Educational Technology

An introduction

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Introduction - Contents

- Integration of ICT into education
- Terminology / Definitions
- Transforming education
- The importance of content
- Processing modes
- Standards
- Advantages / Disadvantages

https://en.wikipedia.org/

Some material is taken from:

- E-Learning: A Guidebook of Principles, Procedures and Practices , Som Naidu, 2006

-The Theory and Practice of Online Learning, Terry Anderson, AU Press, 2008

ICT is transforming education

- The impact of ICT systems and services has and will continue to enrich and transform education at all levels and in formal, non-formal and informal settings.
- According to UNESCO, ICT can contribute to:
  - *universal access to education,*
  - *equal opportunities in education,*
  - *the delivery of quality learning and teaching,*
  - *teachers' professional development,*
  - *more efficient education management,*
  - *governance and administration.*

United Nations
Educational, Scientific and
Cultural Organization

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- ICTs potentially provide powerful tools for enabling educational change and training reform.

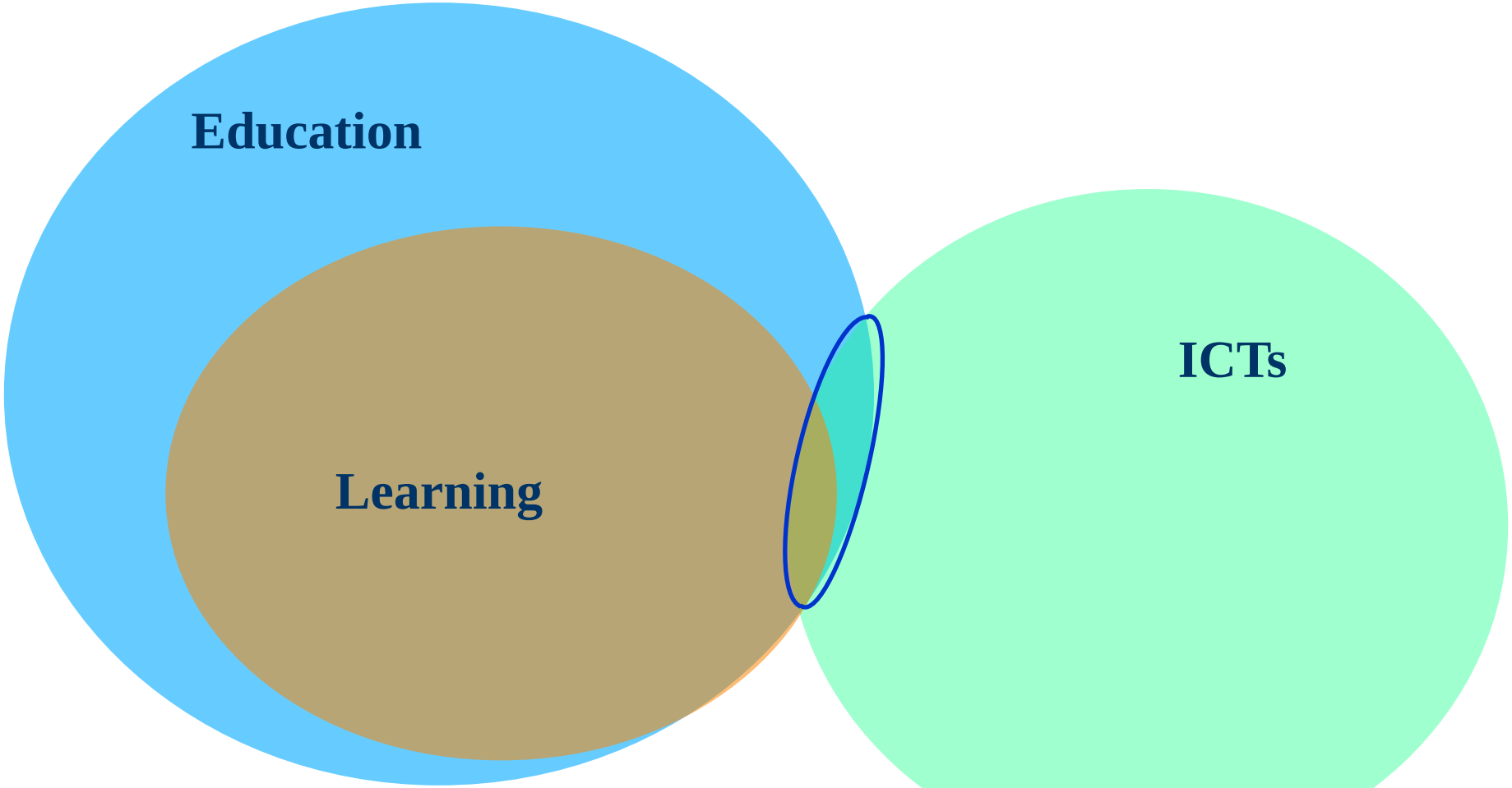
Integration of ICT into education

- Multifaceted and sometimes complicated process.
- Apart from sufficient ICT literacy, it also involves:
  - *suitable pedagogy (learning theories, teaching),*
  - *teacher competencies (training, content)*
  - *adequate ICT implementations,*
  - *institutional readiness and leadership,*
  - *appropriate curriculum and*
  - *long-term financing.*

https://en.wikipedia.org

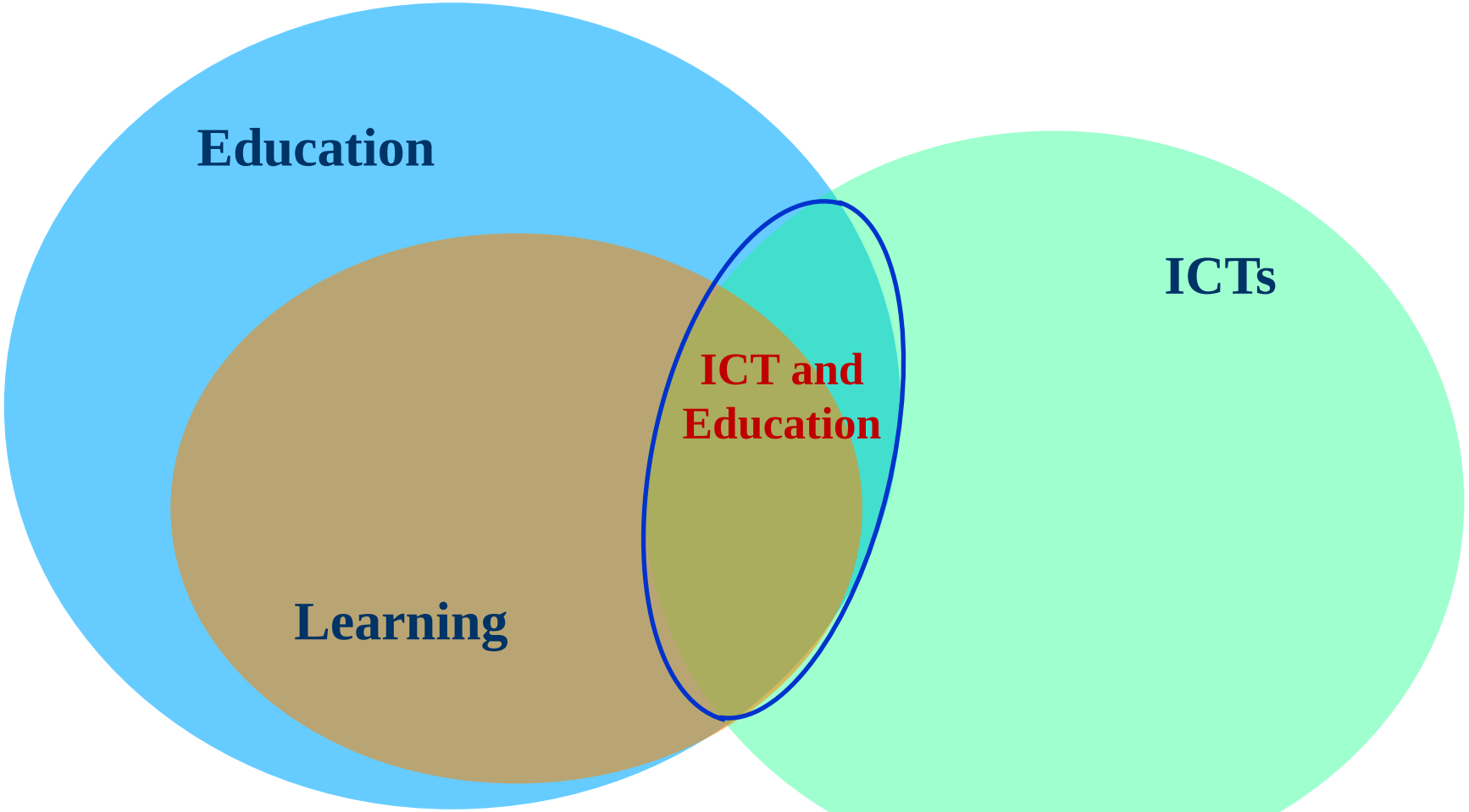
- Aim: best harnessing of ICT to improve the efficiency and effectiveness of education.
- A creative osmosis between ICT and learning.

Before 1990: ICT was a bit supplementary



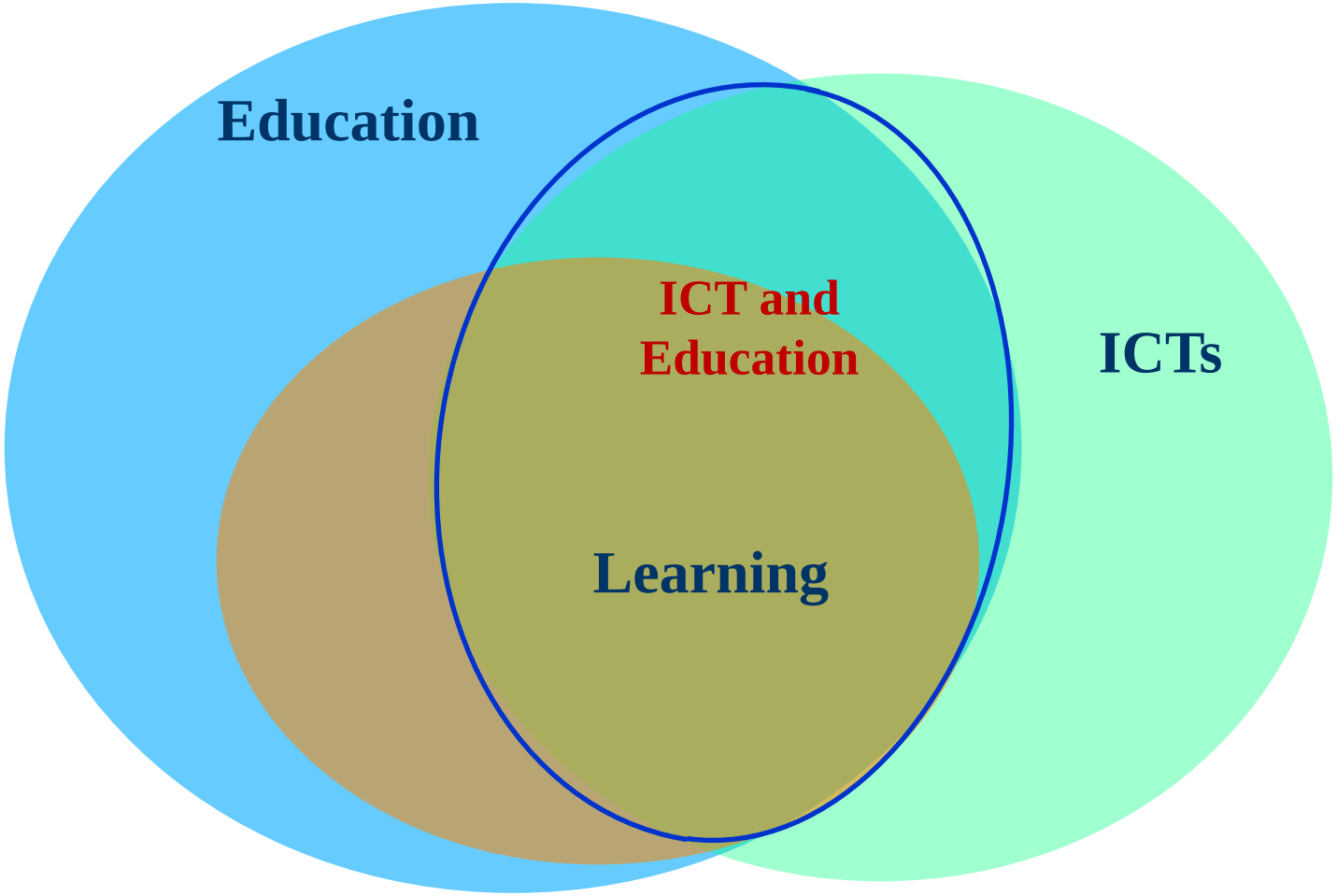
No eLearning

1990-2000: ICT is still complementary



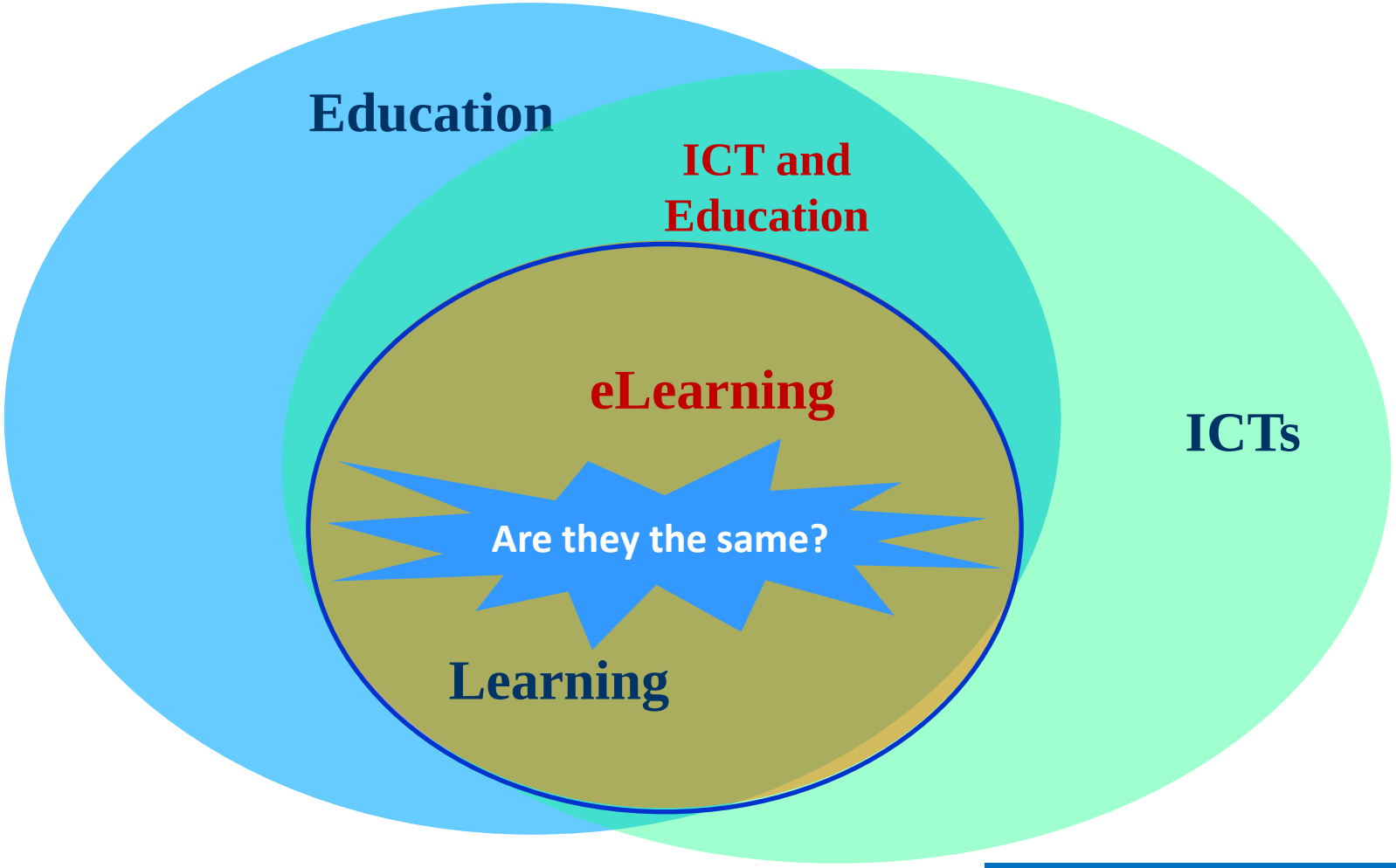
Blended Learning

2000-2010: Integration of ICT in learning.



Most used term: eLearning

After 2010: ICT is an integral part of education



eLearning 2.0, eLearning 3.0?
Educational Technology

Approaches to the educational use of ICT

- Learning about ICT
  - *develop ICT literacy (terminology, concepts, operations) and*
  - *use various productivity tools (office automation, internet tools, programming, databases, graphics).*
- Learning with ICT
  - *ICTs are the means to learning activities (presentation, manipulation of educational resources, create learning activities, use educational applications for facilitating teaching and tracking processes).*
- Learning through ICT
  - *It combines learning about ICT and learning with them.*

Introducing eLearning

- The gradual emergence of eLearning has caused progressive disruptions in education:
  - *The roles of stakeholders have been changed.*
  - *Need for implementing new teaching models.*
  - *Review of existing learning theories.*
  - *Emergence of new learning theories.*
  - *Need for enriched educational resources ("content is the King").*
  - *Increased demands for ICT literacy, digital educational environments, internet availability.*

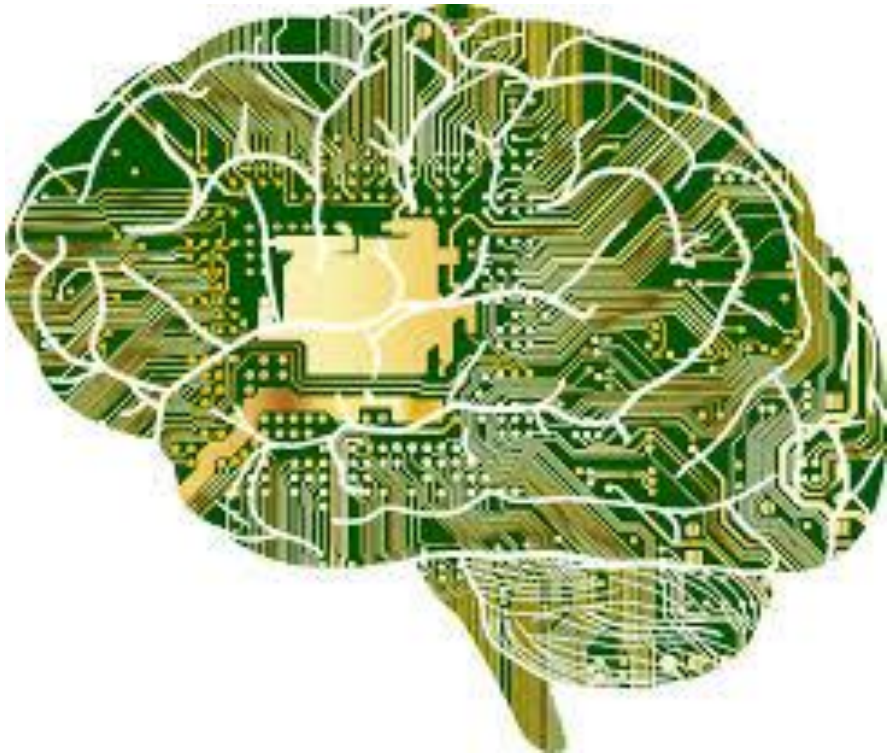
www.flickr.com

- All these define the framework of *educational technology*.

History of technologies serving education

- 1700s – Universities offer formalized learning through written correspondence courses (shot hand lessons 1728).
- 20th Century – The Communication Revolution
  - *1923 - invention of film*
  - *1930 - instructional Radio / TV*
  - *1960 – "medium is the message" (McLuhan, 1964)*
  - *1970 – "C.A.I."*
  - *1980s – "C.B.T."*
  - *1990s – The Internet Revolution, WBT, LMS, "e-learning" (1998)*
  - *-2020 the internet years of educational technology - streaming media, collaboration platforms, gamification, analytics etc.*
- 21st Century - Adoption of eLearning portals by primary, secondary and tertiary education institutions. Learning 2.0
- Wikipedia has an extensive listing of eLearning initiatives in the article: History of Virtual Learning Environments.

Definitions and descriptions



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“ICT in education” OR “eLearning” OR …

- Various terminologies have been used, reflecting the diversity of practice and associated technologies.
- That makes it difficult to develop a generic definition and there is a plethora of terms.
- Today, *eLearning* is the most common used term.
- Before 2000 the term *Computer-based Training* (CBT) was the most frequently used.
- *eLearning* can be defined as the use of digital technologies and media to deliver, support and enhance teaching, learning, assessment and evaluation.
- *eLearning*: is simply learning that occurs through ICT.
- In any case, the learner and the learning process should be the focus.

Most generic terms

- eLearning (or e-learning)
- Educational Technology
- Online Learning
- Digital Education

Flash Activity

With your teammates, try to dig out terms related with:

“Educational Technology”, “eLearning”,….

pixabay.com

EDUCAUSE, “Online Learning” description

EDUCAUSE

- Online Learning is referred to by many names:
  - *E-Learning, Blended Learning, Mobile Learning, MOOC, Online Education or Virtual Learning Environment (VLE).*
- It can take on many forms and delivered through various platforms, but one thing remains the same,
  - *technology is a core component.*

JISC eLearning definition

- eLearning can be defined as "*learning facilitated and supported through the use of information and communications technology*".
- It can cover a spectrum of activities from the use of technology to support learning as part of a *blended* approach (a combination of traditional and e-learning approaches), to learning that is delivered entirely online.
- Whatever the technology, however, learning is the vital element.

from http://www.jisc.ac.uk/elearning

Description of “eLearning” (webopedia)

- Education via the Internet, network, or standalone computer.
- It is essentially the network-enabled transfer of skills and knowledge.
- It refers to using electronic applications and processes to learn.
- It was first called "Internet-Based training" then "Web-Based Training".
- Today you will still find these terms being used, along with variations of e-learning such as e-learning, Elearning, and eLearning.

Description of “eLearning” (wikipedia)

- Educational technology is the effective use of technological tools in learning.
- It concerns an array of tools, such as media, machines and networking hardware, as well as considering underlying theoretical perspectives for their effective application.
- Also called e-learning, it includes an array of approaches, components, and delivery methods.
- Information and communication systems, whether free-standing or based on either local networks or the Internet in networked learning, underlie many e-learning processes.
- Educational technology and e-learning can occur in or out of the classroom. It can be self-paced, asynchronous learning or may be instructor-led, synchronous learning.

Educational technology (Wikipedia -new)

- Educational technology as the theory and practice of educational approaches to learning.
- Educational technology as technological tools and media, for instance massive online courses, that assist in the communication of knowledge, and its development and exchange.
- Educational technology for learning management systems (LMS), such as tools for student and curriculum management, and education management information systems (EMIS).
- Educational technology as back-office management, such as training management systems for logistics and budget management and Learning Record Store (LRS) for learning data storage and analysis.
- Educational technology itself as an educational subject; such courses may be called "Computer Studies" or "Information and communications technology (ICT)".

Definitions of “eLearning” (companies)

- e-Learning is the use of technology to enable people to learn anytime and anywhere. e-Learning can include training, the delivery of just-in-time information and guidance from experts. (www.e-learningconsulting.com)

- The delivery of a learning, training or education program by electronic means. E-learning involves the use of a computer or electronic device (e.g., a cell phone) in some way to provide training, educational or learning material (derekstockley.com.au).

- The term “e-learning” describes a range of information technologies at use in schools and corporations for education and training (www.mindflash.com).

- eLearning is a formalized teaching system with the help of electronic resources such as webinar tools or online learning platforms. The use of the internet and computers are significant components of eLearning that allow teaching to be often based out of the classroom (https://findstack.com/)

What is Educational Technology, IGI Global

- Practice and study of facilitating and enhancing the learning process through the use of technological resources.
- Refers to various digital technologies that are used for teaching and learning
- Information and communication technology incorporated into education to help improve activities in teaching and learning processes.
- The process of improving teaching and learning through the optimal use of technological resources inside the classroom.
- The use of technological resources to deliver content; the term may refer to the tools themselves, their use, and/or the design of the instruction and curriculum.
- The term of educational technology generally refers to the introduction of computers and related pieces of equipment to the classroom.
- Integration of Information and Communications Technologies (ICT) into education.
- Theory and practice of systematic design of learning processes and resources.

from https://www.igi-global.com/dictionary/educational-technology/9142

Which definition?

- Difficult to develop a generic definition for eLearning. There was much debate about it.
- Initially, the term *eLearning* covered any use of ICT in learning, but gradually it focuses more on online delivery of education.
- Except “eLearning” various other terms and definitions are also used to describe this mode of teaching and learning.
- All these terms are used to *describe applications* and *services* of ICT in the educational context.
- Fundamentally, they all refer to educational processes that *utilize ICT* to mediate asynchronous as well as synchronous learning and teaching activities, although each one has its own meaning.

Related terms

Computer Based Learning

Technology Based Training

Computer Based Instruction

Computer Based Training

Computer Managed Instruction

Hybrid Learning

Blended learning

educational technology

Internet Based Learning

Open Education

Open learning

Web Based Training

Web Learning

Distance Learning

Technology Enhanced Learning

Distance Education

Virtual learning

Computer Assisted Training

Ubiquitous learning

Asynchronous Teaching

Online learning

Mobile learning

Game Based Learning

Project Based Learning

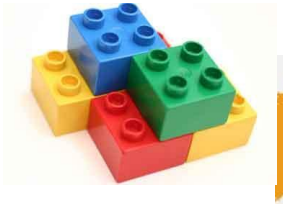
Synchronous Teaching

Scenario Based Learning

Adaptive learning

Digital Education

ICT's outcomes concerning learning



OPEN EDUCATIONAL RESOURCES

PLN

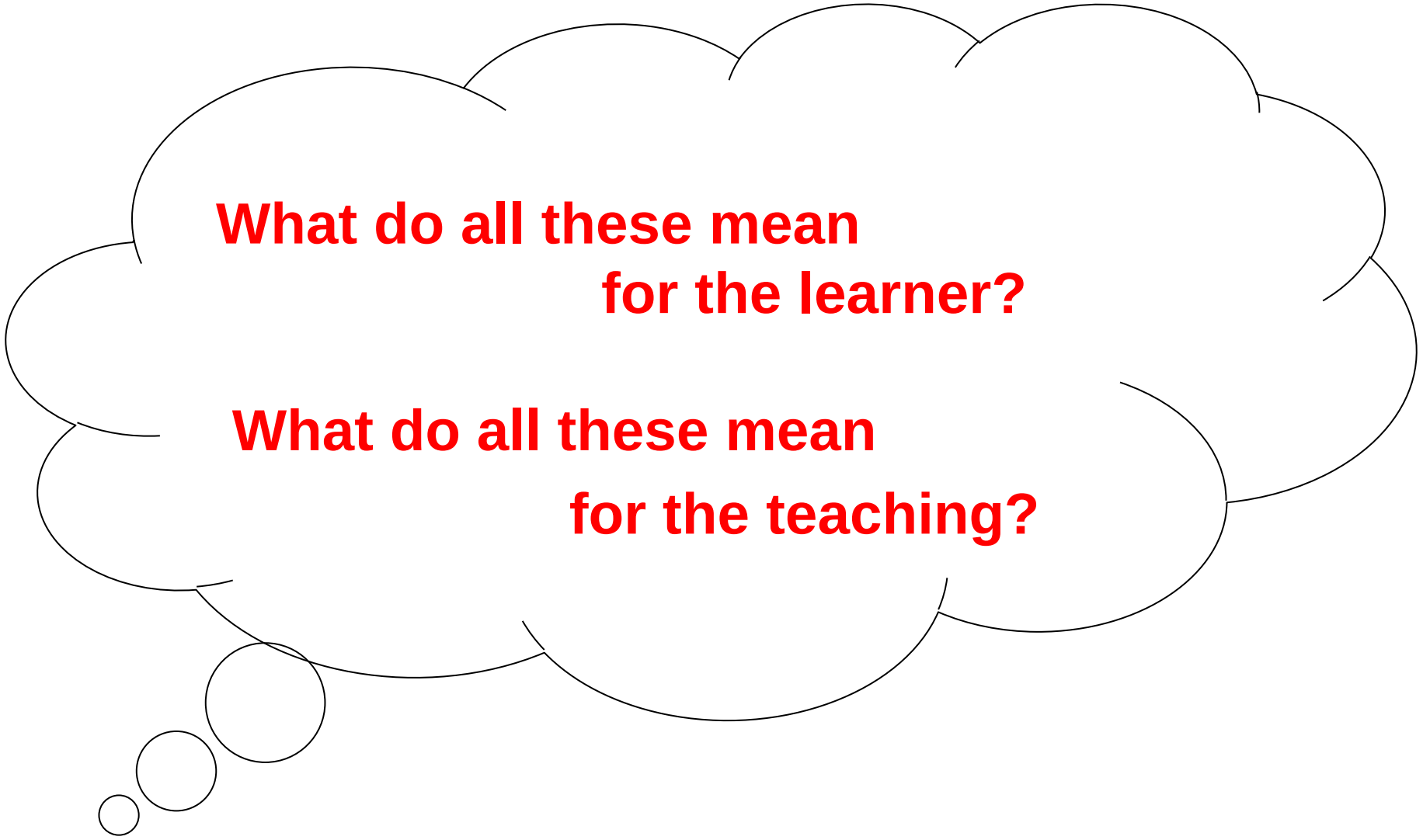
MOOC
MASSIVE OPEN ONLINE COURSE

Personal Learning Environments (PLEs)

Student ePortfolios

Learning Analytics

Flash Activity



What do all these mean for the learner?

- uses some form of *ICT device* (smartphones, tablets, computer, network) to access learning material,
- uses *ICT implementations* to interact with the instructor and with other learners,
- *not* be always at the *same space* with the instructor (space independence),
- *not* be always at the *same time* with instructor (time independence),
- Should be able to study in his *own pace* (self-paced),
- should be *more active*,
- show high level *responsibility and self-discipline*.

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What do all these mean for teaching?

- Question: **Can ICT influence learning?**
  - *opportunities to re-think and re-engineer teaching and learning practices.*
  - *ICT has the potential to improve learning*
- Integrating ITC in Education could serve to:
  - *motivate learner's interest (more attractive material),*
  - *capture authentic contexts and situations from the real world and represent real-world scenarios (video),*
  - *develop environments for specific educational strategies (ICT affordance),*
  - *the accessibility,*
  - *the availability of educational services (24/7, just in time).*

What does all theses mean?

- For the learners?
- For the instructors?
- Educational systems?
- For the classrooms?
- For schools?
- For universities?
- For companies?
- For states?
- For people?
- For societies?

Teaching model has changed

http://torgroup.org/theory-of-reality/the-scientific-evidence

from

teacher centered model

(focus on instructor)

www.youtube.com

Teaching model has changed

http://torgroup.org/theory-of-reality/the-scientific-evidence

to

learner-centered model

(focus on learner)

www.flickr.com

Teaching model has changed

eLearning seems to be very effective in developing learner and learning-centered educational environments.

…idence

…ed model

(focus on learner)

www.flickr.com

What about instructor's role?

shifting from

form foreground

(actor)

to background

(director)

So, to whom learners should pay attention?

…to the content!

The instructor should create material that works with students without instructor's participation.

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Educational material is taking the place of instructor!

Who is creating content?

Educators/Teachers/Instructors

Educational organizations

…and

Learners!

libguides.humboldt.edu

evertonpom.blogspot.com

What kind of content…

en.wikipedia.org

- Teachers/instructors
  - *Not only static (behaviorism)*
  - *With high degrees of interactivity and adaptability*
  - *Concept: Learning by doing / making (constructivism)*
  - *Aim: Teach learners how to learn!*
- How?
  - *Skillful integration of both ICT and teaching methods (i.e. learning theories).*

    Office suites, authoring tools, Rapid Application /Simulation development tools, Intelligent Tutoring System (ITS), assemblers/packagers/converters of documents.

What kind of content…

www.flickr.com

- Learners
  - *Not just a content consumer.*
  - *Discover, share, reuse, redistribute, revise, remix…*
  - *Not a passive content recipient anymore.*
  - *An active content creator.*
- How?
  - *Use of Web 2.0 platforms/tools*

    (wikis, blogs, portfolios, social networks).
  - *Learning 2.0 era (connectivism)*

What kind of content…

com

- Learners
  - *Not just a content consumer.*
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  - *An active*
  - *Use of Web 2.0 platforms/tools*

    (wikis, blogs, portfolios, social networks).
  - *Learning 2.0 era (connectivism)*

Learning has been changed.

Learning has been changed

- New opportunities
  - *New ways of communication and interactions*
  - *Modern environments for teaching and managing the content*
  - *Upgraded educational material*
- New learning theories
  - *New teaching technics*
  - *New educational activities*
  - *New ways of assessment*
  - *Whiteout the presence of the instructor*
  - *Without spatial and time restrictions*
- New priorities
  - *Learning by doing / making (constructivism)*
  - *Teach learners how to learn*

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Educational content then…

- Early on, educational technologists had perceived the importance of content.
- In 1994, a new term *Learning Object* appears (W. Hodgins) in order to describe effectively the educational content of the new era.
- A definition from IEEE:

Any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning

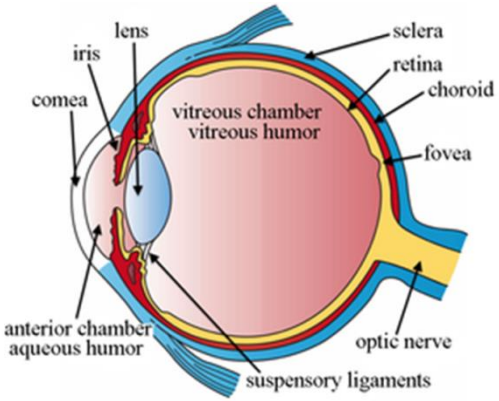
(The LOM standard, 2005)

- In their effort for an efficient exploitation of learning material, educational technologists tried to assign to Learning Objects some *desirable attributes*.

www.flickr.com

Desirable attributes of Learning Objects

- Reusability
  - *write once, use anywhere.*
- Accessibility
  - *disabilities, learning styles, locatable content, open.*
- Interoperability
  - *Functionally through diverse platforms.*
- Metadata
  - *Make content "machine processable".*
- Educational soundness
  - *Context in education is essential.*



en.wikipedia.org/wiki/Lens_(anatomy)

Desirable attributes of Learning Objects

- Reusability
  - *Write once, use anywhere!*
- Interoperability
- Durability
- Accessibility
- Educational soundness
  - *Context in educ*

But the vision of IEEE:

To enable computer agents to automatically and dynamically compose personalized lessons for an individual learner

(IEEE LOM 2002).

…has not achieved yet!

en.wikipedia.org/wiki/Lens_(anatomy)

Formal education and eLearning

- Educational learning (formal education), *concerns face-to face courses of fairly long duration* (weeks to months) for the long-term educational benefit of the learner (formal learning).

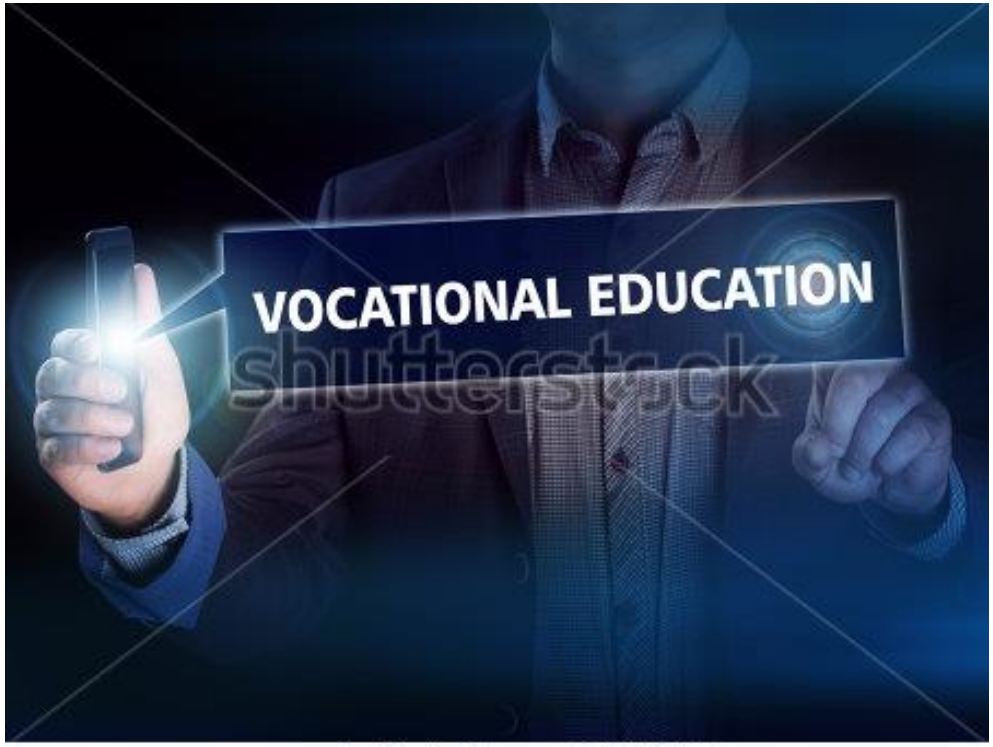
In virtual eLearning environments, the instructor who leads the course is available by video/voice/written conferencing, via email and discussion groups and sometimes via virtual classrooms.

pixabay.com

Corporate training and eLearning

- Corporate training (including government and the non-profit sector), concerns *short courses* (hours to days) for immediate updates, with specific focus on job functions and objectives.

In the corporate e-learning environment, there is a high degree of dependence on self-directed learning, often using courses that have been purchased off-the-shelf from third-party vendors.



eLearning: processing modes

- eLearning is an alternative method of delivering and receiving education and training.
- In eLearning, the educational activities:
  - *are carried out by individuals or groups,*
  - *working online or offline, and*
  - *operating synchronously or asynchronously.*

  via networked or standalone computers and other electronic devices (mobile or not).
- Of course, they can be carried out *from distance*.

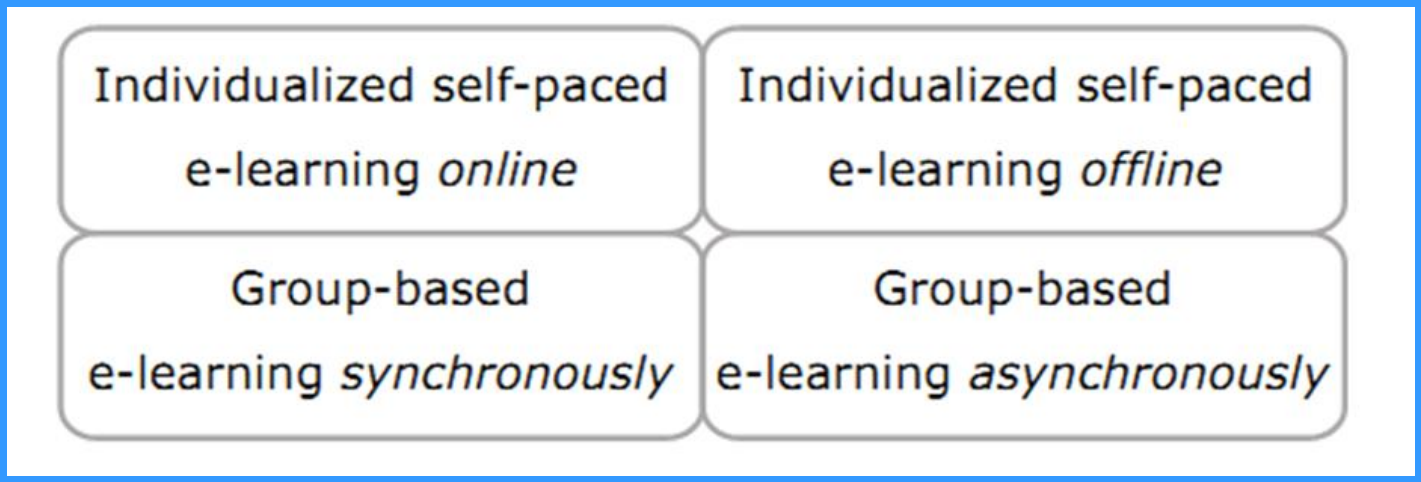
www.flickr.com

eLearning: modalities

- Individualized self-paced eLearning *online*
  - *individual learner is accessing learning resources via the net (internet / intranet).*
- Individualized self-paced eLearning *offline*
  - *individual learner is accessing learning resources via her/his computer.*
- Group-based e-learning *synchronously*
  - *groups of learners are working together in real time via the net.*
- Group-based e-learning *asynchronously*
  - *groups of learners are working together via the net where exchanges among participants occur with a time delay.*

eLearning: modalities

- Individualized self-paced eLearning *online*
  - *individual learner is accessing learning resources via the net (internet /*



E-learning modalities (from "E-learning", Som Naidu)

  - *groups of learners are working together via the net where exchanges among participants occur with a time delay.*

Asynchronous mode

- Communication *does not occur simultaneously*.
- It can be carried out even when learner or instructor is *offline*.
- Coursework and communications delivered via *web*, *email* and *messages posted* on community forums.
- Main benefit: *flexible use of time*.
- Main drawback: *interaction can be slow*.
- Learners can follow the curriculum at *their own pace*.

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Synchronous mode

- Learners and instructors communicate (interact) each other at *same time* during the lesson.
- Learning tools are in "*real-time*", such as *online chat* or *video/voice conferencing.*
- Main benefit: *avoid* feelings of *isolation* (sense of event & audience).
- Main drawback: *not as flexible in terms of time*.

Adequate *technical support* and training for both student and instructor is essential.

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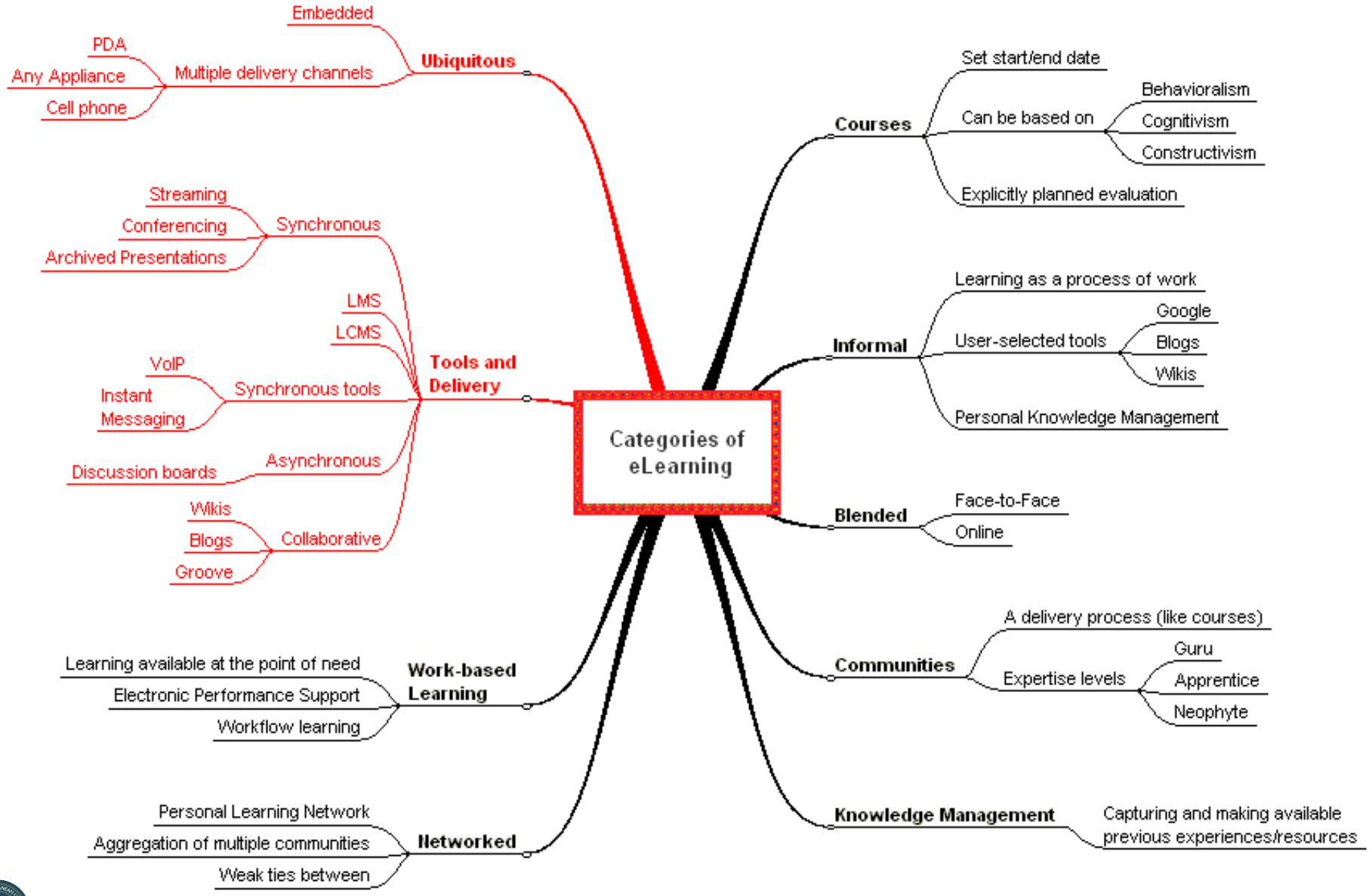
Blended mode

- Combination of eLearning and traditional (face to face) learning in a way that the *one compliments the other*.
- A learner might attend classes in a real-world classroom setting, and then supplement the lesson plan by completing *online coursework*.
- It is often also referred to as *hybrid* learning.
- Tools and platforms that complement blended learning include *LMSs* and mobile devices, such as tablets and smartphones.
- Blended learning applications have allowed many “traditional” universities to offer flexible learning opportunities and proceed smoothly to the digital transformation of education

Categories of eLearning (G. Siemens, 2004)



Teaching with technology (Siemens 2009)

Teaching with technology can be viewed as gradients within three broad categories.

- Augmented

  the use of technology to extend a physical classroom (integrating tools into existing teaching activities –LMS, LCMS, discussions etc.)

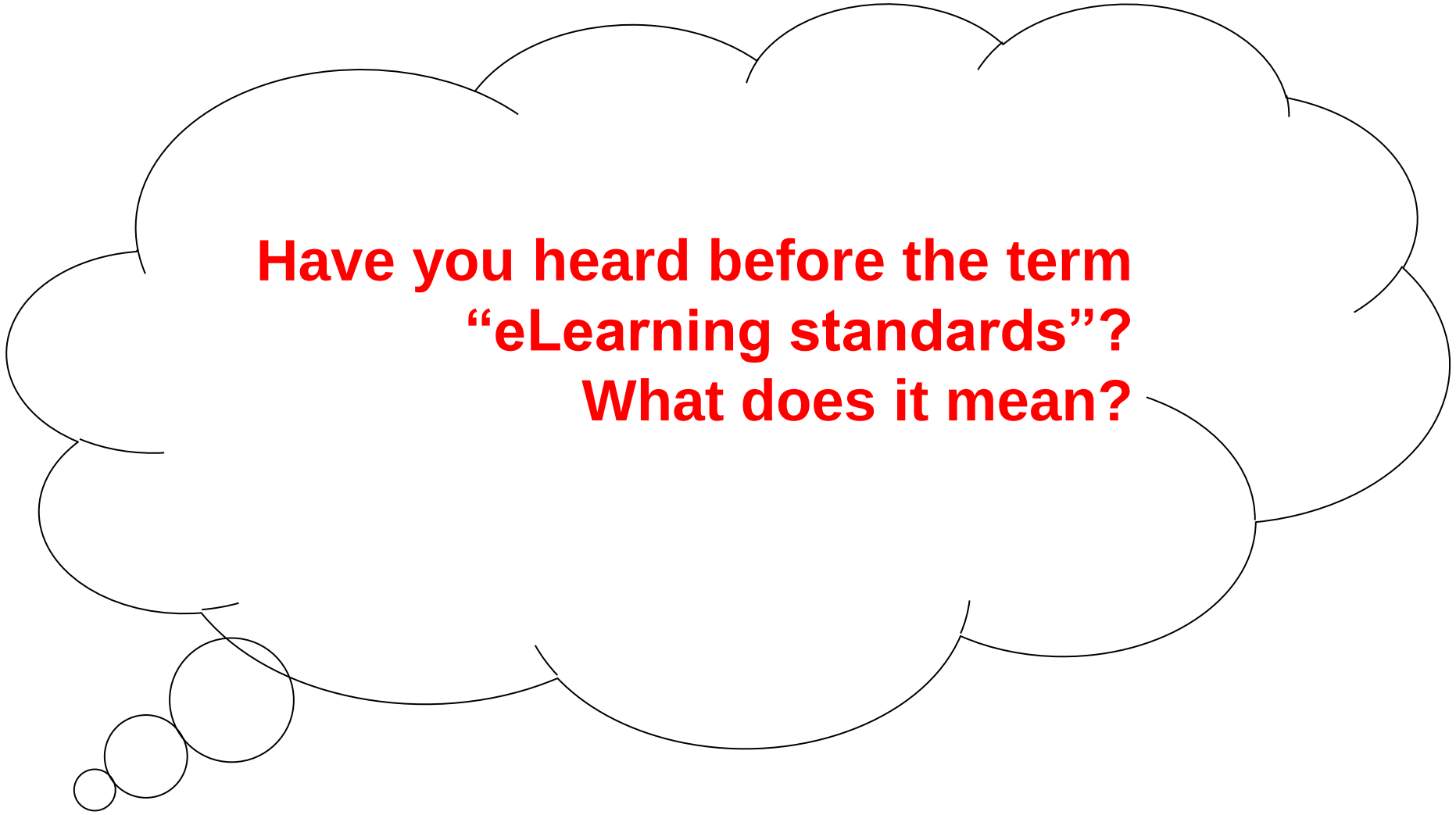
- Blended

  technology partly replaces in-classroom learning. Part of the course is face-to-face and part is online (for instance: initial face-to-face class, followed by several weeks of online classes, and a wrap up face-to-face class).

- Online

  technology entirely replaces face-to-face classroom teaching or paper-based distance education (courses delivered completely online and offered through virtual learning environments – synchronously or asynchronously).

Flash Activity



eLearning standards

- They aim to the convergence of respective technologies, by allowing a variety of eLearning products to co-exist.
- Standards in eLearning help to ensure:
  - *Interoperability - can the system work with any other system?*
  - Re-usability - *can courseware (content, activities) be re-used?*
  - *Manageability - can a system track the appropriate information about the learner and the content?*
  - *Accessibility - can a learner access the appropriate content at the appropriate time?*
  - *Durability - will the technology evolve with the standards to avoid obsolescence?*
  - *Protection and even nurture eLearning investments.*

eLearning standards categories

- Architectural standards,

  define architectures involving learning components. The IEEE Standard for Learning Technology Systems Architecture (LTSA) is such an example.

- Data standards,

  define data models for enabling the interchange of data between different learning systems. They have a data model and an XML binding (IMS, AICC and ADL specifications are of this type).

- Behavioral standards

  define programming interfaces for enabling communication calls between different learning systems. The LTI of IMS is an examples of this type.

- Instructional design standards

  designed to ensure that a product will give satisfactory performance and concern factors of usability, interactivity and learning effectiveness (ASTD, IMS LD).

- Accessibility standards

  related directly to general Web accessibility, particularly for people with disabilities. The initiative is led by the Web Accessibility Initiative (WAI) of WW Consortium.

Digital transformation of learning

- "Digital transformation" is a term that concerns to the technological shift influencing almost everything we do.
- Obviously, this transformation has an important impact on education.
- Educational systems, organizations and institutions should proceed to changes reflecting to the expansion of this transformation.
- ICT evolves from technology provider to service provider, creating that way new opportunities to education.

Digital Transformation – why?

- Digital transformation is already having significant effects on many businesses, and it will inevitably have a deep, pronounced impact on education.
- Technology trends include advances in analytics, artificial intelligence, AR/VR, storage capacities, cloud services and social networks (trends that have applications in education).
- Demands for advanced IT services that could effectively promote improved student *o*utcomes, innovative teaching and learning methods, and groundbreaking research capabilities.
- Digital transformation of learning offers extraordinary opportunities for educational/training institutions to best serve learners and other stakeholders.

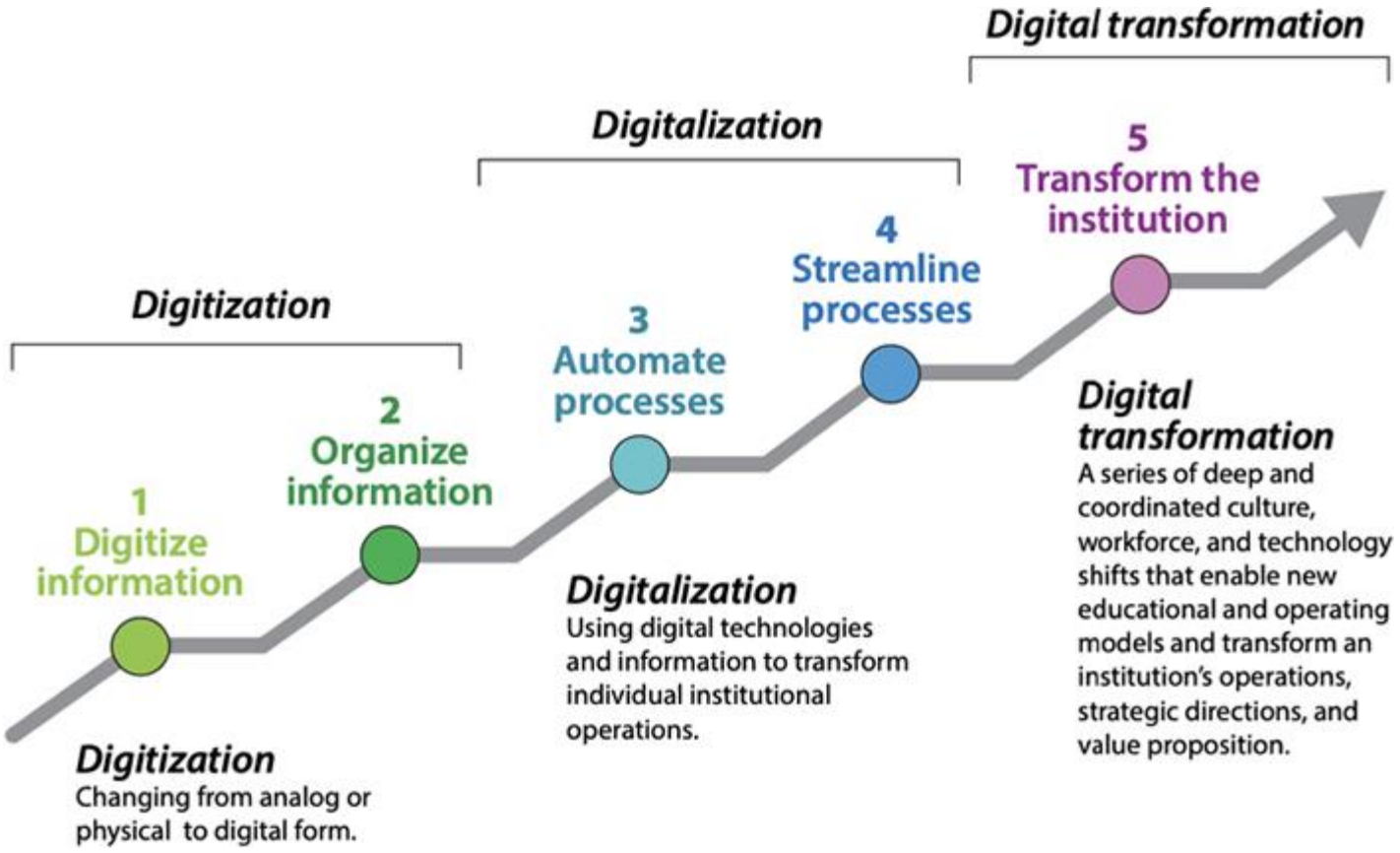
Digital transformation: what are the downsides?

- Digital transformation requires institutions to be more receptive in proactive changes and establish a culture open to wholly new ways of working.
- Also, there are challenges for adequate IT skills at all levels and needs for professional development on facing the rapid changes.
- The academy's traditional resistance to change exacerbates these challenges.
- Institutions that could be helped the most by digital transformation will be most challenged to fund the required innovations.

Digital transformation: Implications

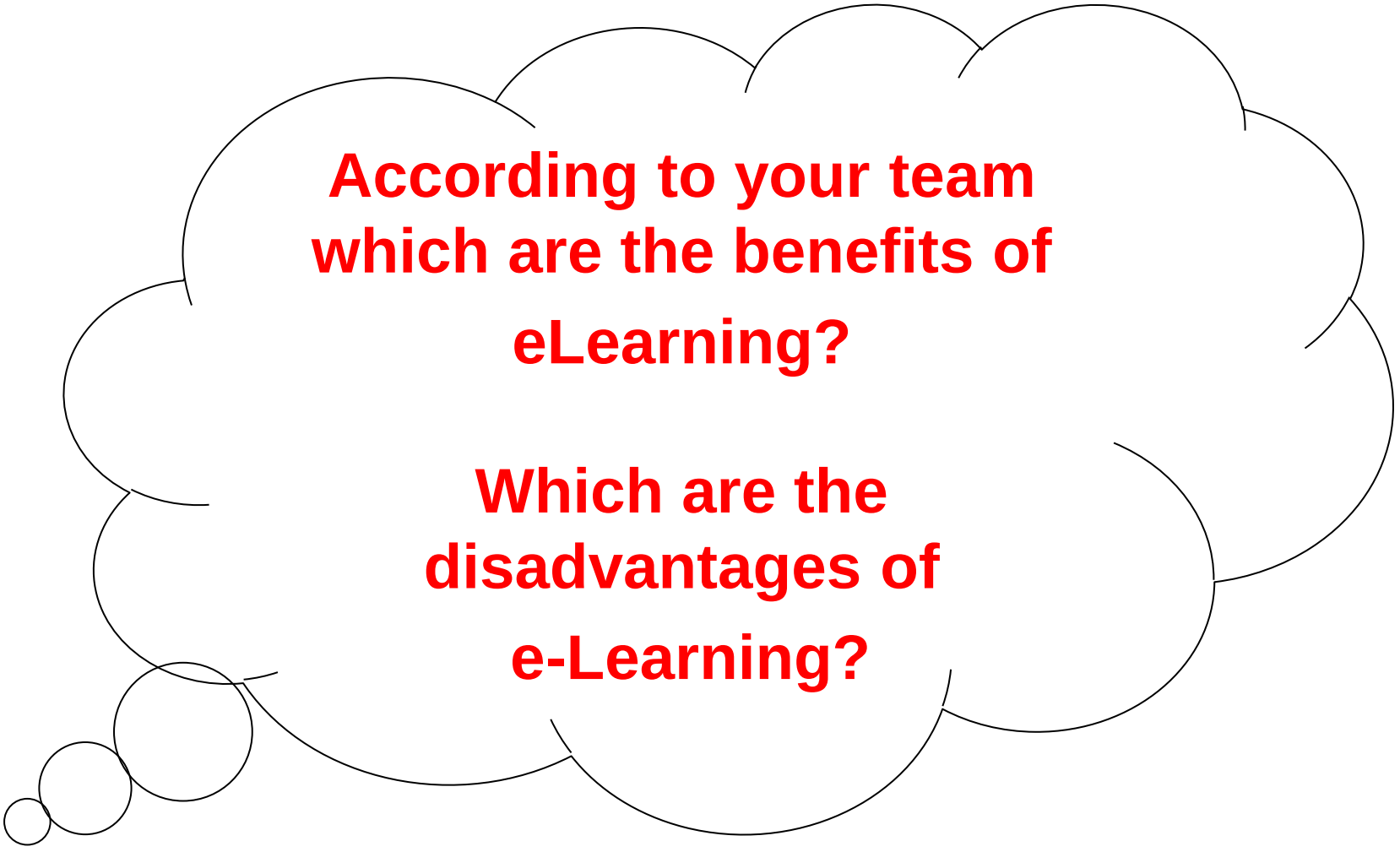
- Facilitates new creative pedagogic strategies.
- Expands the circle of learners, including those who seek new kinds of skills and credentials.
- Offers new horizons to the research with emergence of new fields, new disciplines and new methodologies.
- Give opportunities to institutions to improve their operations and business practices.
- In that sense, digital transformation can be a cornerstone of institutions' strategic vision for a fruitful future.

Digital transformation: 3 Ds



- digitize information
- digitalize processes
- digitally transform educational institutions

Flash Activity



Some benefits

- Use of technology to *enrich classroom*/workplace learning.
- Flexibility, extendibility, accessibility, convenience, availability
- Accommodates *multiple learning styles* using a variety of delivery methods geared to different learners.
- *Collaborative* and exploratory learning environments that *foster greater student interaction and collaboration*.
- Immediate *feedback* (online homework, quiz, test).
- Direct *access* to many other remote *training resources.*
- Enhances computer and Internet skills.
- Easy and *affordable training delivery*.
- Inexpensive *worldwide distribution*.
- Easy and quick content review, update.
- Travel cost and time savings.
- Opportunities for those that could not attend in campus.

Some disadvantages

- Requires *technology infrastructure* which may be not be available.
  - *ICT resources are necessary for eLearning implementation.*
- *Bandwidth limitations* may restrict instructional methodologies and the provision of rich multimedia applications (streaming, downloading). This still holds for some areas.
- Lack of *ICT skills* is a major barrier. Often preparatory training mainly for instructors is necessary.
- Depends on *students' abilities* to be self-directed and internally motivated.
- *Difficulties in teaching*. A good classroom instructor may not be a good online instructor.
- *Time-consuming to guide* (individually) online students.

Some more disadvantages

- Lack of *physical interaction* (body language) and traditional campus facilities (counseling).
- *Student assessment* and feedback is limited. It is rather hard to ensure academic honesty (digital cheating).
- Is *not easy to design and develop* suitable e-courseware on the net (learning theory, formatting of content).
  - *Often e-courses are too static, with little if any interactivity and poor multimedia.*
- Big difference in time zones hinder synchronous teaching.
- e-training has high-fixed *running costs*
  - *provision of access, control usage, technical support and billing -if applicable.*

Criticism to eLearning

- Noam (1995) claimed that providers of an electronic curriculum will be rather commercial firms than universities.
  - *Nowadays, this prediction seems to be true (i.e., publishers)*
- Noble (1998) saw technology as a vehicle for the commercialization of higher education, and the undermining of the autonomy of academics.
- A lot of the criticism of eLearning revealed a claim regarding the superiority of face-to-face education over distance learning (eLearning is impersonal), and an assumption that face-to-face is the only valid form of education.
  - *Much of this criticism came from the United States, which is one of the few major countries not to have a national open university.*
- Also, part of academia is overly critical, seeking reasons to refute every technology and dismiss any change.

Criticism to eLearning (continued)

- Researchers argued that systemic change in higher education is inevitable because education is mature for disruption, and eLearning is the means through which such change is realized.
- But there is "the dark side of educational technology":
  - *Privacy issues. Invasive uses of technologies (into education also), which highlights the importance of developing an understanding of how data is used (sometimes in in unexpected ways).*
  - *Illegal social and political uses or connections of educational technology either technology designed for education specifically or co-opted into educational purposes (software to identify persons, algorithms that reinforce bias etc.).*
  - *Indications that online technologies lead to increasingly extreme and divided groups (algorithmic filters and fakes news that grow conspiracy theories and fuel distrust).*

Learning technology specialist

- The past few years have seen the birth of a new type of professional especially in tertiary education:

  the Educational Technology Specialist.

- The term learning technologist has been used to describe staff involved with any of the functions and *activities associated* with the embedding, development and support of *learning technologies or eLearning*.

- Learning technologists have a unique role to play in bringing together the *technical and the educational* to underpin and drive the development of e-learning mainly in higher education.

- There is no doubt that this *new role* has become as embedded in the business of higher education as that of lecturer or librarian.

What learning technologist expect to work with?

- Student Information Systems
- Virtual Learning Environments (VLEs) –LMS, PLEs etc.
- Computer Assisted Learning (CAL) or Computer Based Learning (CBL) environments.
- Creating enriched educational material.
- Presentation technologies (digital projectors and interactive whiteboards).
- Virtual libraries and digital learning material collections.
- Online assessment or Computer assisted assessment.
- Computer Mediated Communication (email, chats, forums).
- Audioconferencing and Videoconferencing
- Security (AAI, SSO).

Thank you for your attention

Questions?