The Learning Context

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The Learning Context

- AI Does Not Operate in a Vacuum – "learning analytics needs to build on and better connect with the existing body of research knowledge about learning and teaching."

- Key Questions Include:
  - What are we trying to do
  - What are we trying to measure or predict?
  - Who is involved?

The Learning Context

- Theory
- Objectives
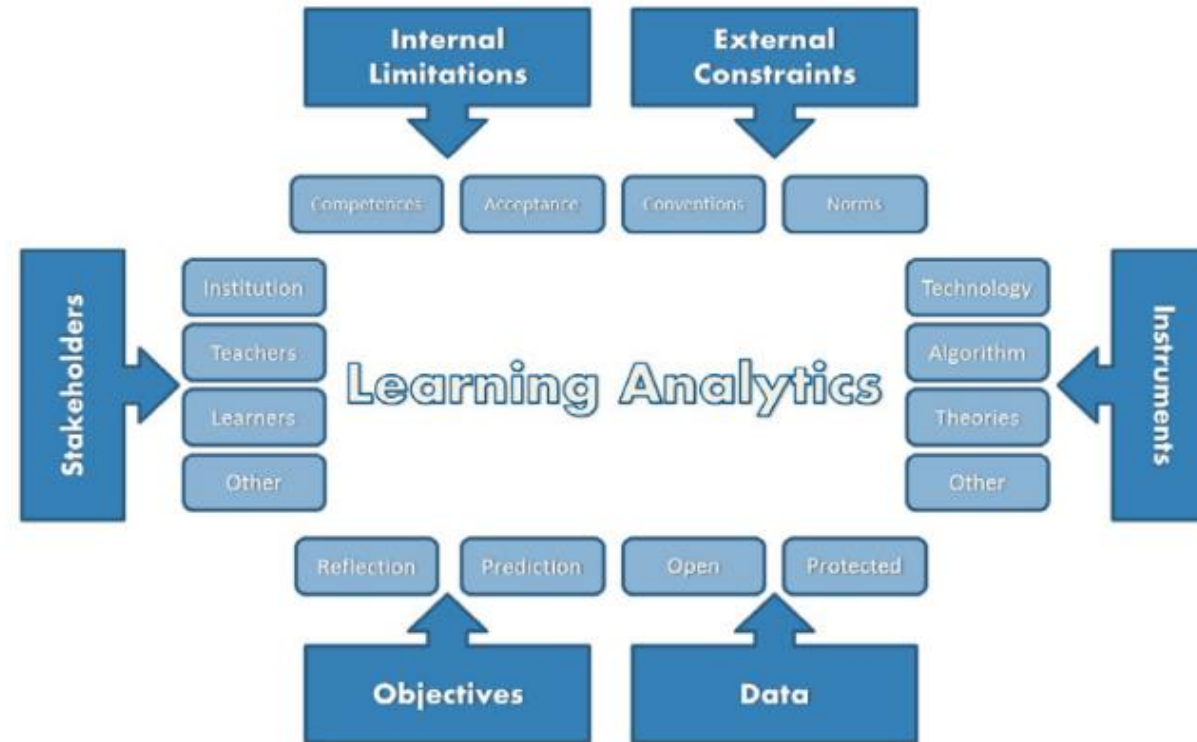- Stakeholders
- Constraints

Figure 2. Learning Analytics Dramework (Greller and Drachsler, 2012)

"Starts with framework provided by Greller and Drachsler (2012). This pedagogical model contains six dimensions: competences, constraints, method, objectives (distinguishing between reflection and prediction), data, and stakeholders." (Seufert, et.al., 2019).
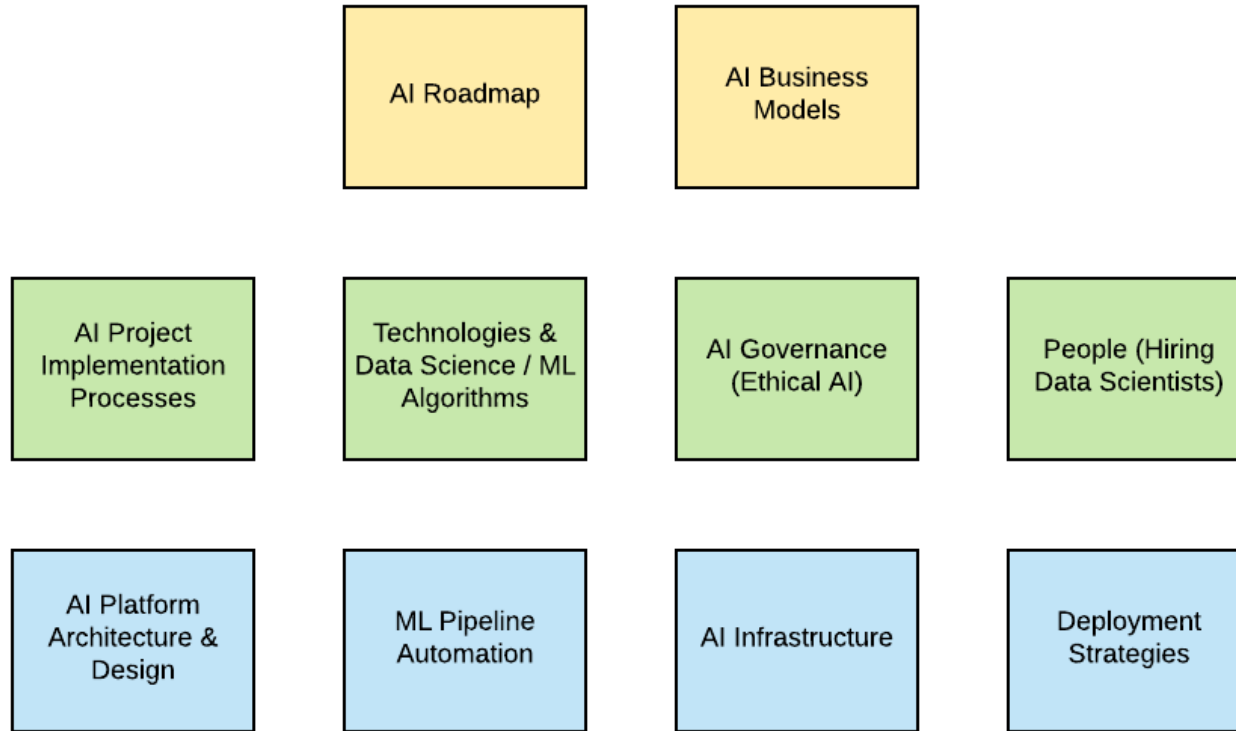
Stakeholders

Responsibility for AI

"Complicity here means that the responsibility for AI is shared by individuals involved in its development and deployment, regardless of their particular intentions, simply because they know enough about the potential harms." (Zimmerman, et.al., 2020)

Joshua Kroll: "While structural inscrutability frustrates users and oversight entities, system creators and operators always determine that the technologies they deploy are fit for certain uses, making no system wholly inscrutable."

EMBED RESPONSIBILITY

Workforce & Talent

Technology & Data Architecture

Operating Model

GOVERN
Governance, Accountability
Create an internal governance framework and processes, anchored to industry and societal shared values, regulations, ethical guardrails and accountability. Promote clarity around decisions.

DESIGN
Honesty, Transparency, Fairness
Architect and deploy AI with trust (e.g., privacy, transparency and security) by design built in and build systems that lead to "explainable" AI. Empower project teams to understand and address bias issues.

MONITOR
Security, Monitoring
Monitor and audit the performance of AI against key value-driven metrics, including with respect to algorithmic accountability, bias, cybersecurity.

ESTABLISH TRUST

Chief AI Officer

Chief AI Officer Responsibilities

Boxes shown:
- AI Roadmap
- AI Business Models
- AI Project Implementation Processes
- Technologies & Data Science / ML Algorithms
- AI Governance (Ethical AI)
- People (Hiring Data Scientists)
- AI Platform Architecture & Design
- ML Pipeline Automation
- AI Infrastructure
- Deployment Strategies

"AI governance (ethical AI), automation of AI/ML pipeline, infrastructure management vis-a-vis usage of cloud services, unique project implementation methodologies etc."

https://vitalflux.com/job-description-chief-artificial-intelligence-officer/

Stakeholder	Objectives	Examples
Learners	Enhance their performance. Personalize online learning. Recommend courses.	Students are informed about learning process and compare their performance with others. Starting large assignments earlier and ask questions using applications like Signals (Arnold & Pistilli, 2012).
Instructors	Enhance their teaching methods. Provide real-time feedback to students.	Monitoring learning progress of the students using applications like SNAPP (Bakharia & Dawson, 2011).
Researchers	Evaluate courses. Improve courses models. Discover new methods of delivering educational information.	Through visualizations, course researchers can compare Learning Analytics techniques to be able to recommend the persuasive one.
Educational Institutions	Support decision processes to achieve higher educational goals.	Increase retention rate. Monitor higher educational perspective goal by increasing retention rate, using applications like Signals and C4S (Jackson & Read, 2012).

Table 1: Learning Analytics Stakeholders

Mohammad Khalil, Martin Ebner, 2015. Learning Analytics: Principles and Constraints
https://www.researchgate.net/publication/278940599_Learning_Analytics_Principles_and_Constraints

Data Subjects, Data Clients

- Data subjects: a group of learners Data clients: Teachers, tutors, discussion moderators (Seufert, et.al., 2019)

- GDPR:
  - Data subjects—those for whom GDPR was written to protect
  - Data controllers—those that make the decisions about personal data processing
  - Data processors—those to whom controllers have outsourced processing activities

Sheila Jambekar, 2017-10-04, GDPR: Data Subjects, Controllers and Processors, Oh My!
https://www.twilio.com/blog/2017/10/gdpr-data-subjects-controllers-processors.html

Stakeholder Issues

The prioritization of, say, institutional stakeholders may lead to undesirable outcomes. (Jaschik, 2016)

https://theconversation.com/why-suspending-or-expelling-students-often-does-more-harm-than-good-93279

Zeide (2019) writes, "the president of Mount St. Mary's University, in Maryland, administered a predictive analytics test to see which students were most at risk of failing. The idea was to encourage them to drop out before the university was required to report its enrollment numbers to the federal government, thereby creating better retention numbers and improving its rankings."

Multistakeholder Collaboration

"Encouraging or requiring that designers and users of AI systems consult relevant stakeholder groups while developing and managing the use of AI applications." (Fjeld, et.al., 2020:58)

- Can be a tool-specific or general policy vision
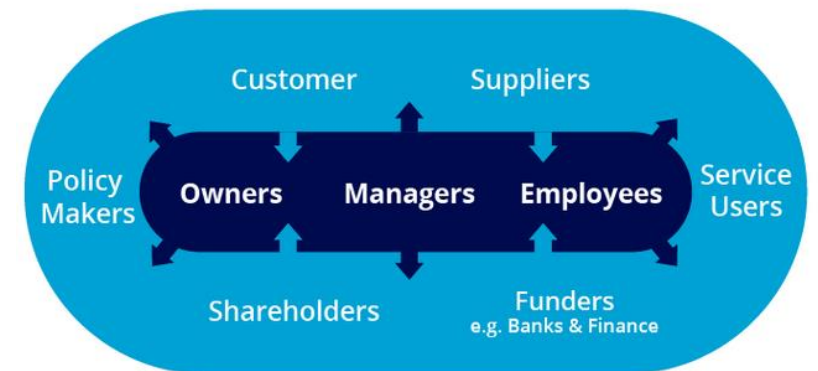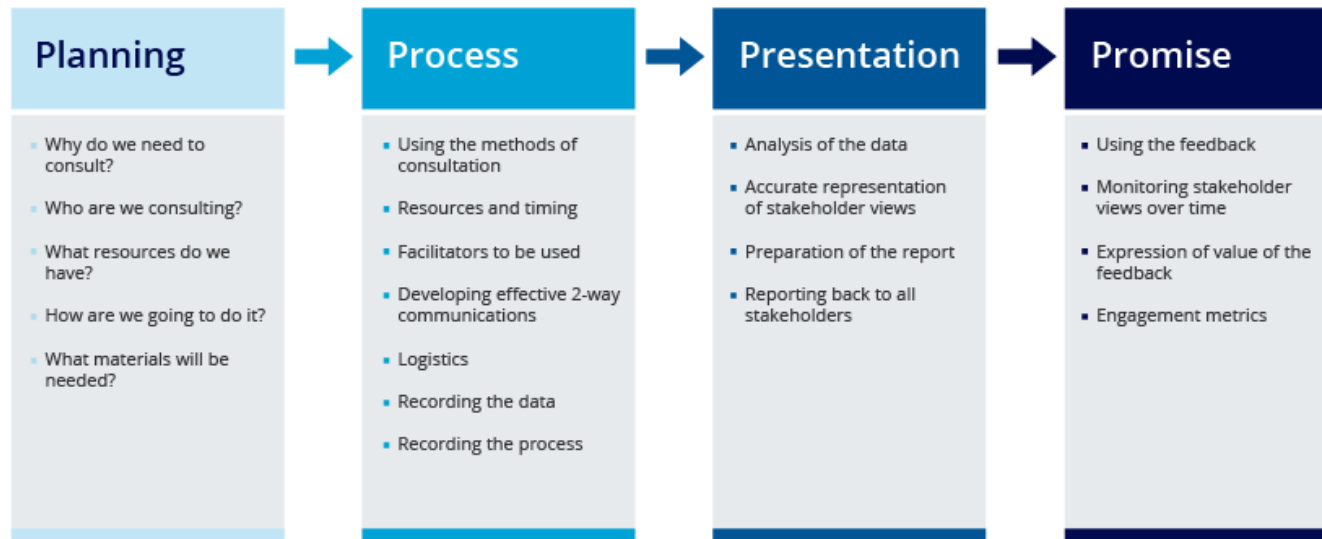
Levels of Analysis

- s
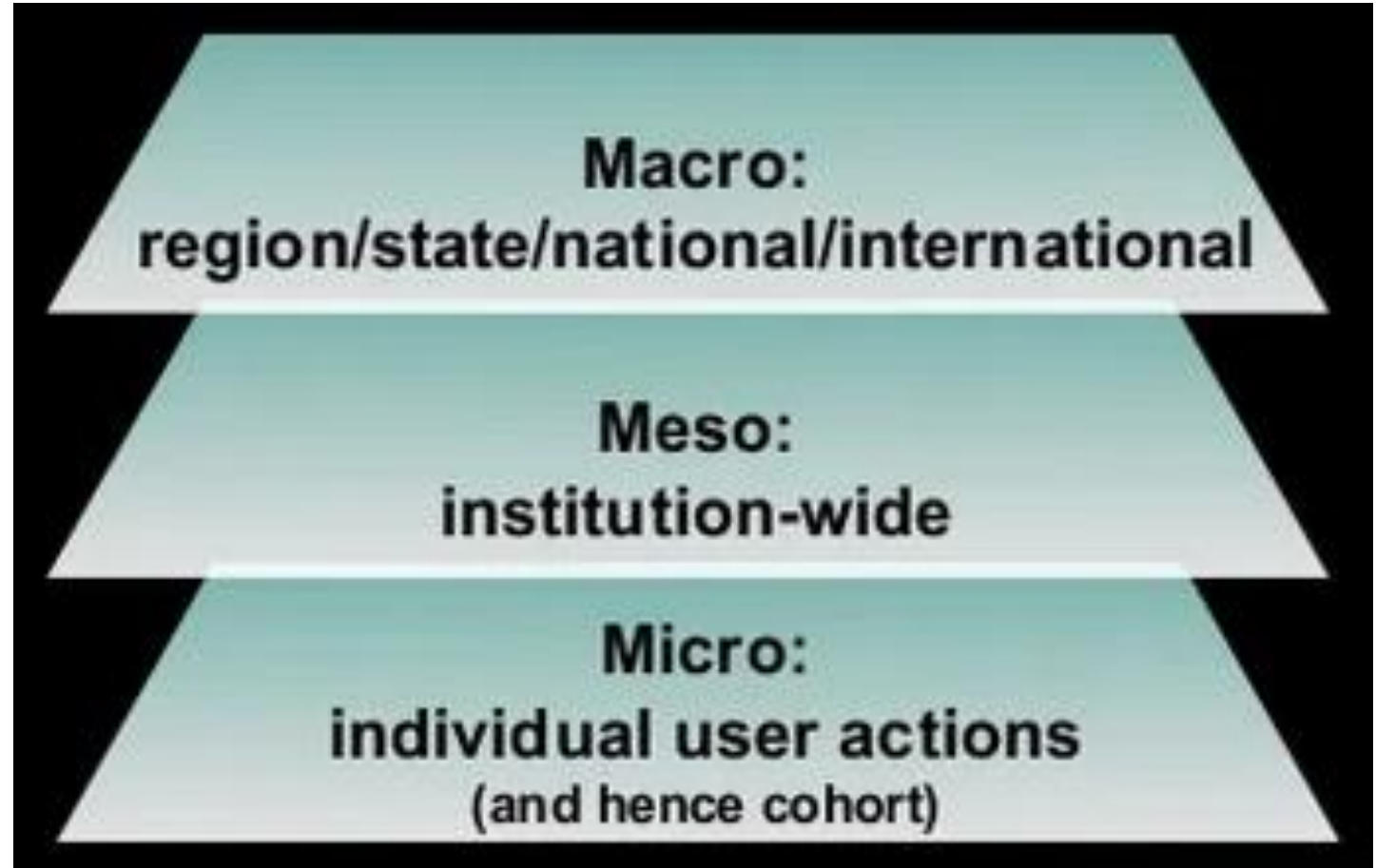
Simon Buckingham Shim, 2012
https://www.slideshare.net/sbs/our-learning-analytics-are-our-pedagogy

Macro:
region/state/national/international

Meso:
institution-wide

Micro:
individual user actions
(and hence cohort)

Different Uses, Different Users

- Lust et al. (2013) – Four groups of users:
    i.   no-users, low level adoption of any tool in the LMS suggested to them in the course design (e.g., quizzes, web lectures, and discussion forums);
    ii. intensive active learners – used all tools suggested by the course design and used those tools actively;
    iii. selective users – only used a selected number of tools offered to them;
    iv. intensive superficial users – used all the tools and spent more time than other groups, predominantly on cognitively passive activities such as reading discussion posts in lieu of contributing to the forum.

Dragan Gašević, Shane Dawson, George Siemens, https://www.sfu.ca/~dgasevic/papers_shared/techtrends2015.pdf
Lust, G., Elen, J., & Clarebout, G. (2013). Students' tool-use within a web enhanced course: Explanatory mechanisms of students' tool-use pattern. Computers in Human Behavior, 29(5), 2013–2021. doi:10.1016/j.chb.2013.03.014

Learning Design Teams

"The 'inclusiveness in design' principle stands for the idea that ethical and rights-respecting AI requires more diverse participation in the development process for AI systems. This principle is expressed in two different ways. The first and more common interpretation calls for diverse AI design teams." (Fjeld, et.al., 2020:52)

Cathy Moore's Action Mapping

Objectives

Broad Objectives

Empowered with education data, stakeholders are better poised to do the following:

- *Increase efficiency:* Ensure that our education systems produce the greatest return on investment possible.

- *Improve system performance:* Inform systemwide management and evaluation decisions

- *Increase transparency:* Shine a light onto the education system to see what works and what does not.

- *Improve student achievement:* Inform all education stakeholders' decisions with quality data to help them make the best decisions to improve every student's achievement.

Simon Buckingham Shum, 2012
https://www.slideshare.net/sbs/our-learning-analytics-are-our-pedagogy

Specific
Is the detail in the information sufficient to pinpoint problems or opportunities? Is the objective sufficiently detailed to measure real world problems and opportunities?

Measurable
Can a quantitative or qualitative attribute be applied to create a metric?

Actionable
Can the information be used to improve performance? If the objective doesn't change behaviour in staff to help them improve performance, there is little point in it!

Relevant
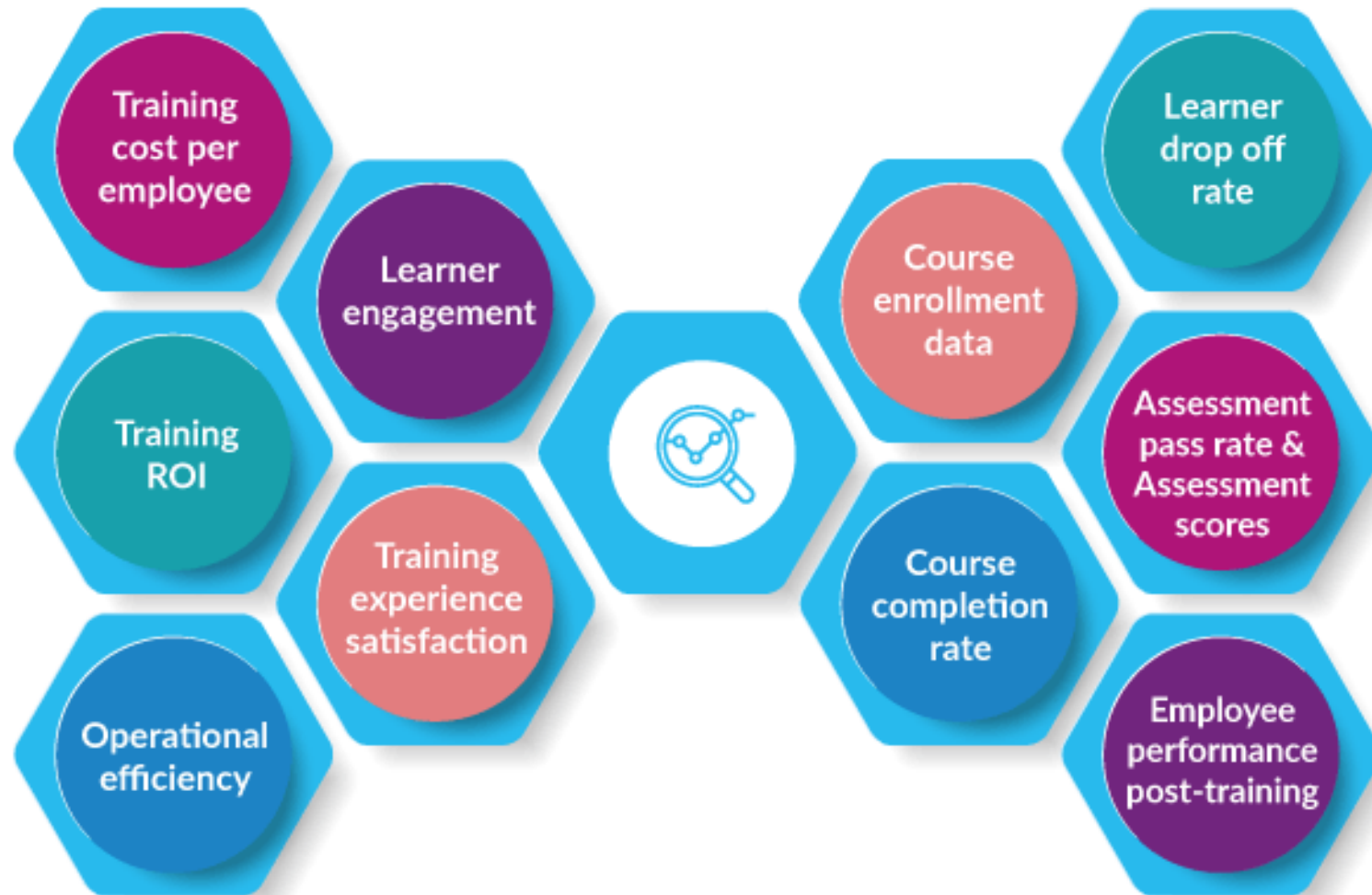Can the information be applied to the specific problem faced by the marketer?

Time-bound
Can the objective be set for different time periods as targets to review against?
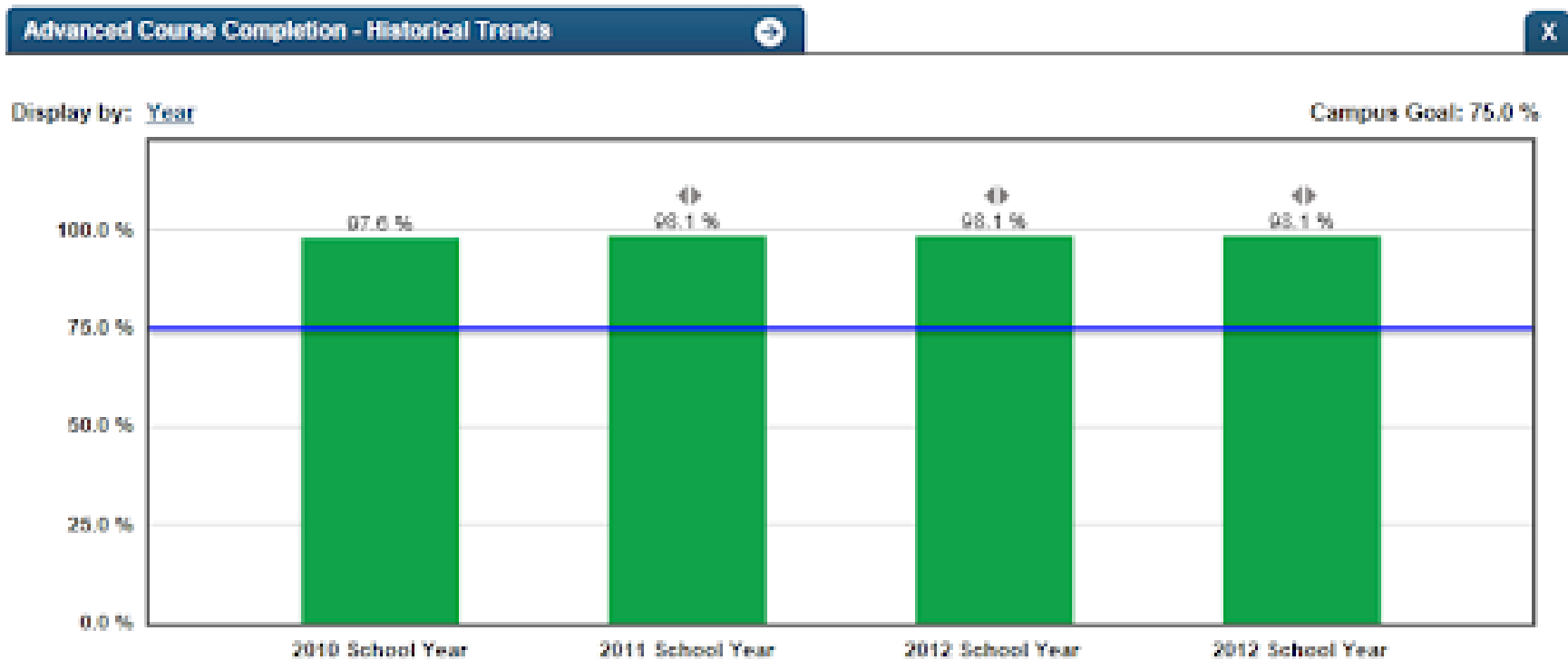
SMART Objectives

https://www.smartinsights.com/goal-setting-evaluation/goals-kpis/define-smart-marketing-objectives/

Metrics

Course Completion

Course completion as a proxy for learning?

Public Good

- Start with public good. "Design usually starts with a 'discovery' period of qualitative research into people's lived experience." (Drew, 2018)

- "Data projects can often start with the data (and well-meaningfully, with the aim for social good).

  - At worst, the process could involve simply playing with a dataset
 - At best, the process would be motivated by a clear public benefit

https://www.un.org/sustainabledevelopment/
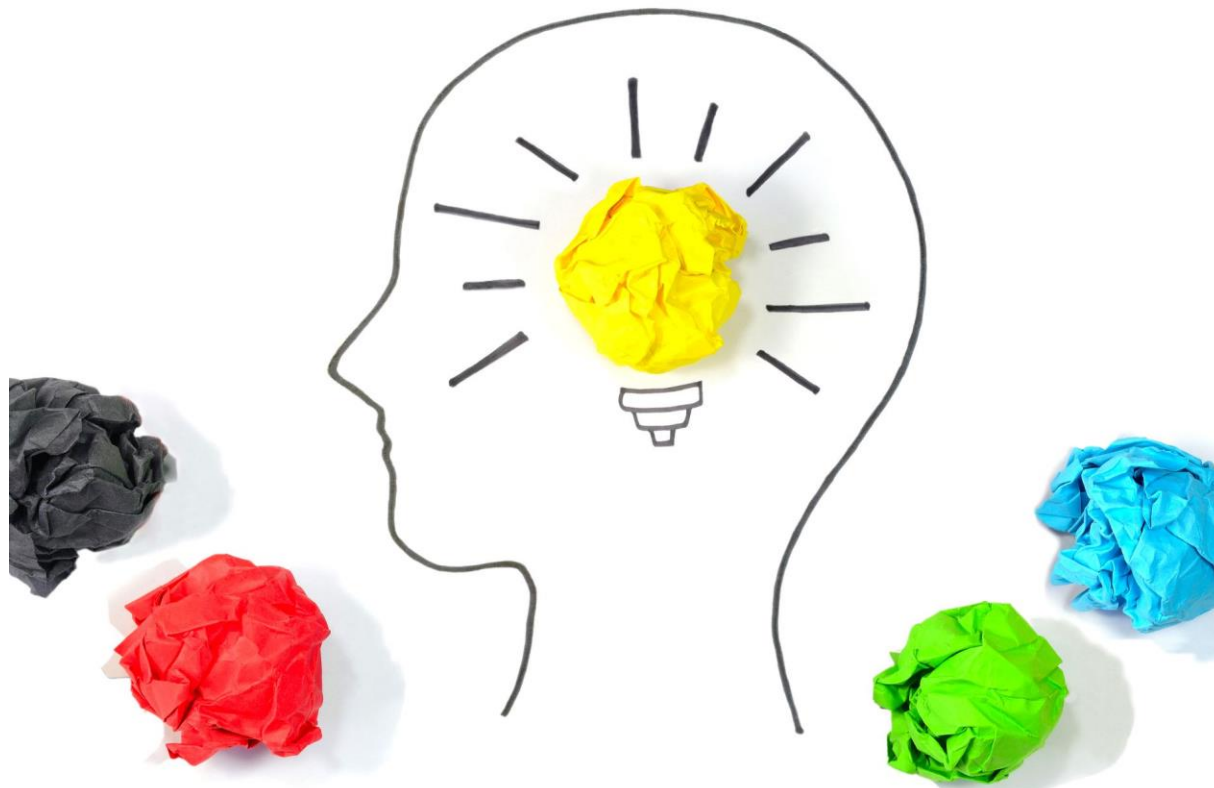
Theory

Pedagogic Theory and Learning Design

- Analogy: teaching to the test rather than teaching to improve understanding
  - "learning analytics that do not promote effective learning and teaching are susceptible to the use of trivial measures such as increased number of log-ins into an LMS"
- Many things are counted, but few have any bearing on theory or practice (Wilson, 1999, p. 250)
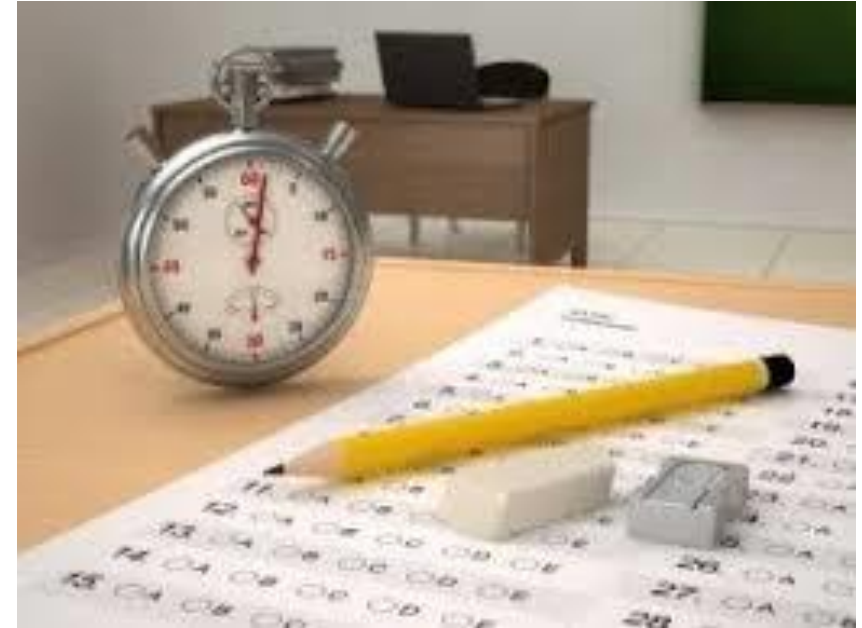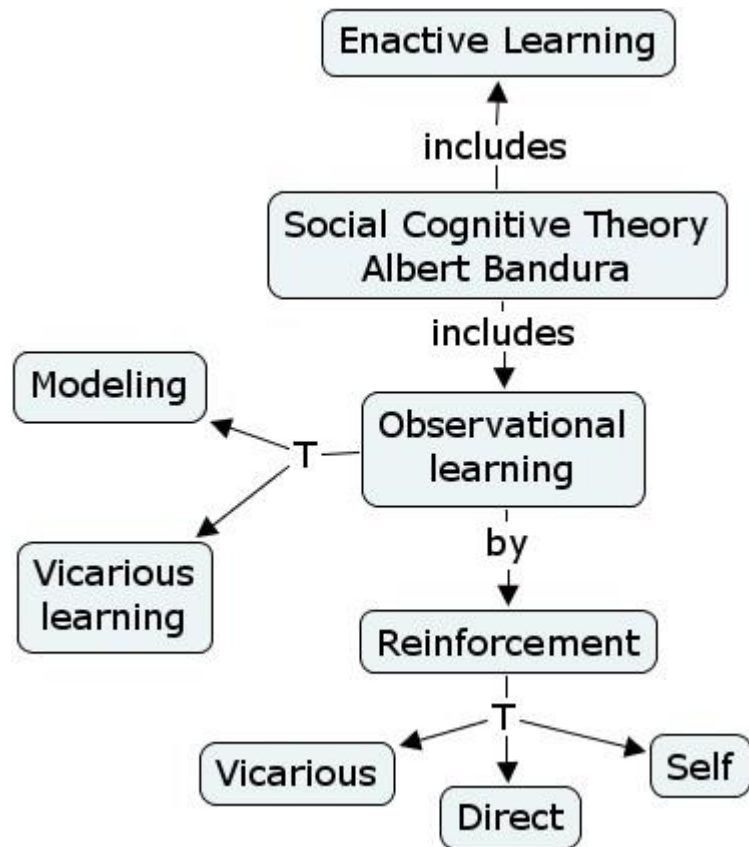
Dragan Gašević, Shane Dawson, George Siemens,
https://www.sfu.ca/~dgasevic/papers_shared/techtrends2015.pdf
https://www.thoughtco.com/definition-of-theory-in-chemistry-605932

The Theory, For Example



- According to a socio-constructivist perspective:

  (1) active participants in a discussion show better learning outcomes, so

  (2) social network analyses of students discussing in a forum are conducted in order to discover effective ways of supporting participatory online learning

- (Seufert, et.al., 2019).

https://www.sfu.ca/~jcnesbit/EDUC220/week9/week9.html

COPES Models

"The model builds on conditions, operations, products, evaluation, and standards learners adopt in order to explain how they construct knowledge. In essence, learners construct knowledge by using (cognitive, digital, and physical) tools to perform operations on raw information in order to create products of learning" Gašević, Dawson, Siemens, 2015

- Conditions
- Operations
- Products
- Evaluation
- Standards
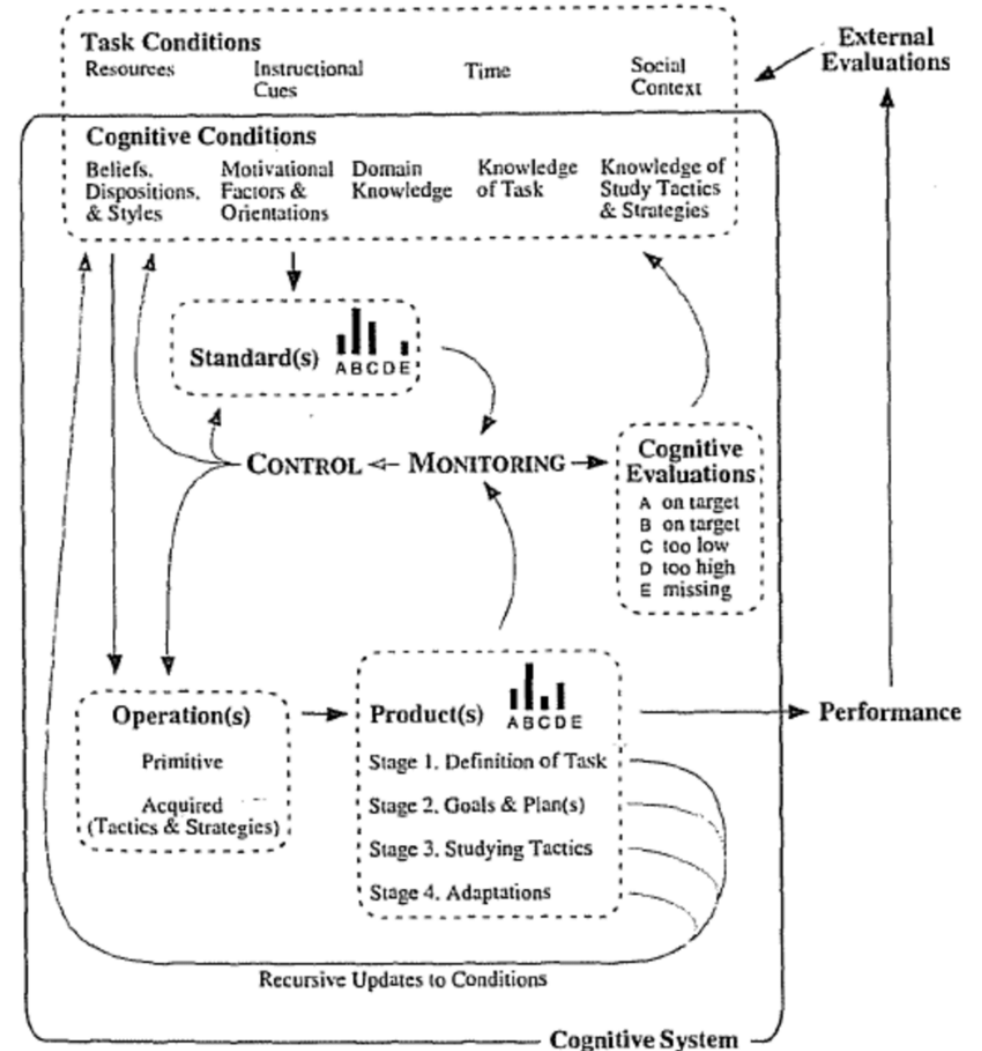
Ranalli, 2012,
https://www.researchgate.net/publication/323694812_Alternative_Models_of_Self-regulation_and_Implications_for_L2_Strategy_Research

Winne's Axioms for SRL

- Learners construct knowledge

- Learners are agents

- Data includes randomness.
  - The difference in instructional conditions
  - Effects of Internal Conditions
  - Effects of Learning Products and Strategy

https://www.mdpi.com/2227-7102/10/4/98/htm
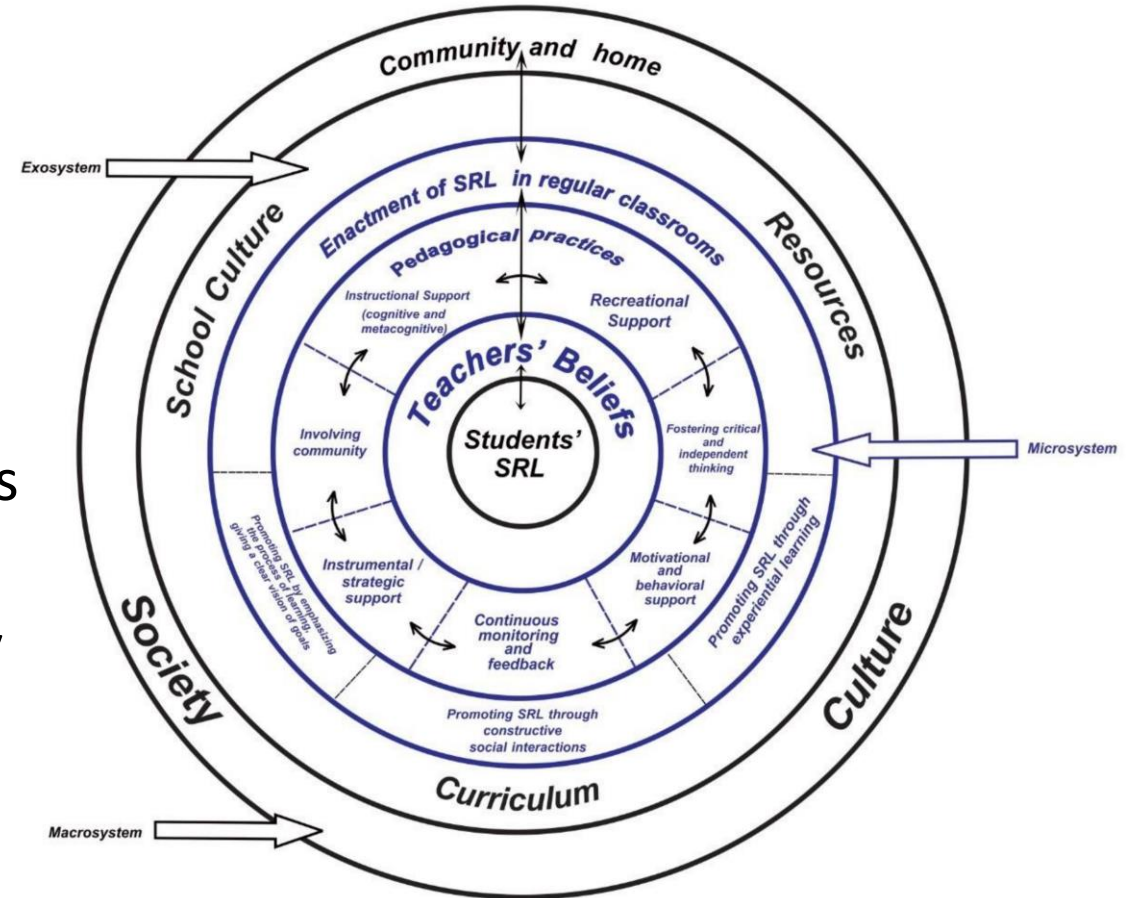
Gašević, Dawson, Siemens, 2015
Winne, 2017 https://www.routledgehandbooks.com/doi/10.4324/9781315697048.ch3

The Conditions For Learning

- Instructional conditions – instructors, instructional models and technology choices

- external conditions, such as instructional design, social context, previous learning history with the use of a particular tool, and revisions in the course content

- internal conditions such as achievement goal orientation, cognitive load, or epistemic beliefs are yet to be fully understood in relation with their collection and measurement with/from trace data.

Dragan Gašević, Shane Dawson, George Siemens,
https://www.sfu.ca/~dgasevic/papers_shared/techtrends2015.pdf

Things To Consider…

- qualitative research methods vs simple quantification
  - "the primary emphasis in the learning analytics field has been in memory recall"
- How to design effective visualizations and dashboards
  - "it is essential to consider instructional, learning and sensemaking benefits for learning."
- development of learning analytics culture and policies

Dragan Gašević, Shane Dawson, George Siemens,
https://www.sfu.ca/~dgasevic/papers_shared/techtrends2015.pdf
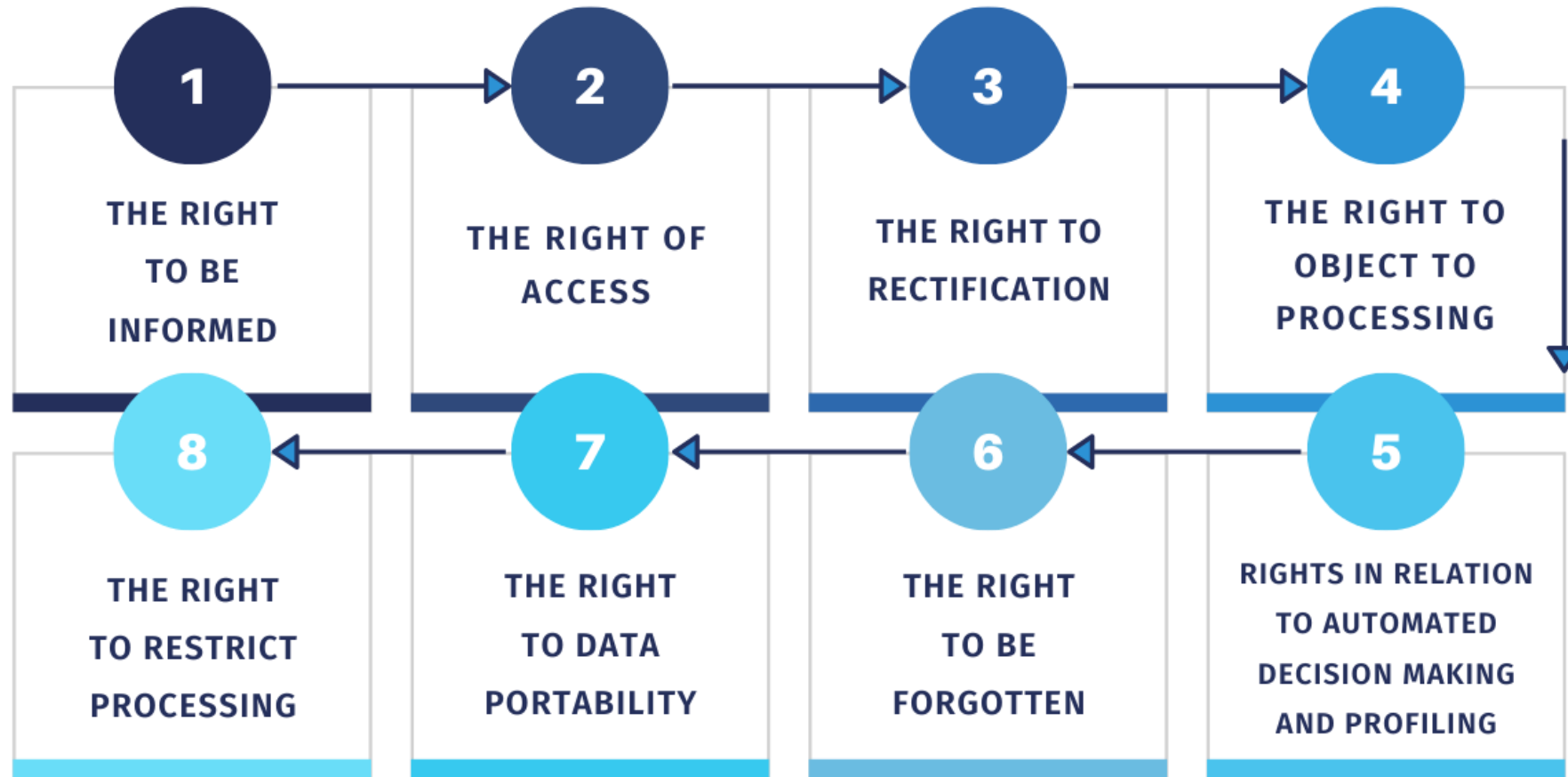
Constraints
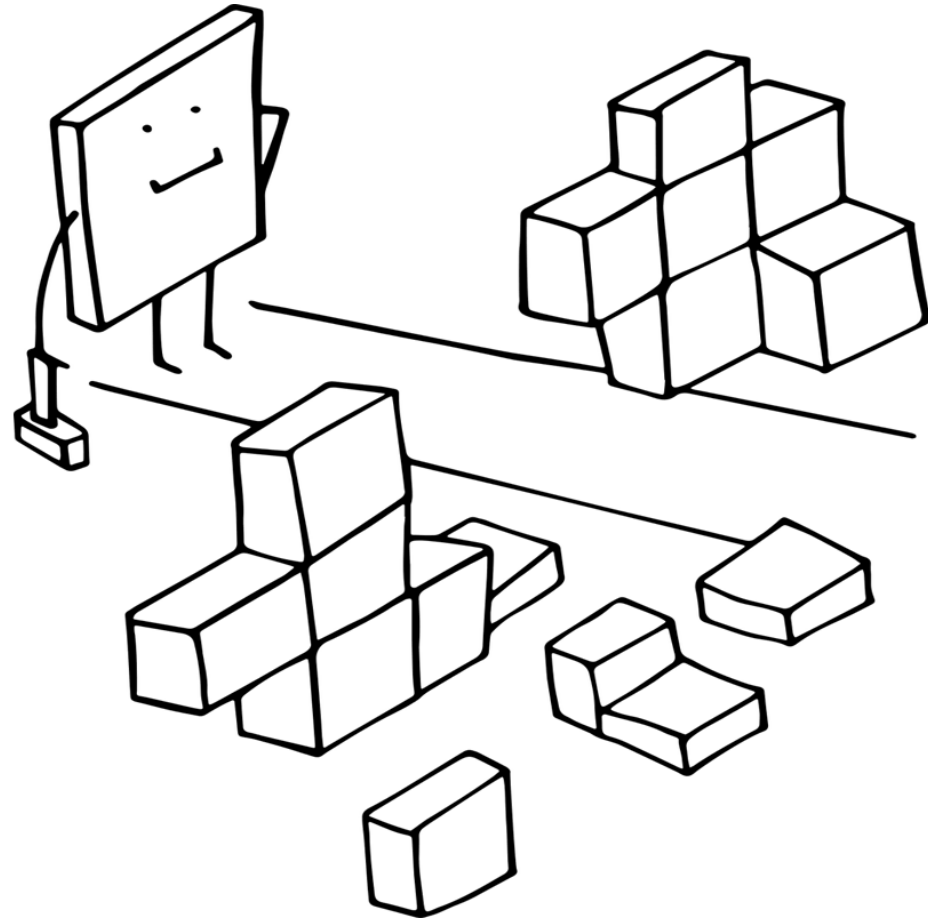
Constraints - External

- Privacy: Is the analysis in accordance with privacy arrangements and are the students properly informed?

- Ethics: What are the dangers of abuse/misguided use of the data?

- Norms: Are there legal data protection or IPR issues related to this kind of use of student data?

- Time scale. Is the analysis post-hoc or just-in-time? Will students still be able to benefit from the analytics outcome?

https://iacis.org/iis/2016/3_iis_2016_236-243.pdf
https://twproject.com/blog/theory-constraints-project-management/

GDPR Constraints

Constraints - Internal

(1) Interpretation: Do the data clients have the necessary competences to interpret and act upon the results? Do they understand the visualization or presentation of the information?

(2) Critical thinking: Do they understand which data is represented and which data is absent? How will they use this information?

https://iacis.org/iis/2016/3_iis_2016_236-243.pdf
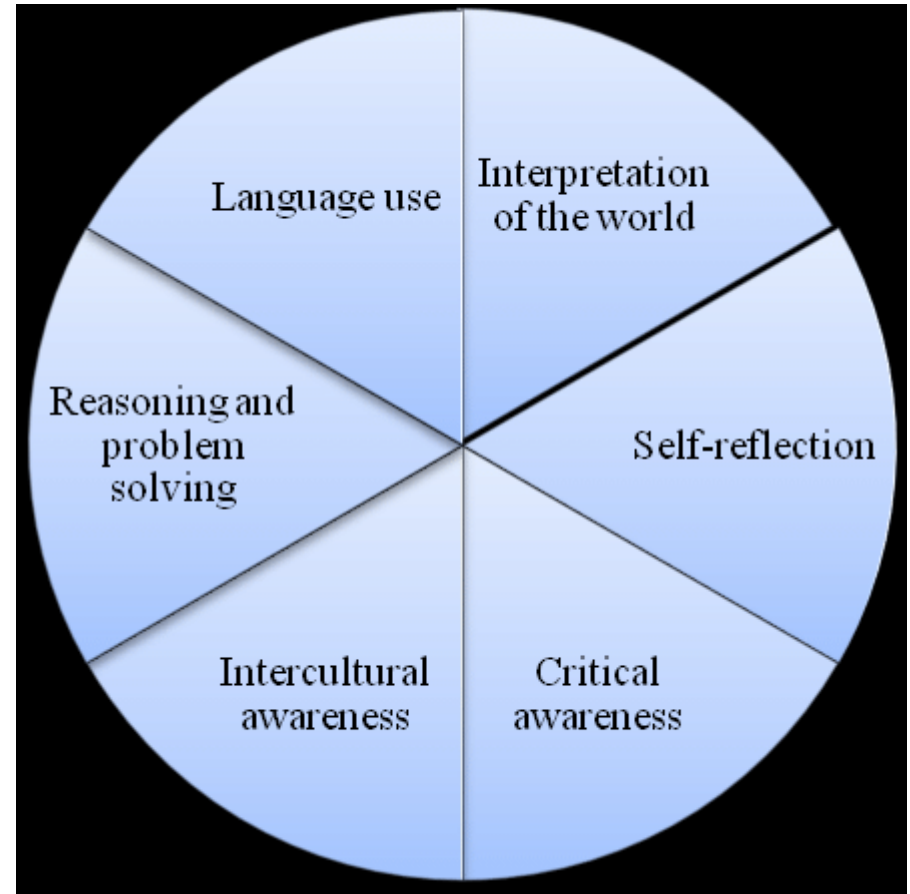
https://www.researchgate.net/publication/319422865_The_Effectiveness_of_Teaching_Critical_Thinking_Skills_through_Literature_in_EFL_Context_A_Case_Study_in_Spain