oriented, with the teacher direction minimized. The teacher acts more as a facilitator encouraging self decision and self control of the learner, more than delivering knowledge and information. (Kilpatrick "Project Method" (early 21st Century)	43
adjusting the pace, adjusting the approach, and connecting to the learner's interests and experiences. (National Educational Technology Plan, US)	33

Figure 5: Definitions of personalized learning (score / 57 partners)



## 6. Conclusions and outlook

The cloud is clearly seen as a new challenge for education, with many opportunities for a different approach. Although a survey shows that not in every country government support is available the interest and intent in most schools is growing. On the other hand a questionnaire among the partners of the network shows that there's still a lot of confusion about what we exactly mean with the Cloud and personalized education.

The network will therefore divide its activities into 4 workgroups/

1. **iManager: transition from ground to Cloud:** sharing experiences of issues related to leadership and management in different educational contexts. These can be technological, social, economic, cultural and pedagogical. They may necessitate training and development, guidance and advice.
2. **iTeacher: role of the teacher:** looking at learning and teaching issues connected with Cloud-based learning. It examines the barriers and key competences required. It explores teachers as innovators. iTeacher reviews learning and teaching approaches and provides practical and essential guidance for teachers and teacher educators.
3. **iLearner: Integrating the Cloud:** exploring the opportunities and issues that access to learning afforded by the Cloud in personalising learning experiences 'at any time, any place by any one'. This concerns teachers and educators, schools, colleges and adult education providers and involves understanding the possibility to exploit the opportunities resulting from both formal and informal learning situations.
4. **iFutures: future prospects:** dealing with topics like the impact of open (education) resources, the availability of free and available information, new generation tools for the Cloud, communicating and publishing on the Cloud and the resultant issues such as ethics and IPR. It will target organisations such as teacher associations, NGOs, publishing organisations, museums, libraries, researchers, Ministries and policy makers.

## References

- [1] Van den Brande L, Carlberg M and Good D (2009), Learning, Innovation and ICT: Lessons learned from the ICT Cluster, Education and Training 2010 Programme, Brussels, European Commission
- [2] European Commission (2010) EU2020: Europe's Growth Strategy (2010), [http://ec.europa.eu/europe2020/index\\_en.htm](http://ec.europa.eu/europe2020/index_en.htm)
- [3] Donert, K., Bonanou, H. (eds.) (2014), Education on the Cloud 2014: State of the Art <http://www.schoolonthecloud.eu/>
- [4] Wikipedia, Personalized learning [http://en.wikipedia.org/wiki/Personalized\\_learning](http://en.wikipedia.org/wiki/Personalized_learning)