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**“INNOMATH - Innovative enriching education processes for
Mathematically Gifted Students in Europe”**

Project Number: 2019-1-DE03-KA201- 059604

Cloud Computing and Adaptable Education Leadership

Presenter: Andreas Skotinos

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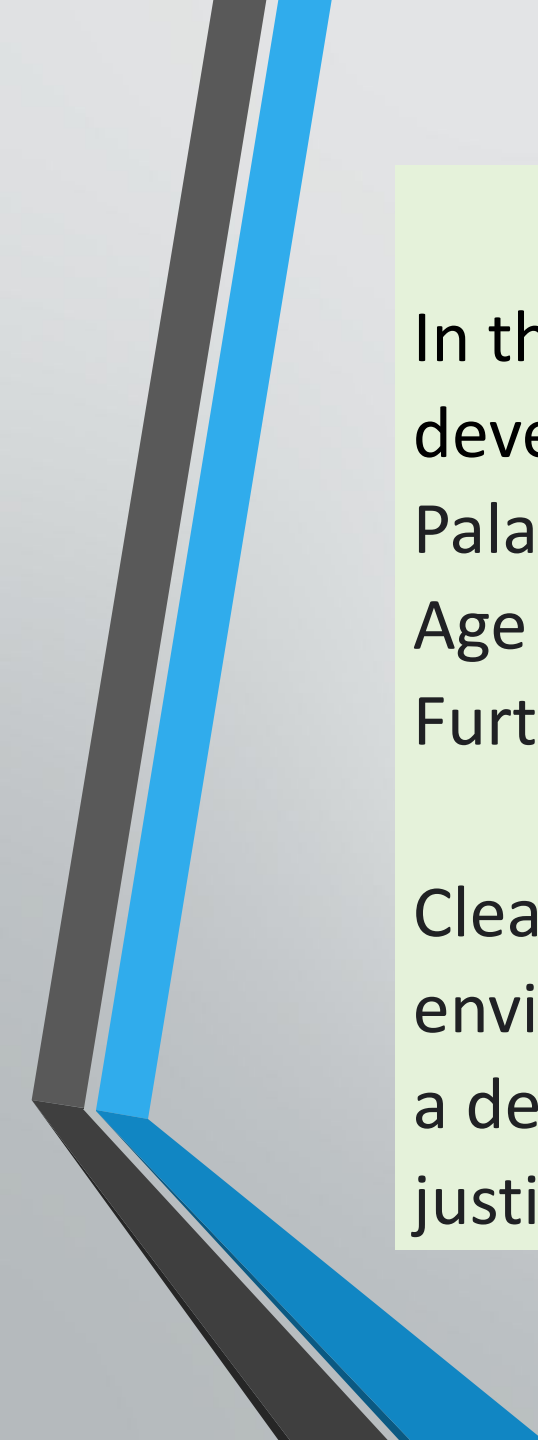


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Module 9

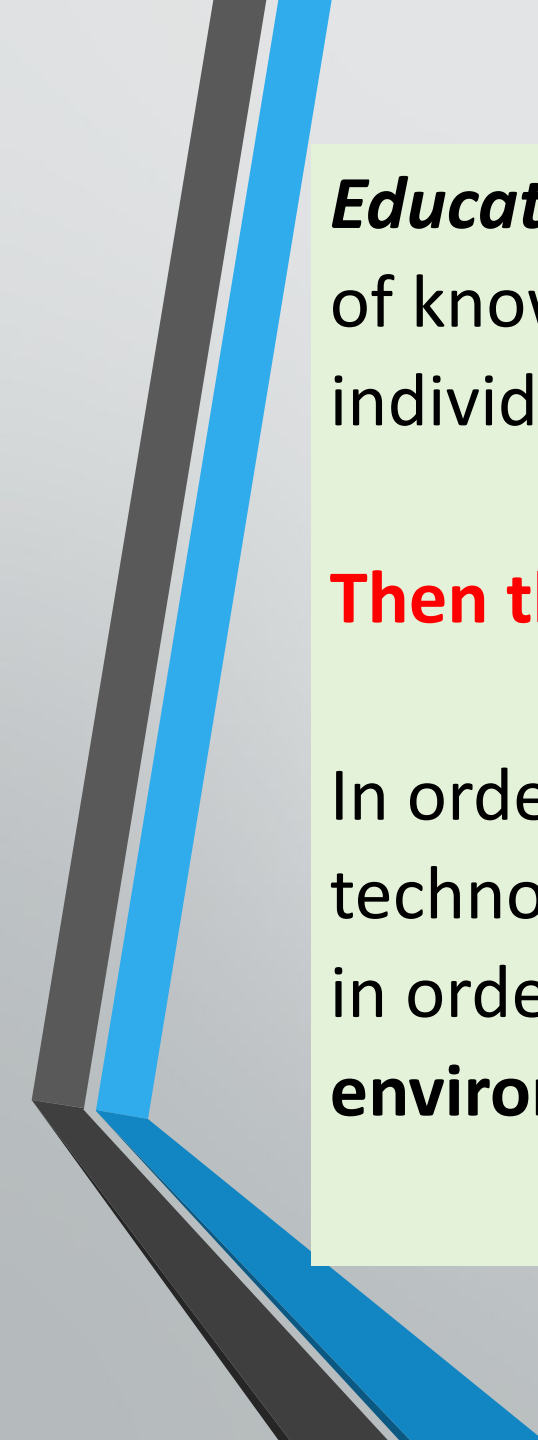
Cloud Computing and Cloud Education Leadership



In the study of earth and the history of man various eras of development are characterized by terms like Palaeolithic Age, Neolithic Age, Bronze Age, Iron Age, Industrial Age and so on.

Furthermore we are talking about Ice Age, Pleistocene and so on

Clearly these suggest that the conditions we live and the environment play a crucial role for man and it becomes clear that a definition of education, taking this into consideration, is very justifiable:



Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, morals, beliefs, and habits to individuals

Then the question comes: For what purpose?

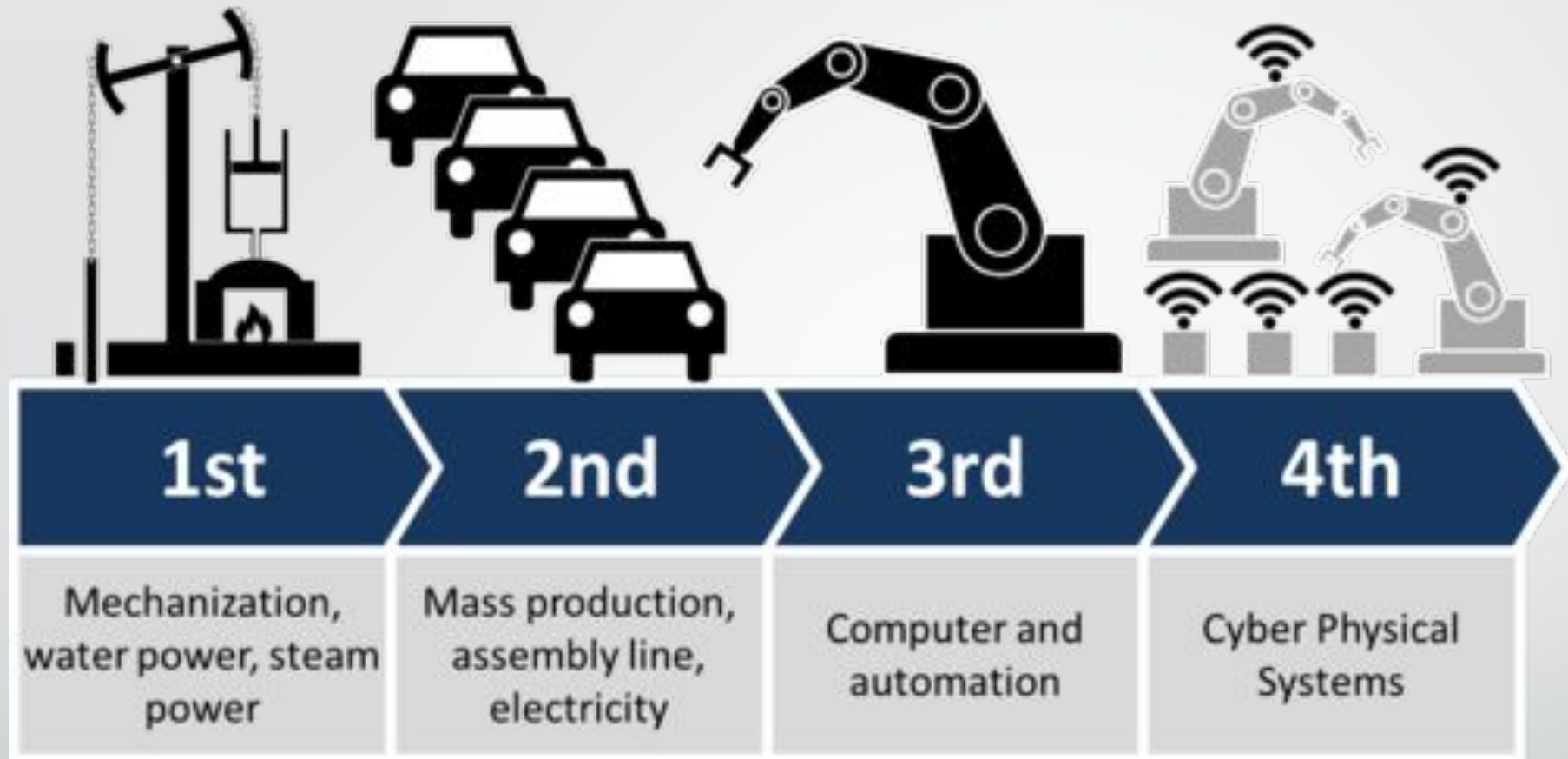
In order **to adapt to the environment** (physical, socioeconomic, technological, cultural ...) but also in order to become able **to adjust/ amend/ change the environment** in the context of the needs of the learner.

Write some answers on the following Questions

- What are some aspects that characterize the 21st century in the context of the economy, the social conditions, the realms of meaning, the educational forum and so on?
- To what extent do these aspects influence the work of a learning facilitator?
- What is the conclusion from these observations for a learning facilitator?
- Does the term adaptable educational leader make sense to you?



Reflection and discussion on your answers



Industrial Revolutions

What characterizes the 4th Industrial Revolution?

- The fourth industrial revolution is in full force today due to the fact that velocity and impact of current breakthroughs is like never before. The innovations and advances are omnipresent led by strong emergence of fields like Artificial Intelligence, Robotics, Internet of Things, Autonomous Vehicles, Biotechnology, Nanotechnology, 3-D Printing, Material Science, Quantum Computing and Energy Storage. The impact of such breakthroughs is so rapid that the fourth industrial revolution is evolving at an exponential pace, and disrupting almost every industry.
- In particular for the education sector an important concept is the concept of Cloud Computing



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Cloud Computing and Cloud Education Leadership

Content of the Presentation

- What is this project about? What concepts are involved?
- Definition of Education and its relationship to the present theme.
- Who are the partners in its development?
- What are its goals and objectives?
- The need for a framework of competencies in the Educational Environment of Cloud Computing
- The framework of these competencies.
- The content of the training course for adaptive educational leaders
- Certification of the adaptive educational leaders

Discussion



What about the programme L-Cloud?
What concepts are associated with it?


Cloud – Cloud Computing

Cloud computing is an aspect of IT based on the
Internet

that enables a range of commonly used (shared) processing infrastructures as computers and data to be placed and be accessible, on demand, on computers or other devices

It is a model that enables access to a common repository of various IT components (eg computer networks, memories, and other IT services, etc.) and which can be accessed quickly and with a minimal administrative effort.





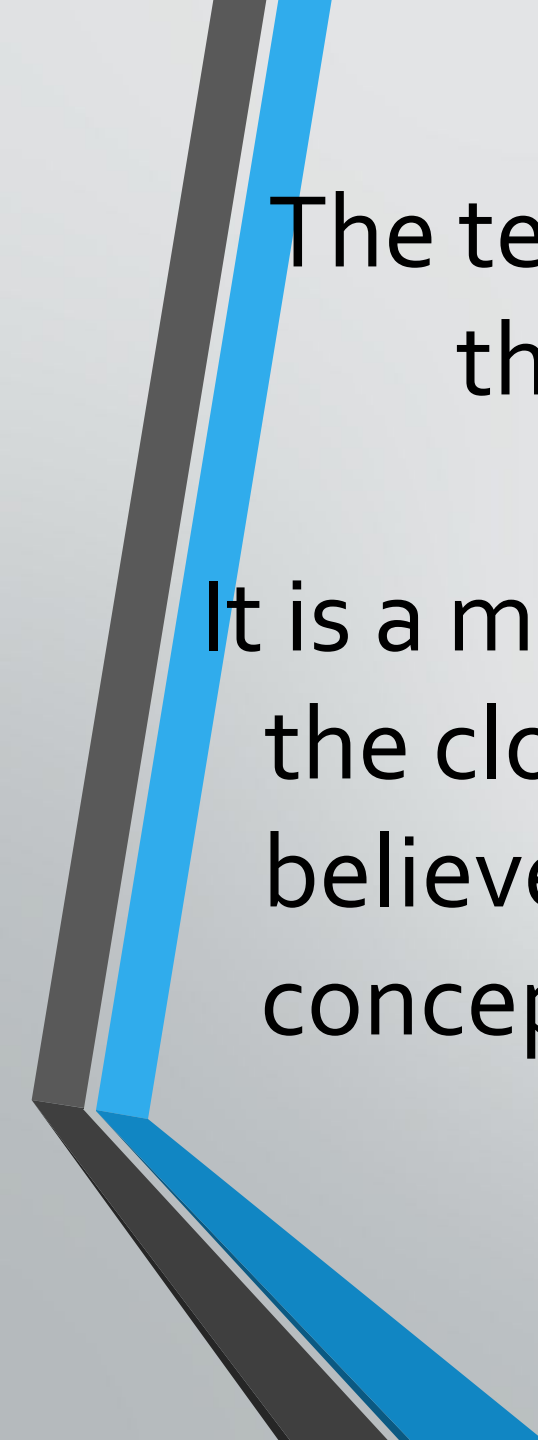
In short, this system enables data management (storage, organization, analysis, utilization)

The Types of Services provided can be divided into the following groups:

Software Services (Software as a Service SaaS)

Platform Services (Platform as a Service PaaS)

Infrastructure Services (Infrastructure as a Service IaaS)



The term Cloud was used due to the fact that the Internet is represented as a cloud.

It is a metaphorical representation that expresses the cloudy manifestations of the Internet and I believe that it is extremely successful since the concept of cloud is characterized by properties such as:

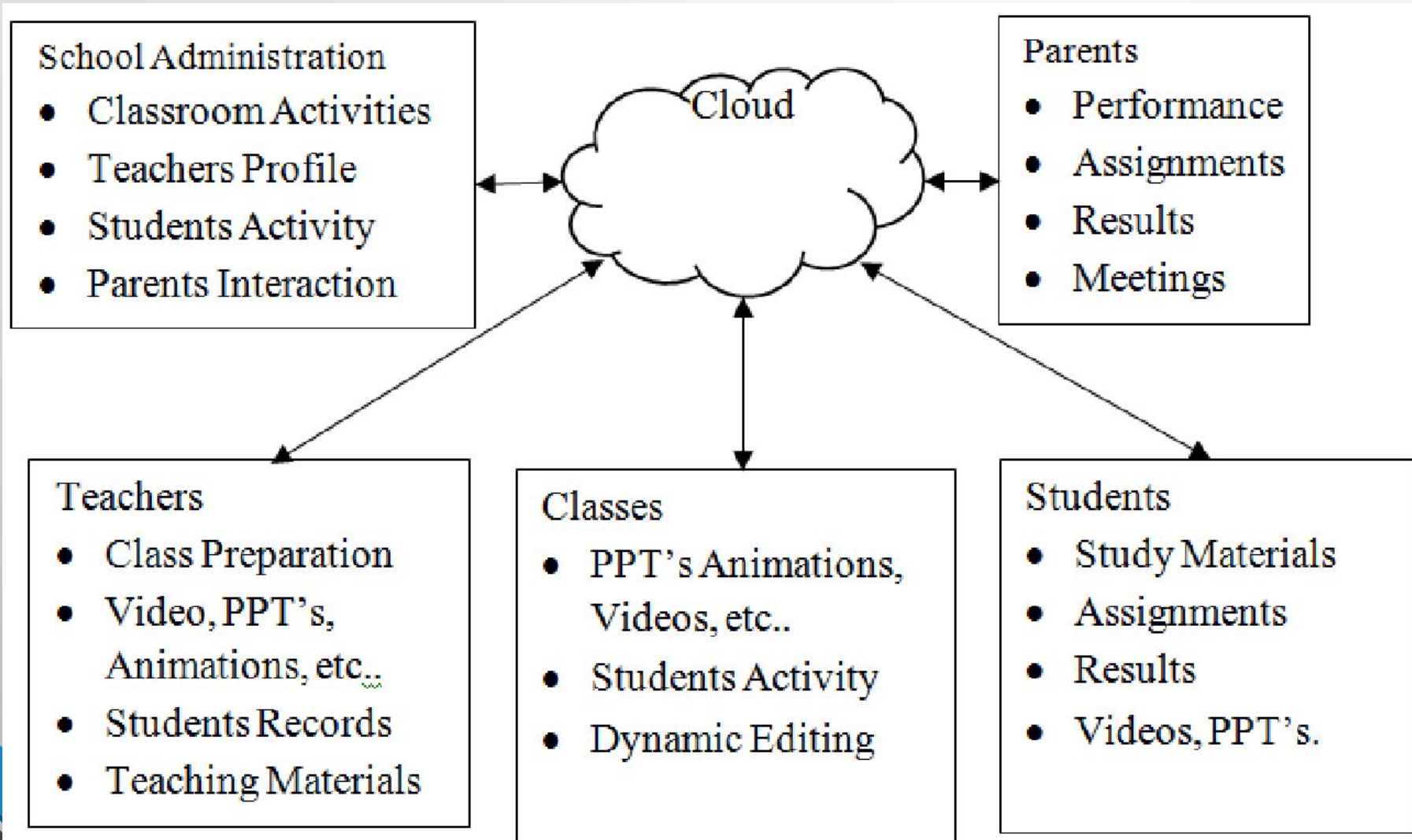
- Adaptability
- Flexibility
- Portability
- Light weight
- Scalability
- Obscurity Incomprehensibility
- Ephemerality
- Divinity
- Mysterious
- Exploration
- Transcended Meditation
- Everyday experience



The second important concept is that of the **Leader in education** (educational leadership)



A third important concept is the utilization of cloud computing in an educational environment



A fourth important dimension is the concept of the need for **adaptability of the educational leader**.

This idea stems from the definition of education as presented earlier. With this in mind, the need for educational leaders with **flexibility in adapting to the environment** becomes clear.

In this case it is obvious that Cloud Computing is the environment they are called to act.

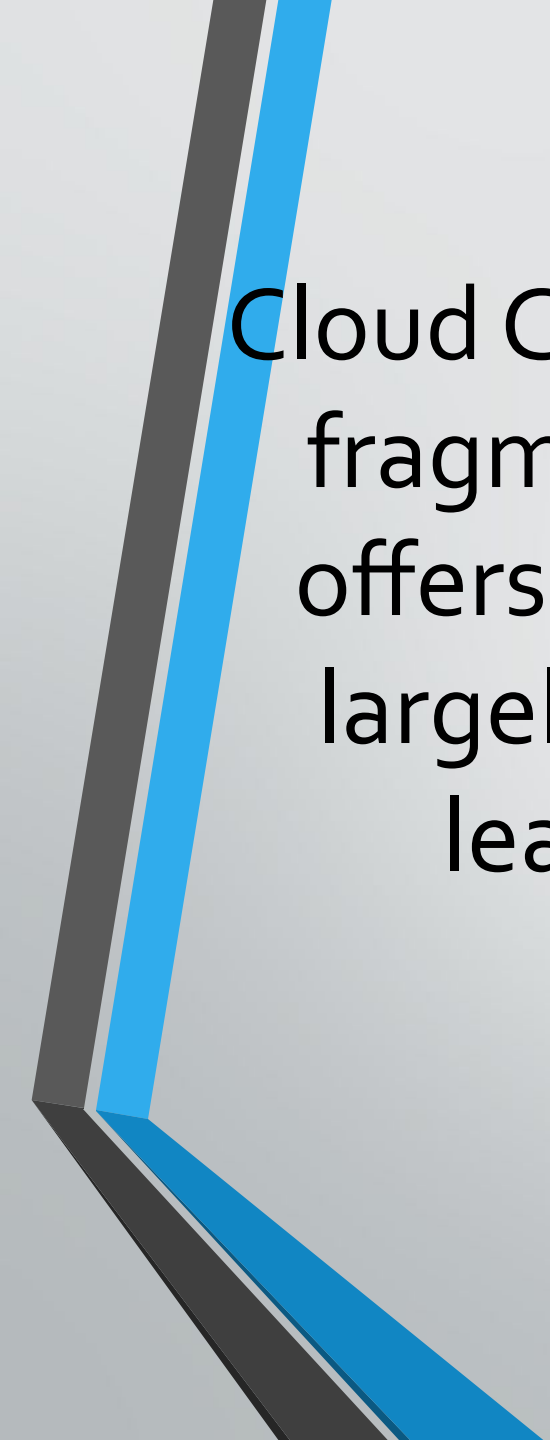
Who are the partners in its development?

The L-Cloud project is the result of a collaboration between a group of 6 EU organizations as shown on the website

https://www.l-cloud.eu/en_US/



Why did the collaboration proceeded with the
shaping of the program?



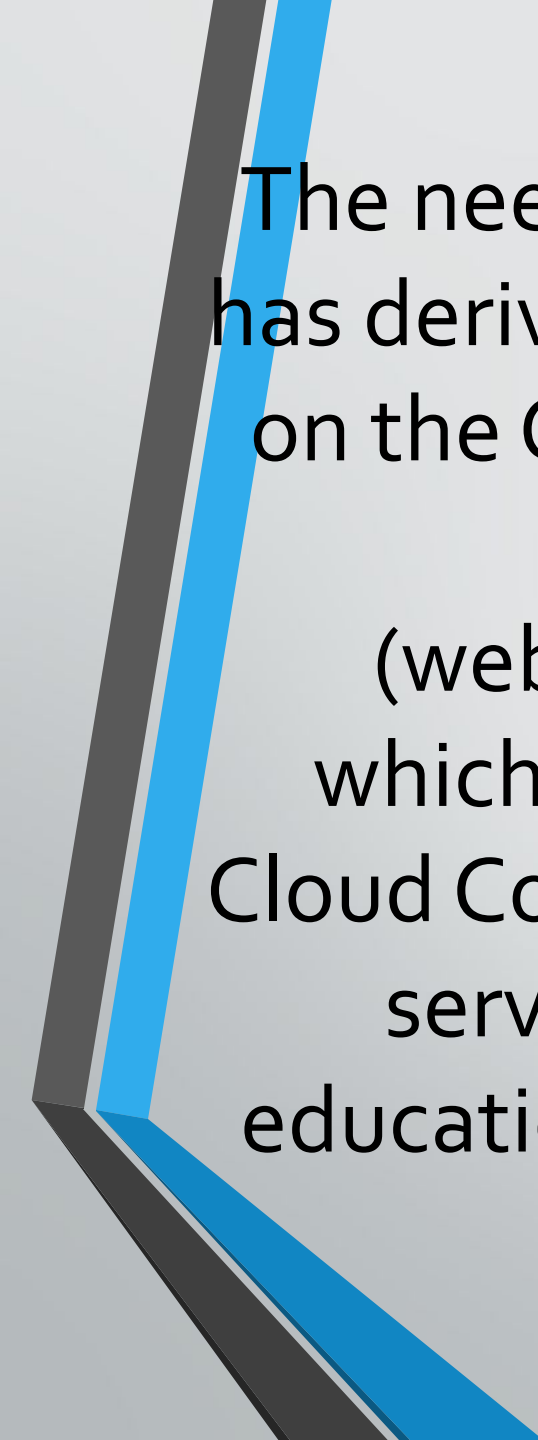
Cloud Computing adoption in education remains fragmented because while Cloud Computing offers many advantages, decision makers are largely unaware of the potential benefits for learning, teaching, administration and management.

Therefore, training and support systems are needed to help them keep up to date with the rapidly changing Cloud Computing environment.

Furthermore there is a need for educational change, otherwise the educationalists will continue the paradox to use the new technological tools in the context of old approaches and teaching methods.




Goals and objectives of the project




The need for the development of the L-Cloud project has derived from the results of the project SoC (School on the Cloud - connecting education to the Cloud for digital citizenship network)

(website: <https://www.schoolonthecloud.net/>)

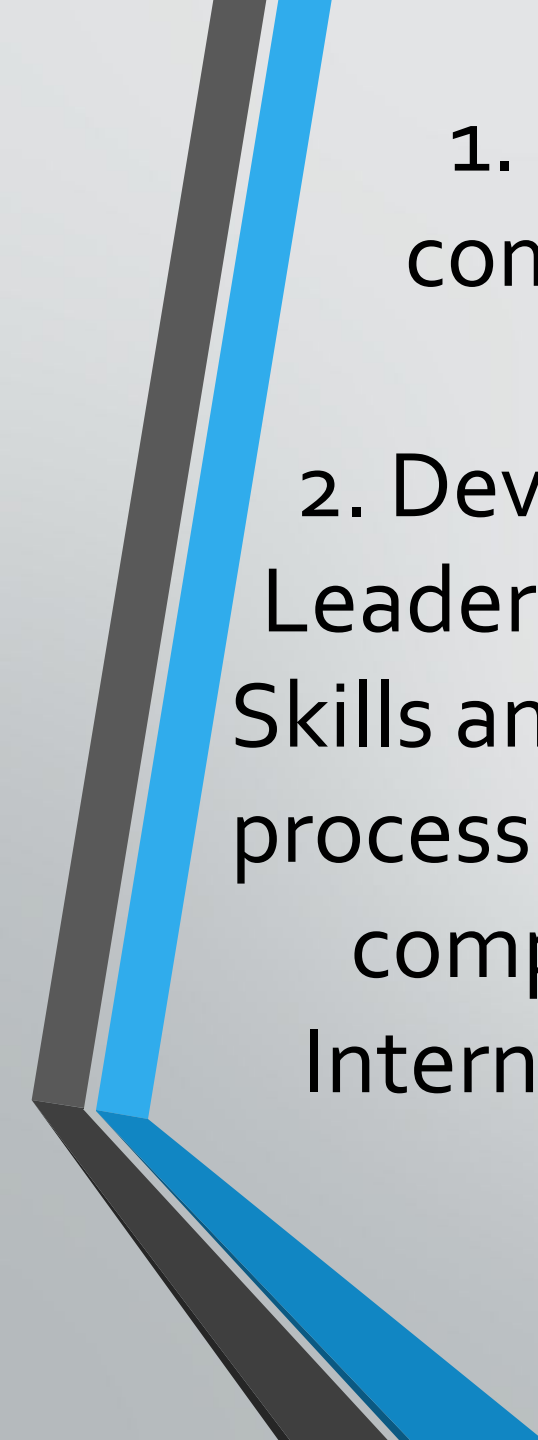
which explored how education should respond to Cloud Computing developments and how Cloud-based services can be used to improve the quality of education and transform the way schools are led and managed.



The School on the Cloud project has demonstrated that leadership for change is needed. The main issue today is no longer access to technology, but the capability to establish meaningful leadership for Cloud-based learning, teaching and administration.




L-Cloud has been designed to promote the leadership for change and it is aiming at the following main results:

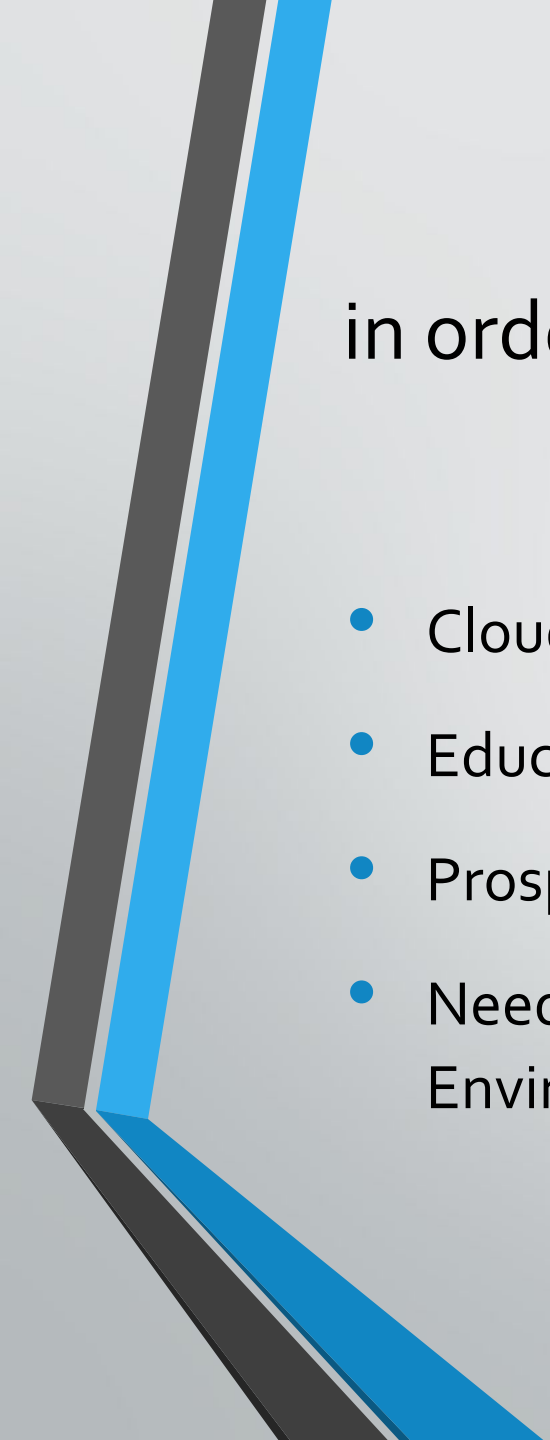


1. Development of guidelines for skills and competencies for adaptive leaders in a cloud environment.

2. Development of a Qualifications Framework for Leaders / Teachers in a Cloud environment based on Skills and Competencies in such an environment. This process includes defining and validating the skills and competencies framework as well as defining an International Vocational Training and Certification Program.



Need for developing a framework of competencies in the educational environment of Cloud Computing



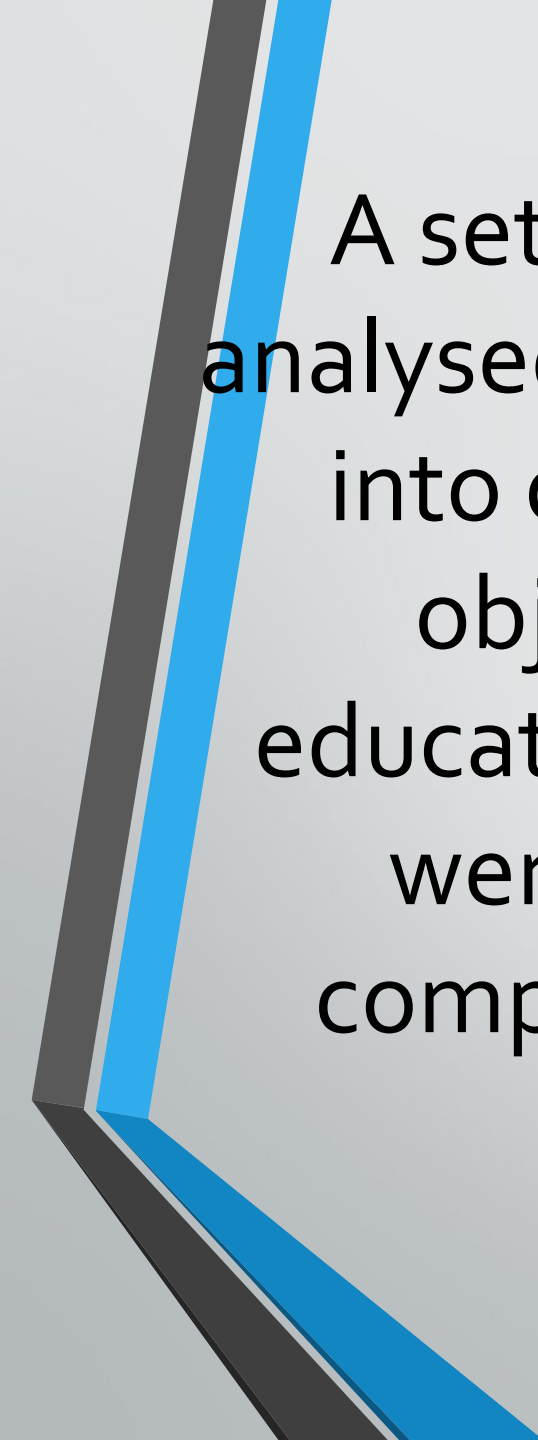
Obviously such a framework is required
in order to justify the extended reference to the following
terms?

- Cloud Computing
- Educational Leadership
- Prospects and areas of use of the technologies of Cloud Computing
- Need for adaptability of an Educational leader to the Educational Environment of Cloud Computing

The reference to these terms justifies why there is a need for ensuring a **Framework of Competencies** for the adaptable educational leader and the development of a **training programme** for him/her, as well as a **certification** process, certifying that indeed this leader is owner and productive user of such competencies.

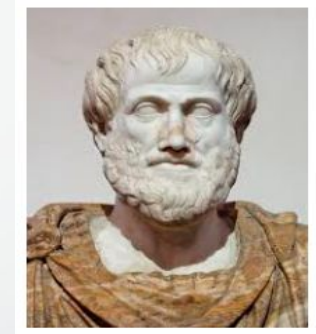
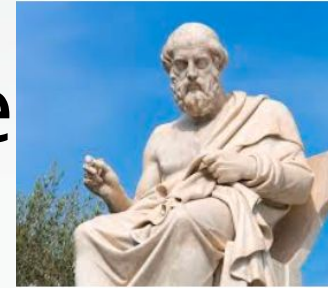


Framework of Competencies in the Educational Environment of Cloud Computing



A set of competencies were considered and analysed. In the process of grouping them, taking into consideration of the core of what is the object of L-Cloud, that is the concept of educational leadership, three axes/ dimensions were identified. Based on these axes the competencies of an educational leader were classified in the following model.

The dimensions of the model proposed:




- The Pedagogical (Platonic dimension)
- The Organisational/ Management (Aristotelian dimension)
- The Digital (Archimedean dimension)



The intersection of these axes forms what is called as the core of the model for the competencies of L-Cloud.



Figure 2: The tree axes supporting the L-CLOUD Competences Framework. Leadership is across all.



We observe that the concept of **educational leadership** is everywhere and that the axes converge towards the idea of the leader in education as can be seen in the following diagram:

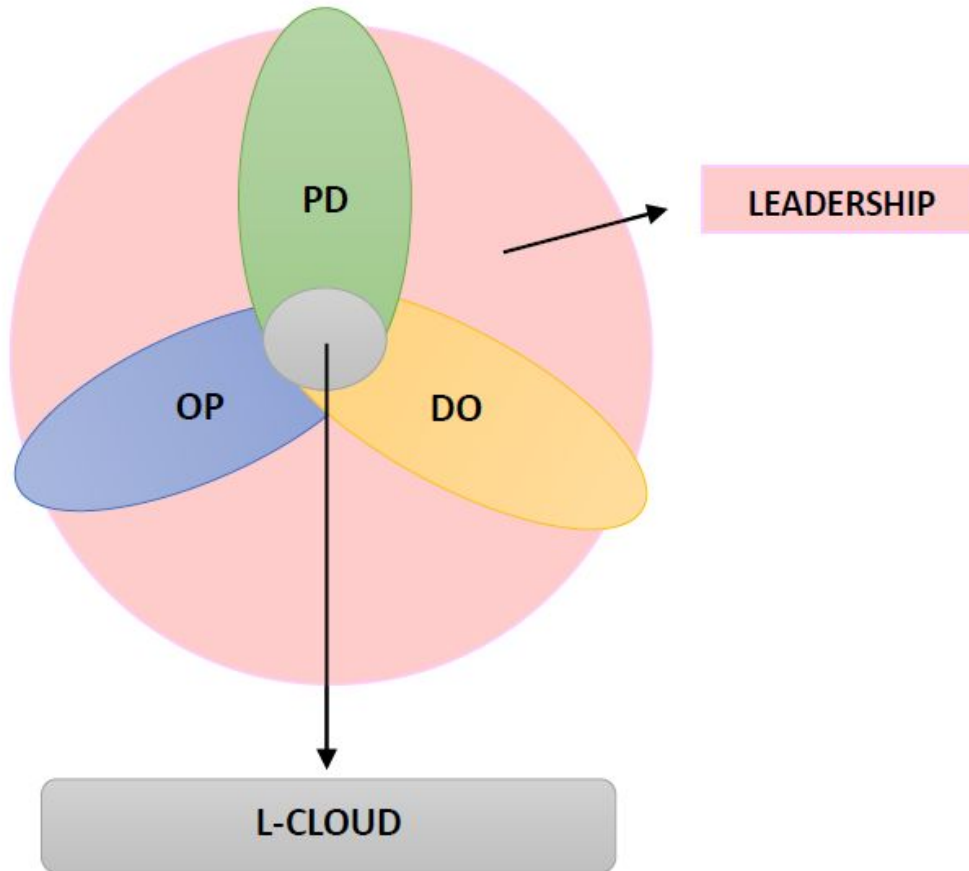
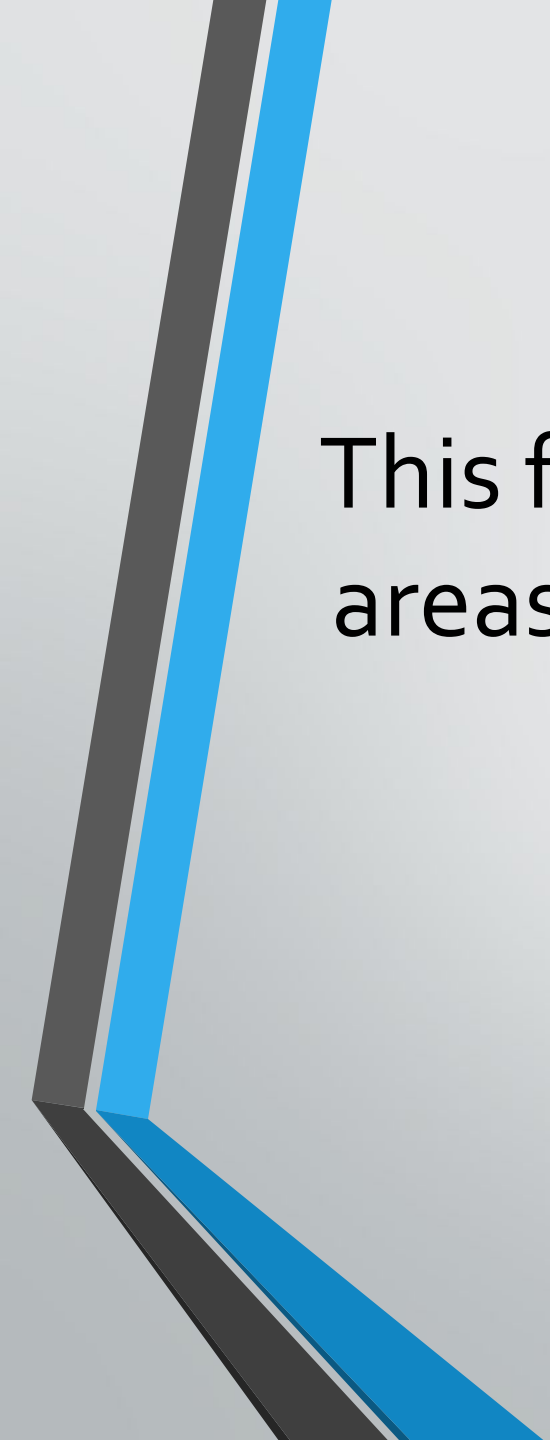


Figure 3: Intersections of the three key L-CLOUD axes

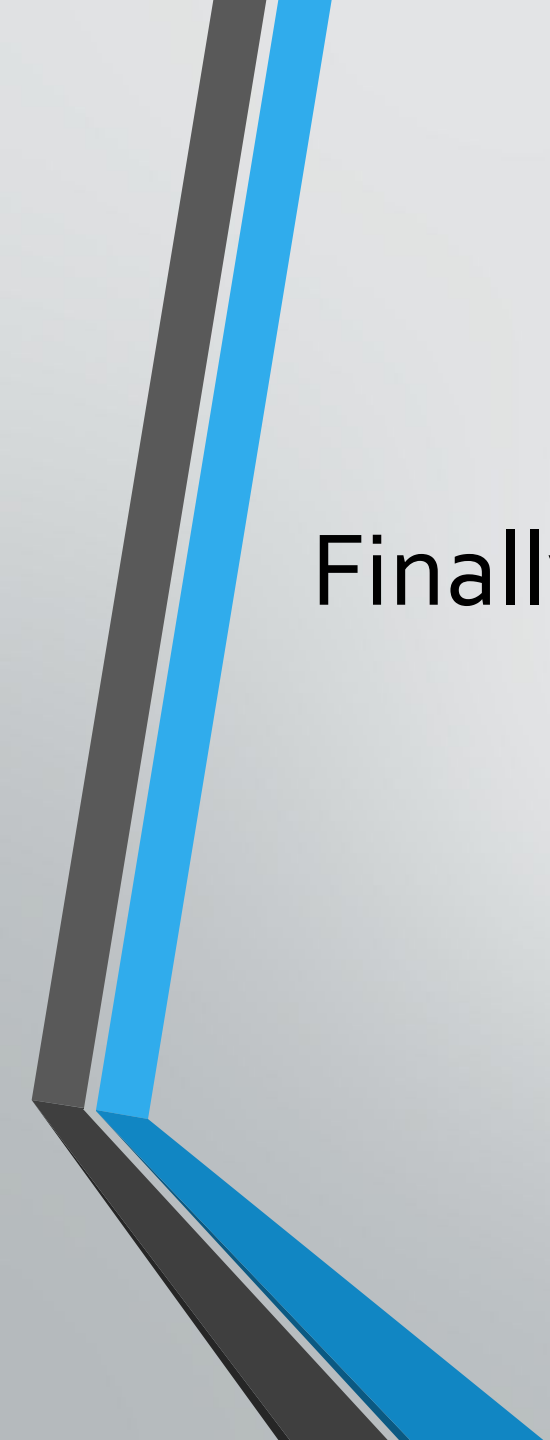
The model POD
(Pedagogical
Organisational and
Digital
dimensions)



This framework covers a range of important areas/ aspects in the learning process in the context of digital technology.

Table 2: Two-by-two intersections

AXES	AREAS
PEDAGOGICAL & ORGANIZATIONAL (PO)	<ol style="list-style-type: none">1. Flexibility and Adaptability2. Knowledge3. Teaching4. Learning to learn5. Social, civic and intercultural inclusion
ORGANIZATIONAL & DIGITAL (OD)	<ol style="list-style-type: none">1. Organizational and management digital resources2. Relationship and internalization
DIGITAL & PEDAGOGICAL (DP)	<ol style="list-style-type: none">1. Design, planning and didactics2. Creative and development3. Ethics and responsibility digital



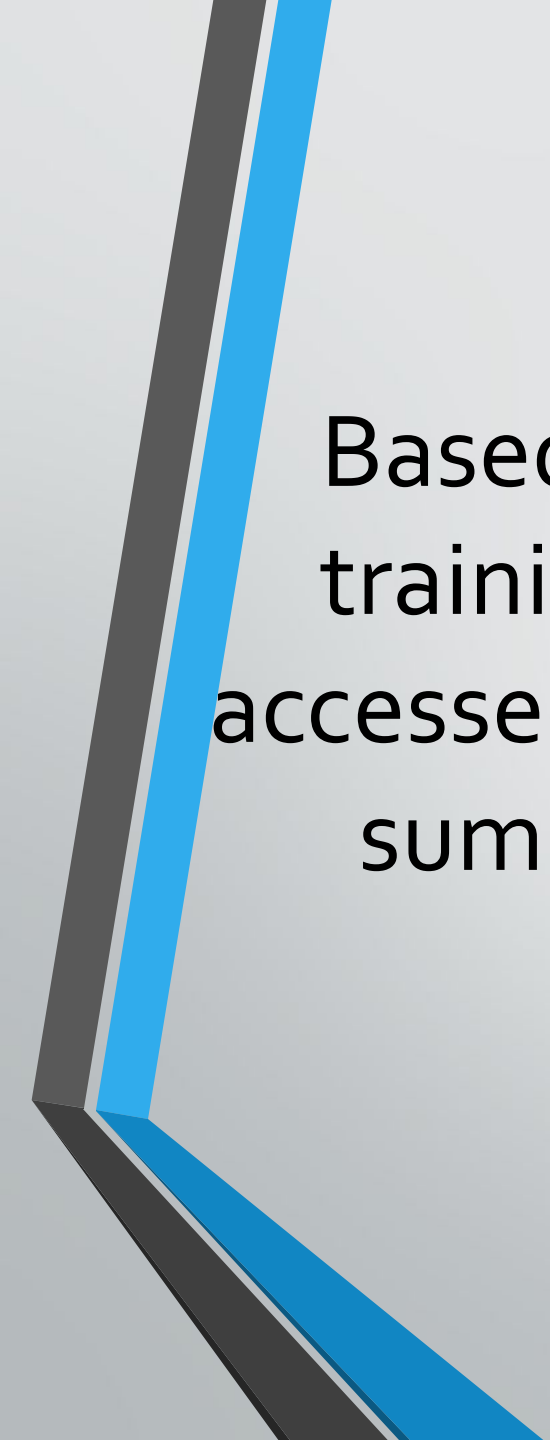
Finally, after an analysis the model POD was developed as following:

	AREAS	COMPETENCES
	1. Communication, Collaboration and Participation	<p>1.1. Knowledge of the foundations of communication as applied to Cloud Education Environments (CEE).</p> <p>1.2. Ability for communication in CEE.</p> <p>1.3. Ability to establish a shared vision on CEE in the educational organization.</p> <p>1.4. Capacity to build and consolidate communities of interest related to CEE.</p> <p>1.5. Negotiation skills (social and political interactions) with multiple educational stakeholders, actors and contexts, and decision making in cloud education.</p> <p>1.6. Ability to manage personal emotions.</p> <p>1.7. Disposition to team building and active participation in CEE.</p>
	2. Innovation, Creativity and Creation	<p>2.1. Knowledge of the foundations of creativity as applied to CEE</p> <p>2.2. Ability to lead cloud education innovations in parallel to the pedagogical project and the infrastructure of the centre.</p> <p>2.3. Ability to creatively use CEE in different educational contexts.</p> <p>2.4. Disposition to investigate about current research, innovations and best practices in the field of cloud education.</p> <p>2.5. Disposition to express creative ideas, experiences and emotions about CEE.</p>
	3. Professional Development	<p>3.1. Understanding, construction and continuous reflexion on educational leaders' professional digital identity in CEE.</p> <p>3.2. Ability to actively participate in educational research and practitioner networks in CEE.</p> <p>3.3. Ability to critically assess your own practice as leaders and develop their understanding of effective and sustainable leadership.</p> <p>3.4. Disposition to participate in cloud education Professional Development programmes (CPD).</p> <p>3.5. Disposition to promote reflexive practice and professional development focused on engagement, responsibility, teaching, learning and leadership, and keeping abreast of change.</p>

<p>4. Ethics and professional responsibility</p>	<p>4.1. Knowledge on the effective and ethical use of the different types of CEE (public, private and hybrid) and their services, tools and functionalities (SaaS, PaaS and IaaS).</p> <p>4.2. Knowledge on legal issues related to safety, data protection, privacy and a responsible use of CEE.</p> <p>4.3. Ability to solve complex problems in CEE.</p> <p>4.4. Disposition to Identifying and removing barriers to create/maintain a cloud education infrastructure.</p> <p>4.5. Disposition to motivating, encouraging, trusting and valuing colleagues to create and use cloud education in their contexts</p> <p>4.6. Disposition to social and global awareness and responsibility in relation to CEE.</p> <p>4.7. Disposition to promote and build an ethical digital identity in cloud education.</p>
<p>5. Intercultural relationships and internalization</p>	<p>5.1. Knowledge on international and global aspects of CEE.</p> <p>5.2. Ability to build and maintain intercultural relationships with partner, stakeholders and the educational community as a whole through CEE.</p> <p>5.3. Disposition to promote international mobility, entrepreneurship, training and cooperation on cloud education.</p> <p>5.4. Disposition to respect and become aware of the diversity of learners' cultures, and identify common values.</p> <p>5.5. Commitment to foster inclusion, cross-cultural skills and equal opportunity in CEE.</p>
<p>6. Pedagogical and Organizational</p>	<p>6.1. Pedagogical content knowledge in relation to different subjects, contents and structure in CEE.</p> <p>6.2. Knowledge on contextual, institutional, organizational aspects of educational policies</p> <p>6.3. Knowledge on class management, assessment and feedback processes in CEE.</p> <p>6.4. Skills on using, developing, creating and managing CEE, including applications, devices, and networks</p> <p>6.5. Skills on selecting, creating, organizing, sharing and publishing educational content according to different CEE.</p> <p>6.6. Skills to identify students' learning needs, and learning progress in the cloud.</p> <p>6.7. Disposition to accept responsibilities to planning and implementing CEE</p>



**The content of the Training Programme/ course
of the adaptable Educational leaders**



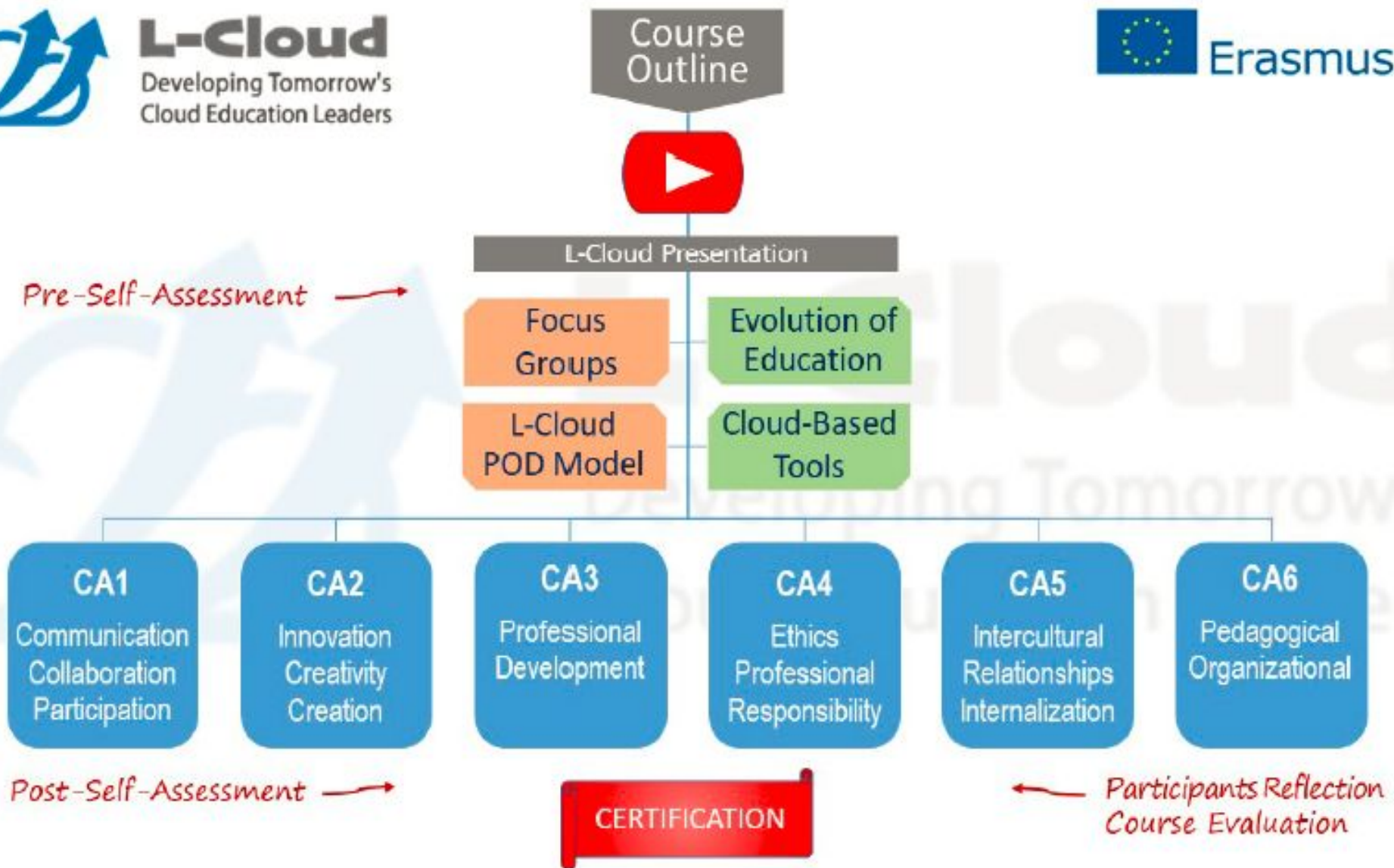
Based on the Framework of competencies a training course was developed which can be accessed through the webpage of the L-Cloud. In summary this course covers the following:



L-Cloud
Developing Tomorrow's
Cloud Education Leaders




Erasmus+



The course covers the following units:

- 1) Introduction: Focus Groups consultation and validation the L-Cloud POD Model framework, Evolution of Education and Cloud-Based Tools.
- 2) Module 1: Communication, Collaboration and Participation in Cloud education environments (Competence Area 1).
- 3) Module 2: Creativity, Innovation and Creation (Competence Area 2).
- 4) Module 3: Professional Development (Competence Area 3).
- 5) Module 4: Ethics and Professional Responsibility (Competence Area 4).
- 6) Module 5: Intercultural Relationships and Internalization (Competence Area 5).
- 7) Module 6: Pedagogical and Organizational aspects (Competence Area 6).
- 8) Reflection and Evaluation. Participants Self Reflection, Course Evaluation.



Certification of the adaptable Educational Leaders

A. Attending the training course (Massive Open Online Course (*MOOC*)).

- To qualify for the Certificate, the interested person will complete the different units of the course.
- A total of eight units, that is an introductory one, six modules related to each of the competence areas of the POD Model, and an assessment unit and reflection on the course itself
- The delivery mode of the training is online, and mostly asynchronous, enhanced with videos.
- For Part A in the Certification process a candidate needs to write 100-200 words for each module (1-6) completed, giving an executive summary of the content of the module.

B. Design of an Implementation of cloud in education plan in a chosen educational setting.

- In order to do so, the following must be accomplished:
 - **B1 - Write a report** (300 words, the user may include annexes, links or other resources).
The report shall consist of:
 - 1. Structure of the plan
 - 2. Methodology used (creativity and innovation in actions will be valued)
 - 3. Implementation Plan
 - 4. Duration
 - 5. Intended results & and potential impact (measuring indicators, evidences, cloud-based tools).
 - 6. Risk management and evaluation plan
 - 7. Continuity and sustainability plan

B. Design of an Implementation of cloud in education learning plan in a chosen educational setting.

In order to do so, the following must be accomplished:

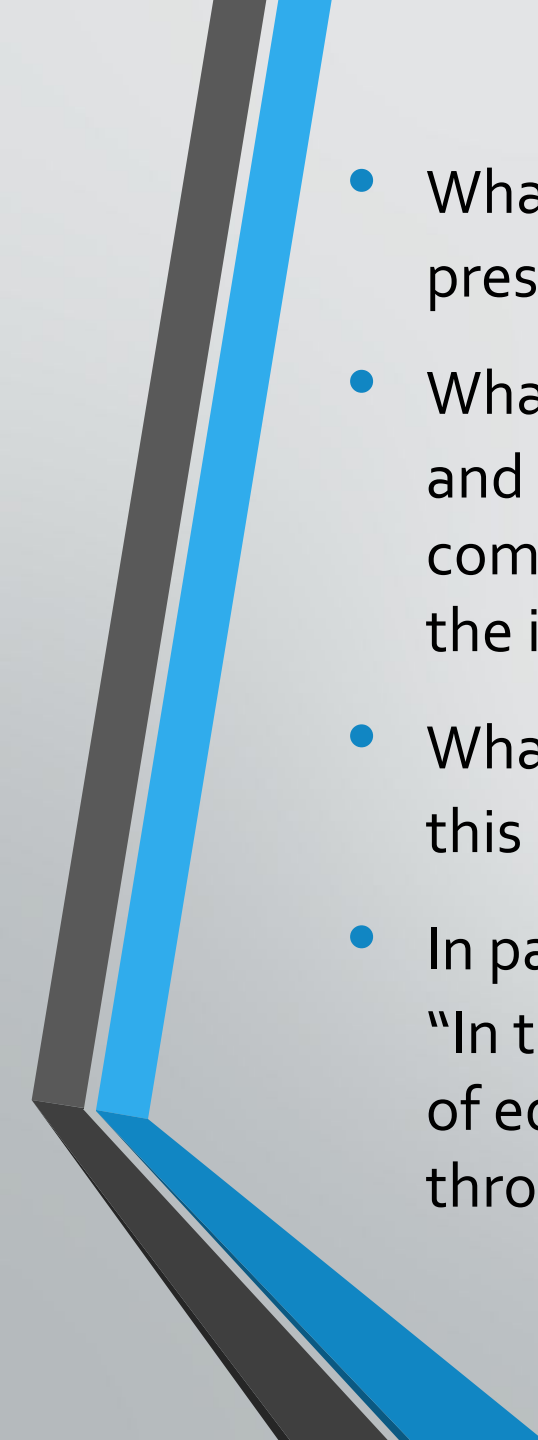
- **B2 - Produce a video of 3-5 minutes duration,** communicating the plan described in Part B1 with creativity vision report and evidence for its application and results, self-reflections and future steps. This video could be developed in either of the following two formats:
 1. As a candidate's streaming video of the implemented plan in B1.
 2. As a presentation like a PPT video, with the candidate's voice-over, stressing the key facts of this implementation, so the listener understands what has been done, and what have been the results and impact in the educational institution.

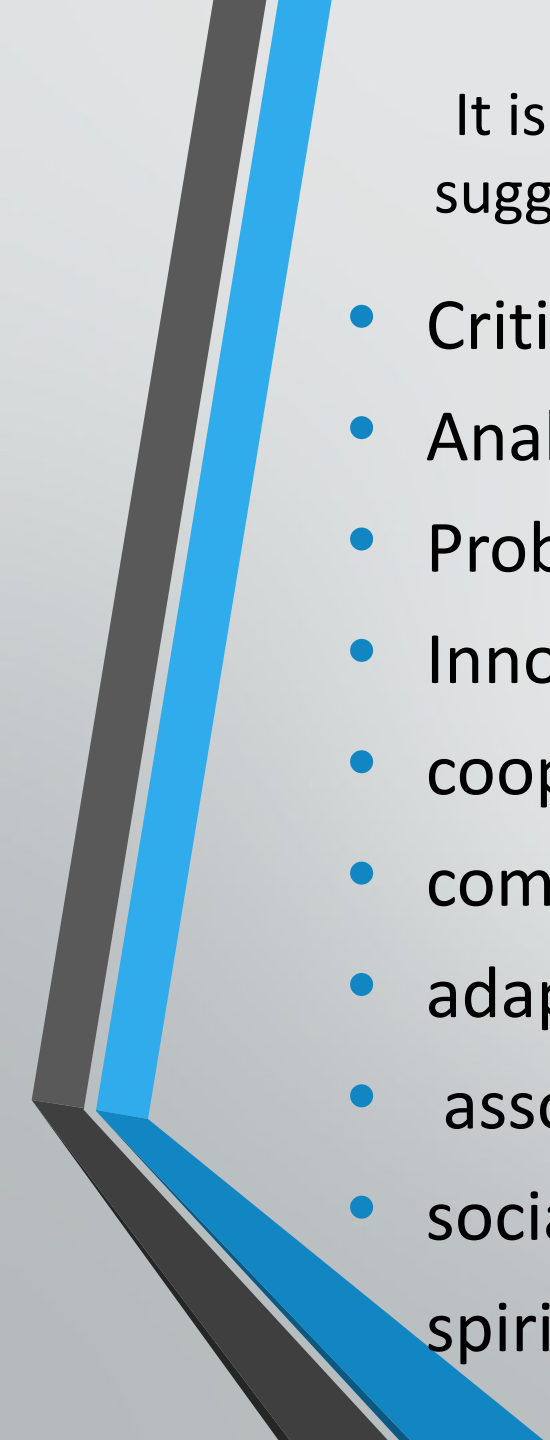
Requisites for grading the Certificate

- In order to receive the **Adaptable Cloud Education Leader Certification** it is required to
- finalise each module and deliver the proposed reports.
- The levels of Achievement are A (Excellent), B (Good), and C (Fair) or (F) for Failure.



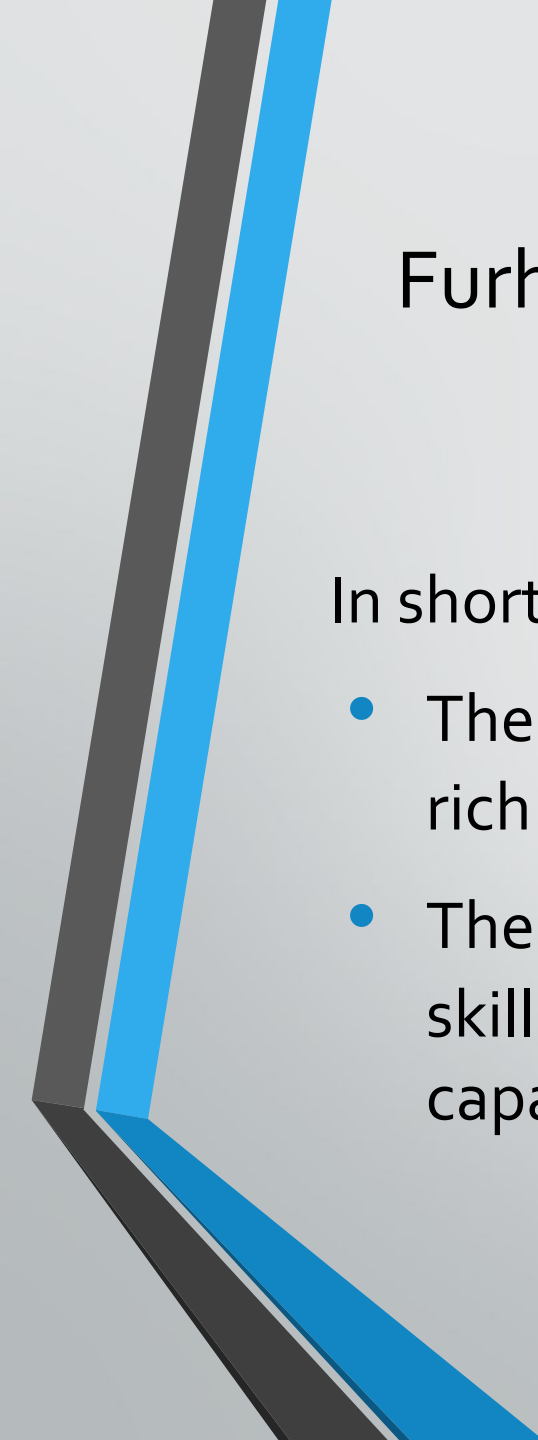
Discussion

- 
- What are your comments, reflections and ideas/ opinions on the presentation?.
 - What are your comments, reflections and ideas/ opinions on the positive and negative characteristics of the approach that is the result of the competencies that are the outcomes of the context that is developed by the ideas of the L-Cloud project?.
 - What are the positive/ negative implications of the L-Cloud and how could this project be used as a catalyst in education?.
 - In particular what would be your comments/ opinions/ ideas on the topic “In the context of the current pandemic of COVID-19, what aspects/ areas of education could we identify with positive or negative contribution through the adoption of the L-Cloud programme?



It is expected that by the development of the skills and competencies suggested in the L-Cloud project an educational leader can support the development of the following ideas to gifted students:

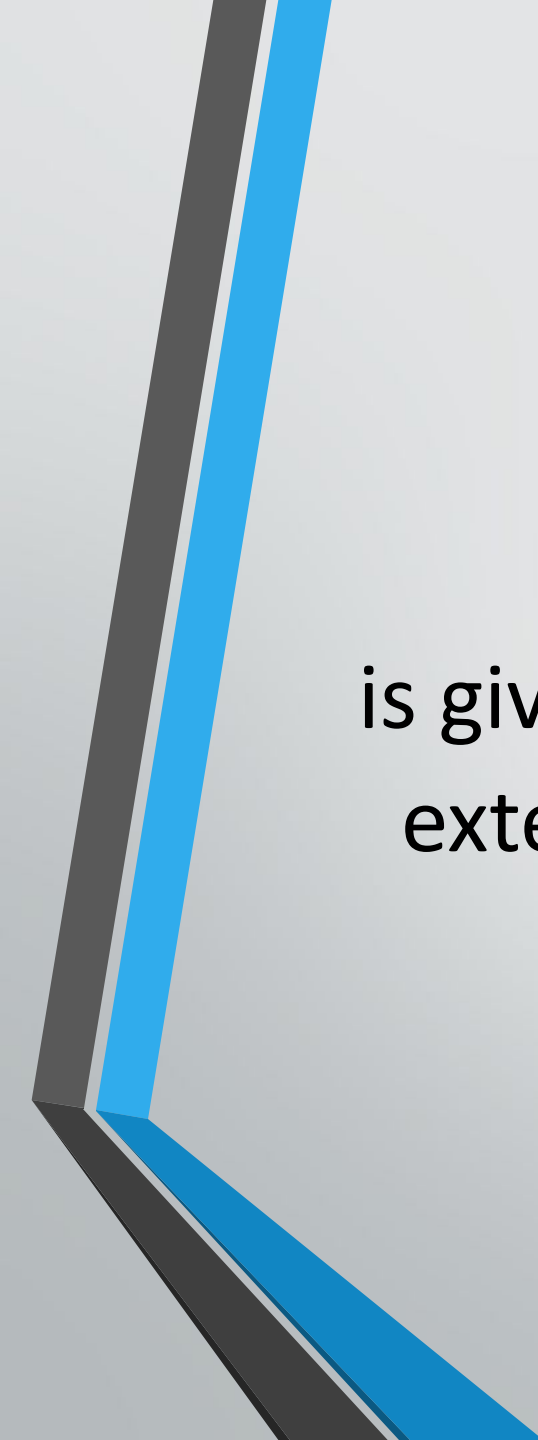
- Critical Thinking,
- Analytic competencies,
- Problem Solving,
- Innovation and creativity,
- cooperation,
- communication,
- adaptability,
- association to the real world,
- social responsibility,
- spiritual and psychological balance



Furhthermore: How L-Cloud can act as a catalyst in the context of the INNOMATH approach?

In short there are the following advantages:

- The Cloud technology provides access, management and analysis to rich resources with flexibility, extension and sophistication.
- The L- Cloud provides the educational framework and strengthens skills and competencies that encourage the development of the capabilities for the fulfilment of the goals of the INNOMATH project.



In this context the following
QUESTIONNAIRE
is given aiming at assessing and commenting on the
extent of usefulness of the ideas of L-Cloud in the
INNOMATH content

QUESTIONNAIRE

Assessing and commenting on the extent of usefulness of the ideas of L-Cloud in the INNOMATH context

Complete the following questionnaire by assessing the degree of contribution of each competency in the strengthening of a teacher's competencies, aiming to support mathematically gifted students.

Mark with: 4 (Excellent), 3 (Good) 2(satisfactory), 1(little).

Furthermore add your comments on the advantages, practicality and difficulties you would expect in applying these competencies in an INNOMATH class

AREAS	COMPETENCES	MARK 1,2,3,4	COMMENTS
1. Communication, Collaboration and Participation	1.1. Knowledge of the foundations of communication as applied to Cloud Education Environments (CEE).		
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AREAS	COMPETENCES	MARK 1,2,3,4	COMMENTS
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5. Intercultural relationships and internalization	1.1. Knowledge on international and global aspects of CEE.		
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AREAS	COMPETENCES	MARK 1,2,3,4	COMMENTS
6. Pedagogical and Organizational	1.1. Pedagogical content knowledge in relation to different subjects, contents and structure in CEE.		
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	1.4. Skills on using, developing, creating and managing CEE, including applications, devices, and networks		
	1.5. Skills on selecting, creating, organizing, sharing and publishing educational content according to different CEE.		
	1.6. Skills to identify students' learning needs, and learning progress in the cloud.		
	6.7. Disposition to accept responsibilities to planning and implementing CEE.		



Thank you