

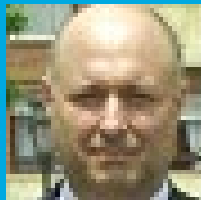


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Navigating ICT and Multimedia Education: The Future is here

INDUSTRIALES
ETSII | UPM



J. Ordieres-Meré
25/09/2024



Joaquín Ordieres:

- **Spanish Full Professor**, working for three different Universities. From 2009 in the “**Universidad Politécnica de Madrid**”.

- **Visiting professor** in six different institutions, INRIA(F), ESTI(F), University of Iowa(USA), Beijing Institute of Technology (CN) and École Polytechnique (F), DTU (DK).

- **Involved** in more than 15 European funded research projects and more than 100 private technology contracts.

- **Coauthor** of more than 150 research papers, 20 books.

- **Coauthor** of more than 10 patents.

- **Advisor** of more than 25 PhD thesis.

- **Interested** in *Improving industrial processes by using data based models, Process Optimization, Data Mining, Business Intelligence & Machine Learning. Project Management, Business Process Modelling, PPPM.*

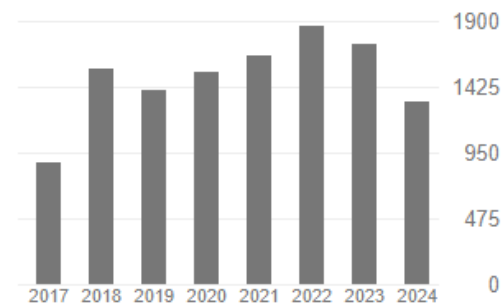
=> Industrial Management



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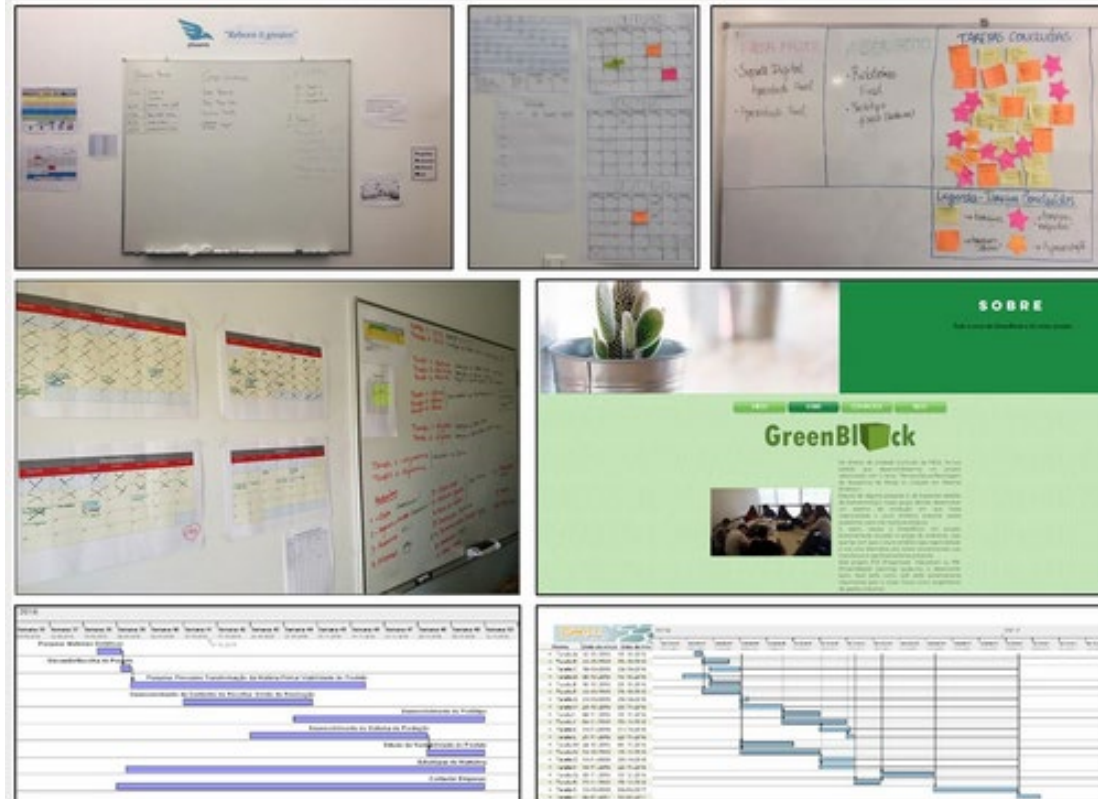
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Outline:

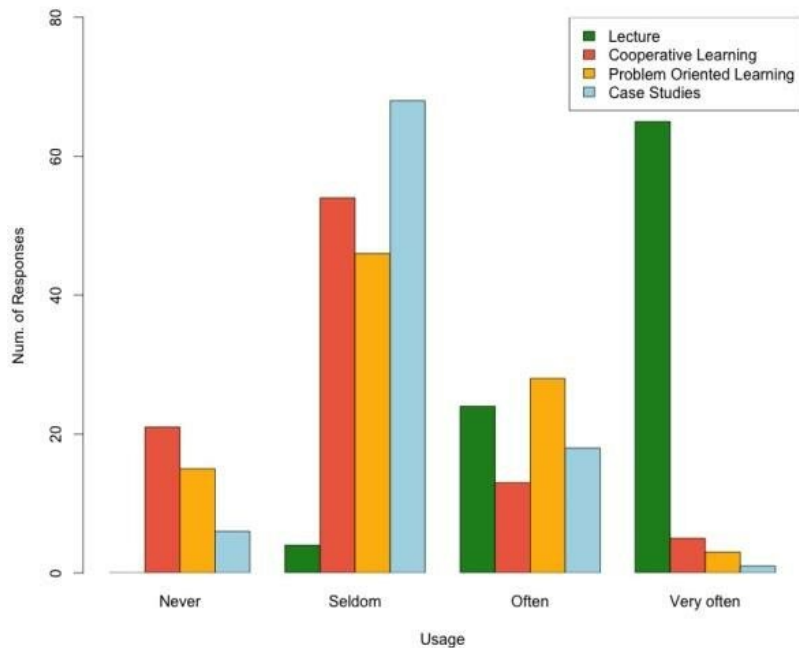
- **Context**
- **Societal changes**
- **Workshop needs**
- **Emerging approaches**
- **Full redesign of the learning approach**
- **EELISA initiatives (EU framed)**
- **Conclusions**

How do we teach?

- *Lecture methods*
- *Demonstration methods*
- *Team teaching methods*
- *Individualized instruction*



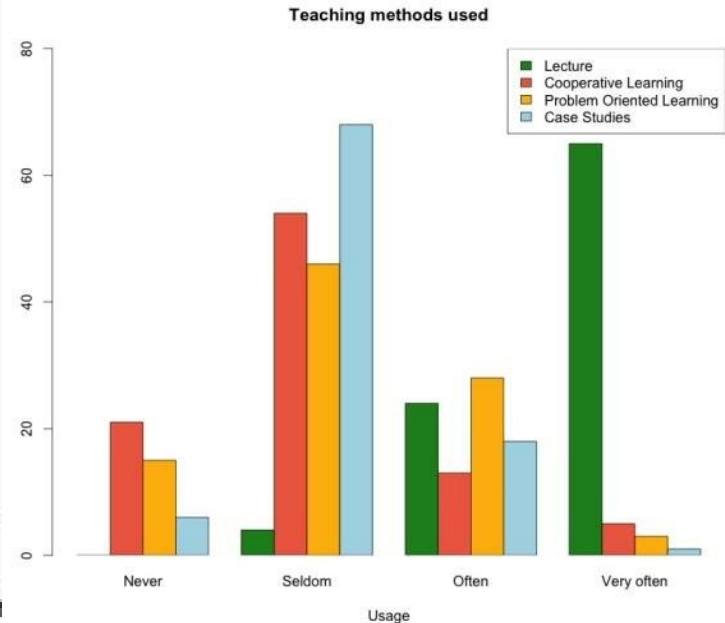
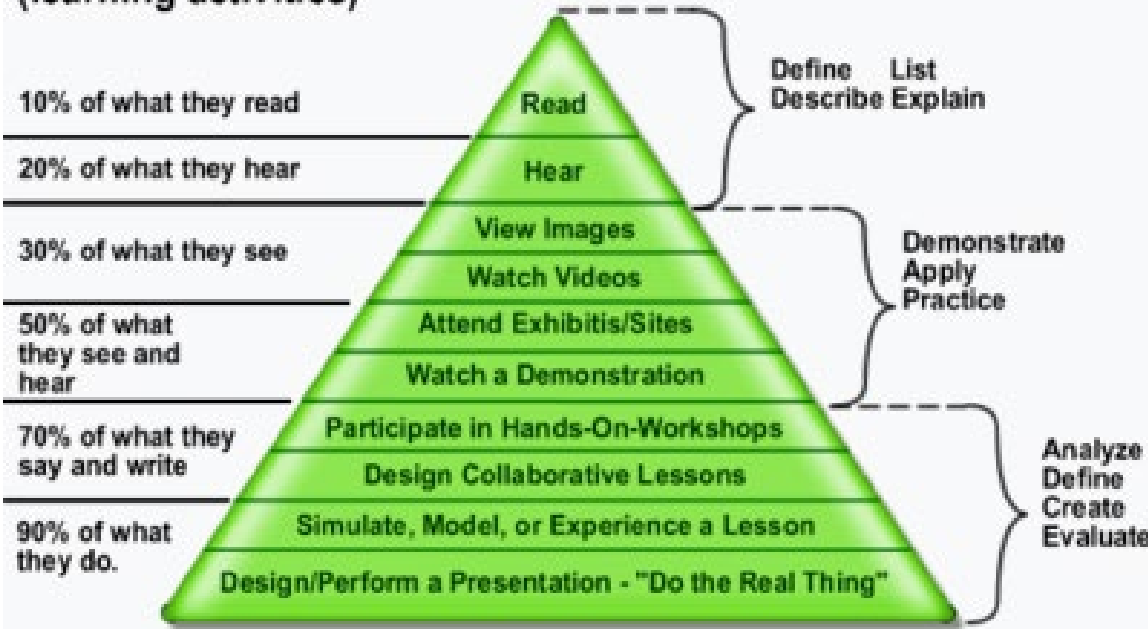
Teaching methods used



How do we teach?

People generally remember...
(learning activities)

People are able to...
(learning outcomes)

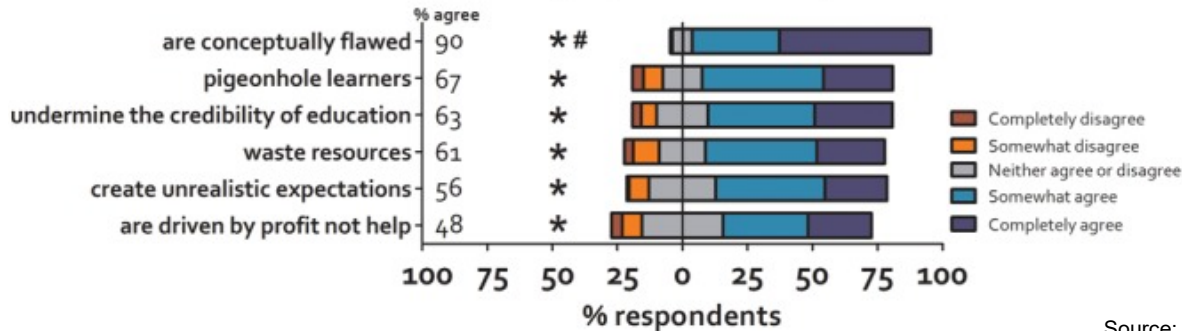


Two main outcomes:

- Watching videos is more effective than attending lectures.
- "Do the real things" is the most effective learning technique.

Most scholars keep the focus on theoretical principles.

We should not use Learning Styles because they



Source: Published online 2017 Mar 27. doi: [10.3389/fpsyg.2017.00444](https://doi.org/10.3389/fpsyg.2017.00444)

Source: <https://www.sciencedirect.com/science/article/pii/S2666374023000298>

The Transfer-Acquisition conceptualization of learning:

Learning is the transfer of knowledge from authoritative sources into the minds of learners.

94.72% of STEM professor data

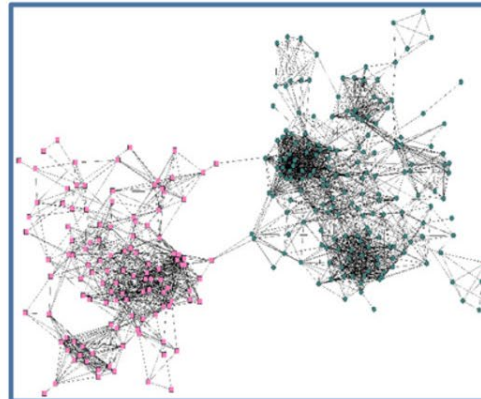
Conceptual Metaphor: Acquisition and Object Manipulation

Conceptual Story: Object Possession

Worldview: Individualist-Competition

Paradigm: Positivist, Post-Positivist

Critical Pedagogy: This conceptualization inhibits learner agency, empowerment, and justice.



Conceptualizations of learning are complex conceptual systems in which numerous interdependent ideas interact, leading to unique sets of emergent practices.

The Construction-Becoming conceptualization of learning:

Learning is a process of becoming and simultaneously a process of knowledge construction.

93.58% of learning scientist data

Conceptual Metaphor: Construction, Becoming, and Apprenticeship

Conceptual Story: Situated Becoming

Worldview: Collaborative-Cooperative

Paradigm: Interpretivist-Constructivist

Critical Pedagogy: This conceptualization fosters learner agency, empowerment, and justice.

Summary: main outcomes

- *Too much focus on “Transfer-Acquisition of Knowledge” in learning processes.*
- *Lower attention to the different Learning Styles than expected.*
- *In some places the business model is driven by “lectures” given.*
- *Too much focus on abstracted exercises not very closely formulated like the real ones as basis for proof of competency.*
- *Limited space to promote innovative thinking & practices, with limited reward approach.*

Fatcs facing workshop

- *There is a need for development and implementation of system solutions for optimizing, managing and diagnosing complex manufacturing industrial facilities.*
- *And for managing complex socio-technical systems, facing new social concerns.*



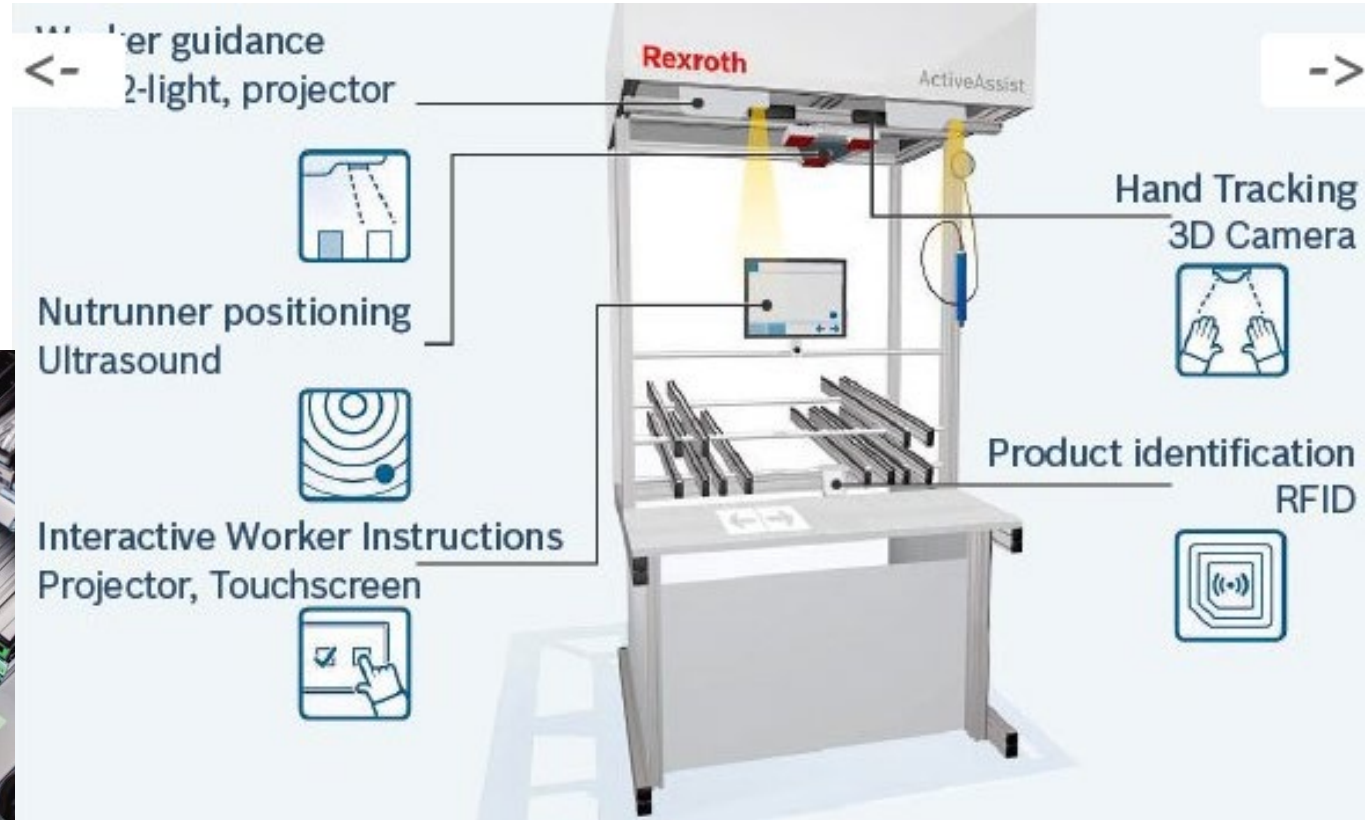
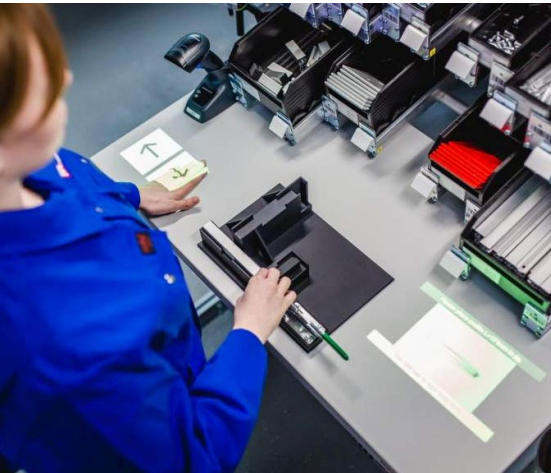
Knowledge

Is a critical point to increase and to sustain productivity.

Design of the working place and helpers have been considered.



Design of the place and helpers are considered.



It does include digital helpers & QC tools & validations, but it also automatize the performance measurements in a digital way.

New workforce attributes

GENERATIONS IN THE MODERN WORKPLACE



STEREOTYPES

Out of Touch & Disinterested in Learning New Things

STRENGTHS

- Characterized as being workaholics who relish long weeks and overtime. They are more committed to their roles than any other generation
- Considered good team players with 53% of organizations saying they work well with others
- Regarded as making excellent mentors to their colleagues and juniors



STEREOTYPES

Cynical & Poor Team Members

STRENGTHS

- 70% of organizations believe Gen X are the best overall workers
- Committed to juggling work with family time, and favor work-life balance
- Gen X is considered to be the biggest revenue generators overall



STEREOTYPES

Cynical, Poor Team Members & Too Confident

STRENGTHS

- Highly adaptive: Unique ability to think abstractly and find new solutions.
- Team Players: Can interpret, translate, and relate to just about anybody, and can quickly adjust to different points of view.
- Coachable: Have strong opinions but tend to be less vocal than Millennials, so coaching is an effective way to leverage their unique point of view.



STEREOTYPES

Entitled & Lazy

STRENGTHS

- Of all generations currently in the workforce, considered the most independent workers
- Concerned with ethics and the social responsibility of the organization they work for
- Grown up sourcing information, they need to be left to create their own processes rather than being told exactly what to do



STEREOTYPES

More Cynical & No Loyalty

STRENGTHS

- The most tech competent of any generation, able to pick on developments quicker than other employees
- Natural entrepreneurs, with 72% wanting to start their own business
- Described as the "always on" generation, able to multi-task unlike any other generation using up to 5 screens at once

New workforce challenges

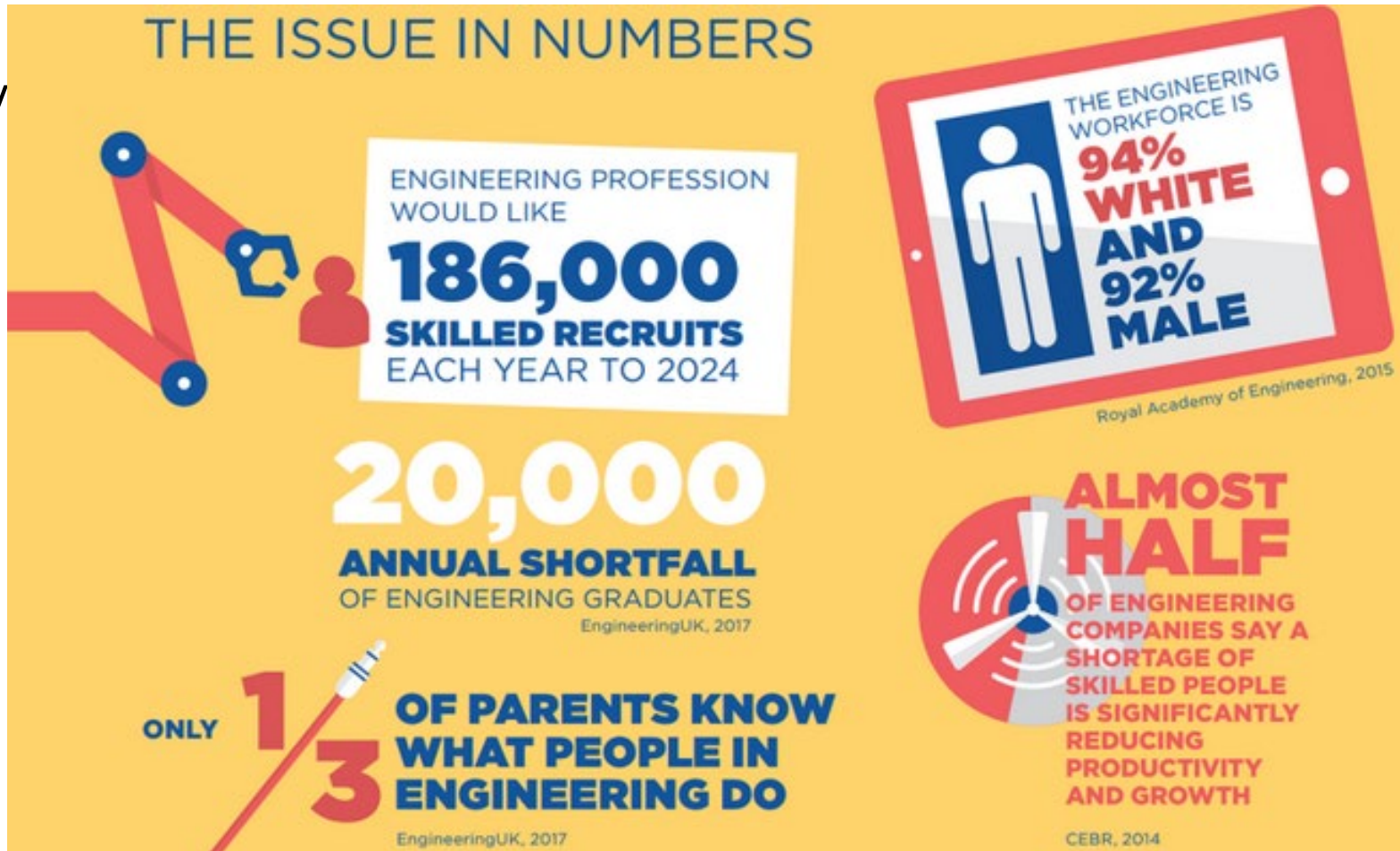
Sustainability

Circular Economy

Digital Transform.

Innovation

Entrepreneurship



Regarding communication, technology (AR/VR) arrives to improve operator's and management guidance:



We have learnt:

- Relevance of Manufacturing for social evolution
- I4.0 improvements for direct machine production
- Challenge when part assembly is considered
- Digital solutions help people in assembly lines
- QC can be further improved by smart devices
- Higher levels of communication and intelligence are required enabling change management.

The question is, while AR technology and LLMs have significantly enhanced human-machine interfaces with transformative potential, how is this impact being felt in higher education? Do we consider new gens needs?

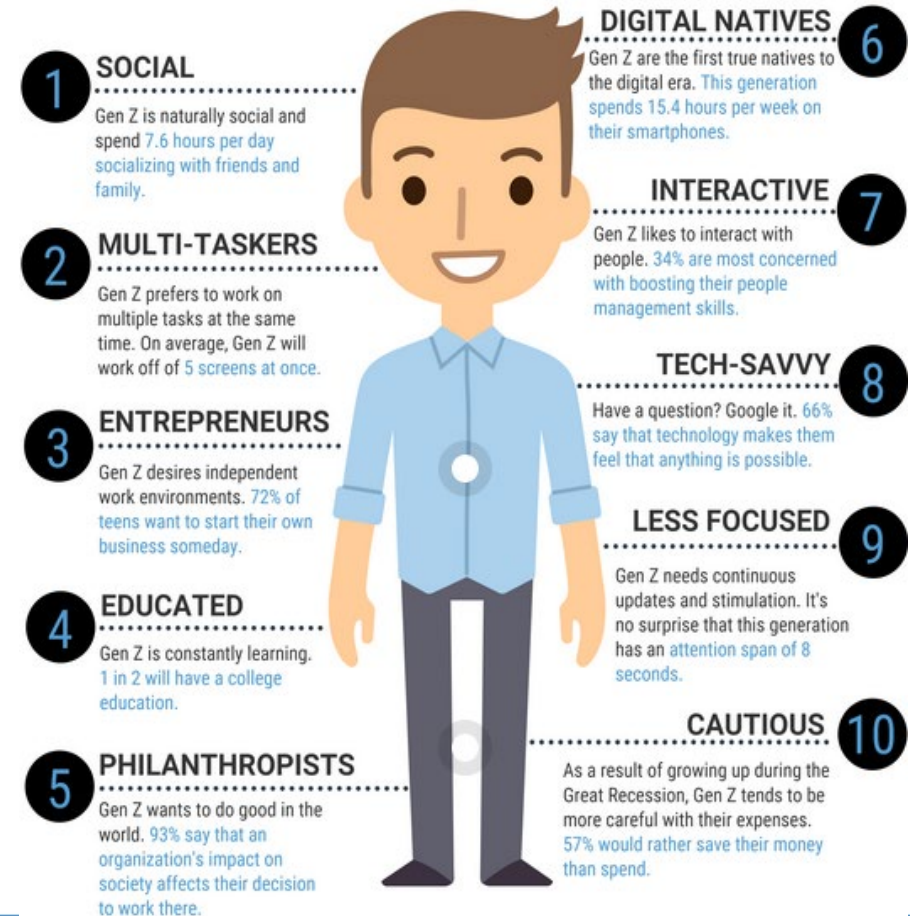


Relevant Dimensions:

- Technology evolved fast in many different fields.
- Labor market involves quickly technological improvements (AI, VR/AR, etc.).
- Different generations have specific mindsets and values.
- Indeed, they have their own learning style (Zs are tech-savy, interactive, less focused, ...)

GENERATION Z

The Next Generation





Challenges to face:



U.S. businesses spend over \$160 billion annually on employee learning and training.



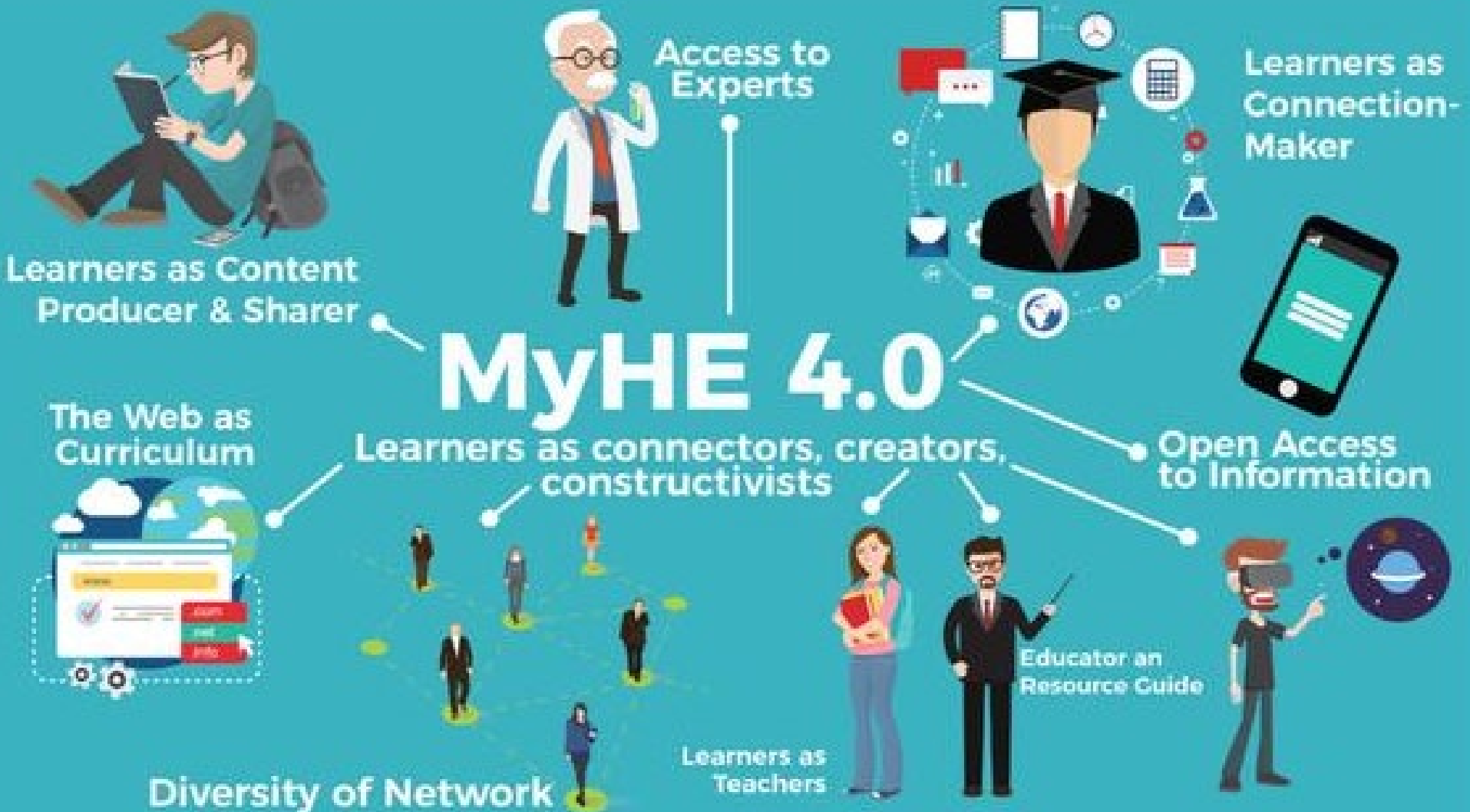
90% of what we learn is forgotten within 30 days.



Employees are interrupted – on average – every 3 minutes.



Classroom-based learning is failing businesses because it covers only about 10-20% of what someone actually needs to do their job.

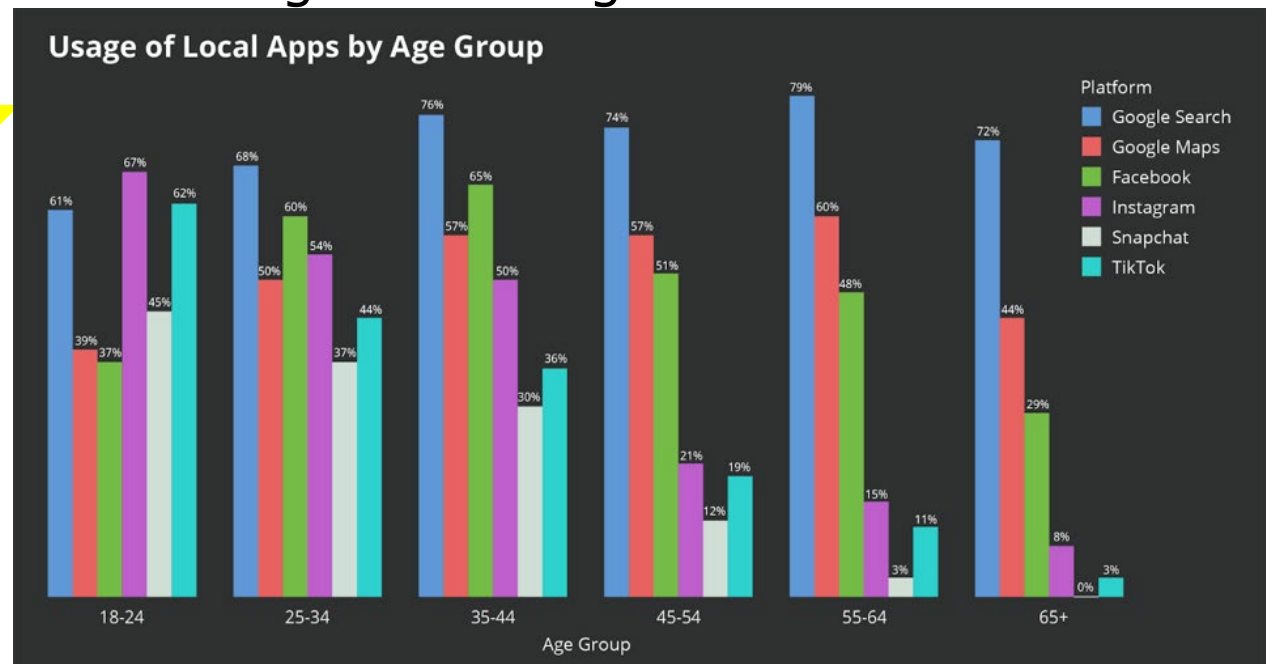


Demands:

- Zs find content asynchronously and at high speed (videos at 1.5 ~2X), where short duration is preferred.
- Zs aim to learn practical things and being able to test them by themselves.
- Zs have shifted from Google to Instagram and **TikTok** as search engines

New design of learning is required.


VET education is key to make the change.





Good tool. Well spread around Europe. Indeed, **it needs YOUR push and transformative willingness.**

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European Universities initiative

Transnational alliances of higher education institutions, paving the way towards the universities of the future.

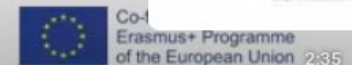
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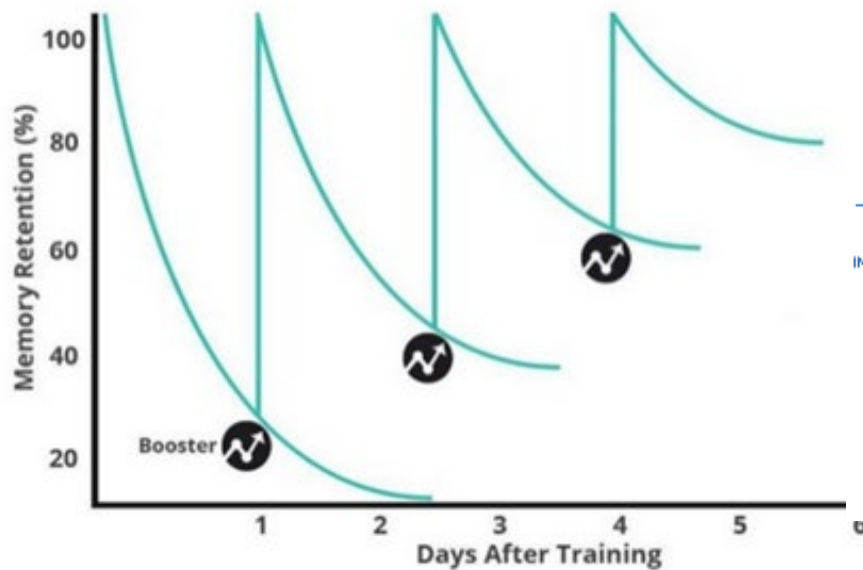
Thinking in terms of Milenial / Z gens

- Focus on **microlearning** for concepts.
- Become much more visual and dynamic (short video pills).
- Create a Graph of Knowledge with living relationships and hierarchical concepts.
- Increase the focus for practical assignments: **"I learn better what I do"**



Thinking in terms of Milenial / Z gens

- Focus on microlearning for concepts.



There are 11 major types of microlearning you can choose from, including:



The improvement that microlearning has in the retention of information over traditional training

22%

(Dresden University Study)



Thinking in terms of Milenial / Z gens

- Focus on microlearning AND VISUAL short explanation of KEY

CONCEPTS

Using AI it does take 15 mins to create a short video explaining such concept:

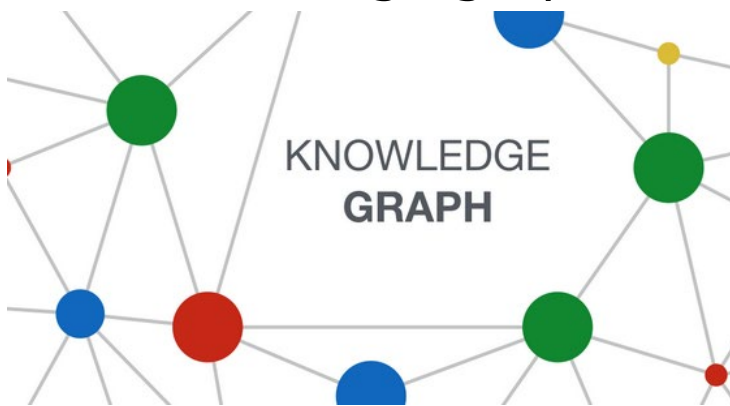
- a) Use a LLM model to prototype a script scenes for one minute time of explanation.
- b) Generate the images or videos to support the content.
- c) Include yourself as an avatar in the interesting language



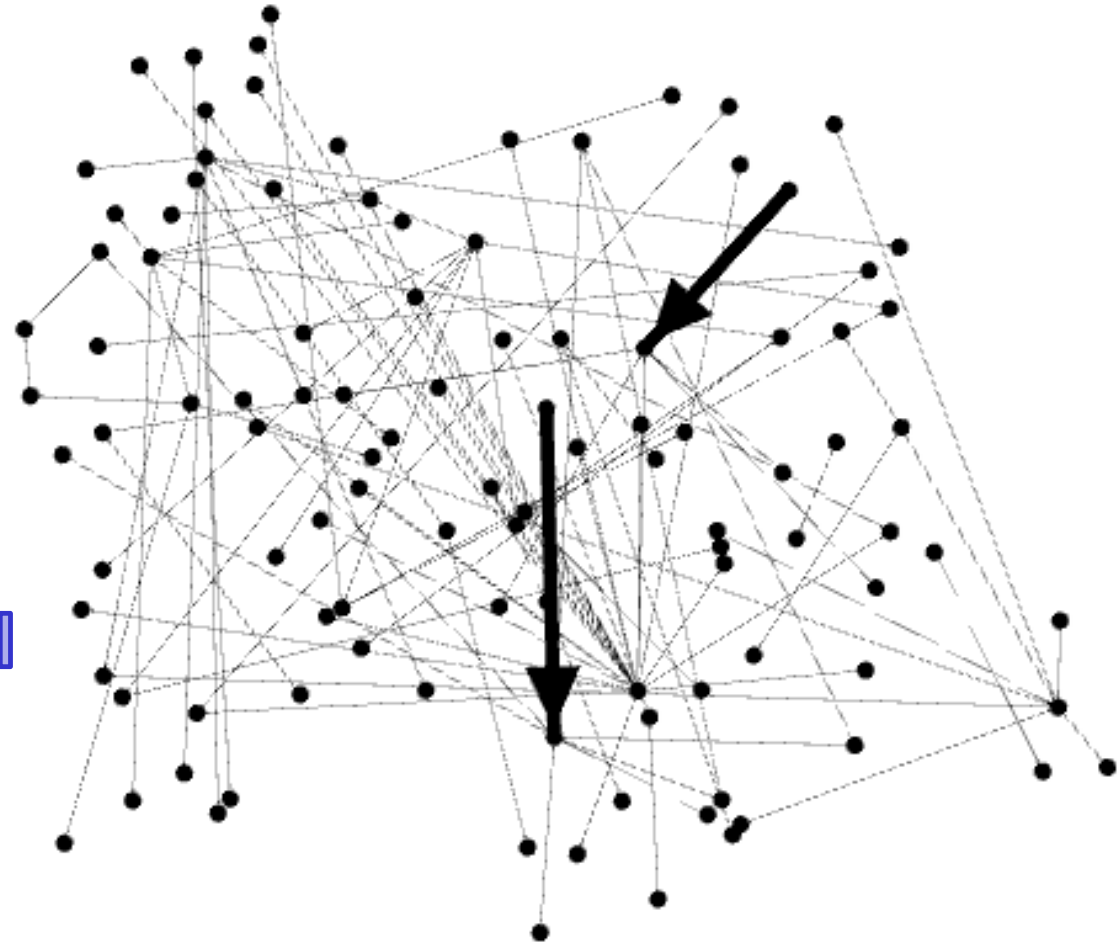
Visual pills for theoretical background are easier to create than ever.

Thinking in terms of Milenial / Z gens

- Knowledge graph.



Gamification
becomes very useful
to measure learning
achievements



Thinking in terms of Milenial / Z gens

Practical assignments.

Once you unlink theoretical content learning from the lecture, there are different options:

- a) Flipped classroom + Gamification.
- b) Individual and incremental assignments requesting to realize effects linked to theoretical content.
- c) Group projects requiring combination of concepts with higher level of integration in several classes. *Example of TBDA and smart socks for MS gait monitoring.*

This approach significantly increase the value for learners, and they use to appreciate the learning process.

Faleminderit shume per vemendjen tuaj

Hvala vam puno na pažnji

Thank you very much for your attention

Много вам хвала на пажњи

Muchas gracias por su atención