

The background features a dark blue gradient with faint, glowing data visualizations. These include a bar chart with teal bars, several overlapping line graphs in shades of blue and orange, and scattered numerical values like '126548' and '1335792'. The overall aesthetic is technical and data-driven.

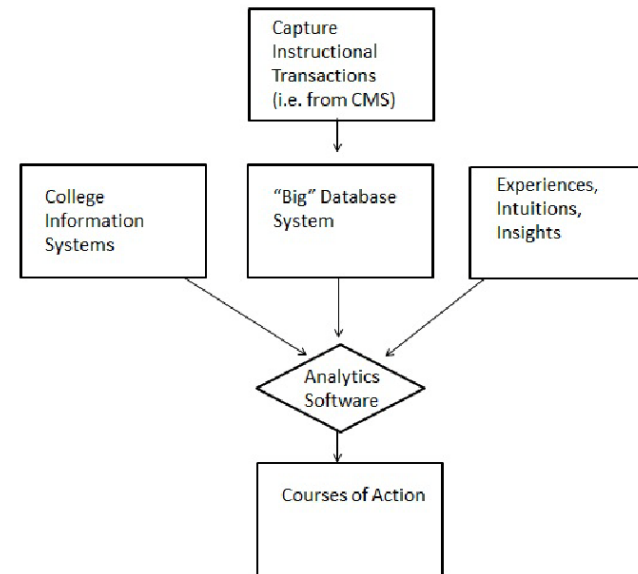
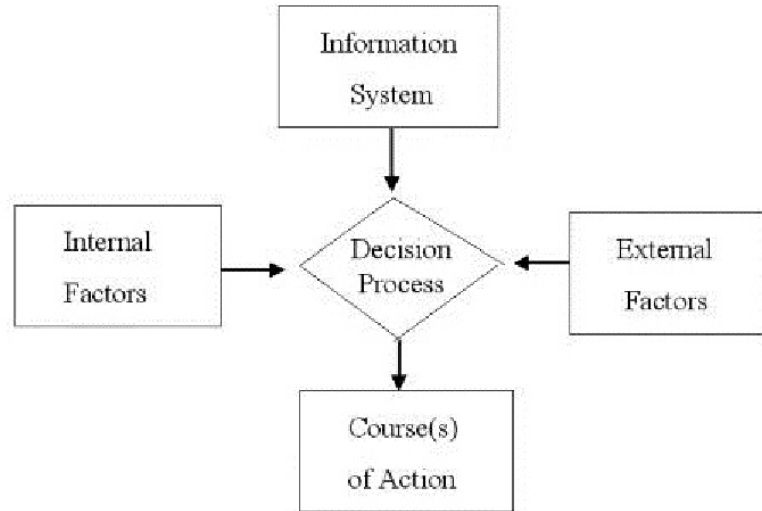
Ethics and Analytics: What We Mean By Analytics

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October 14, 2021

By 'Analytics' We Mean...

Analytics is thought of generally as “the science of **examining data** to draw conclusions and, when used in decision making, to present paths or courses of action.” (Picciano, 2012).



By 'Analytics' We Mean...

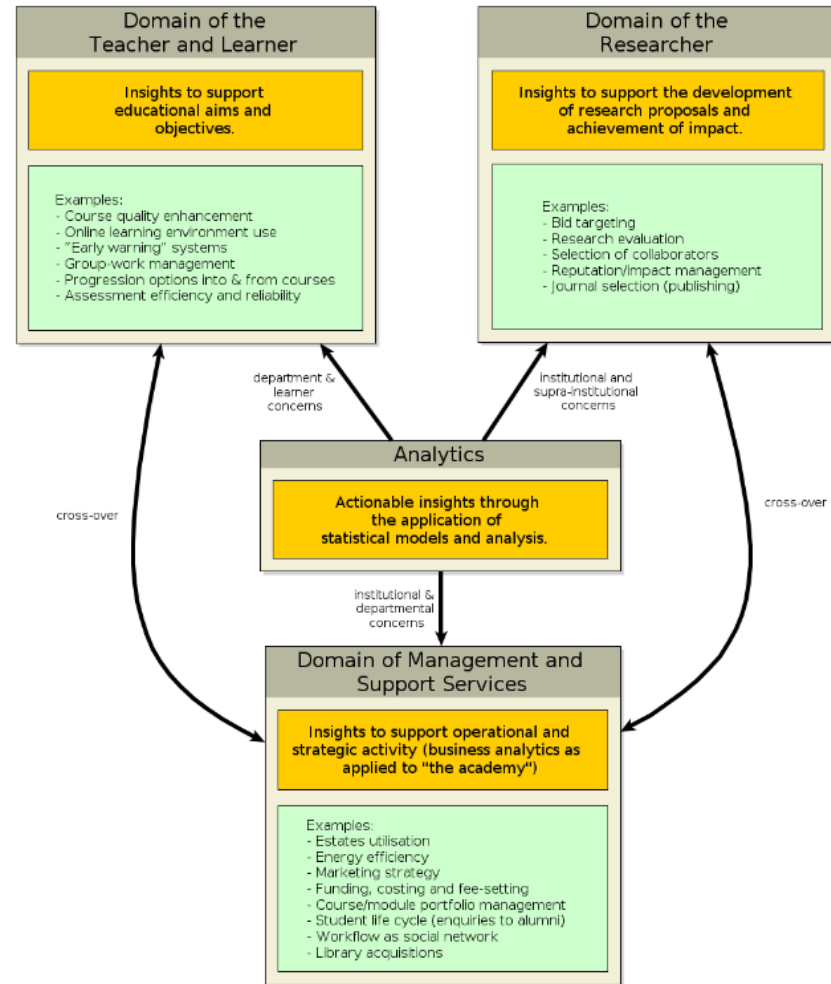


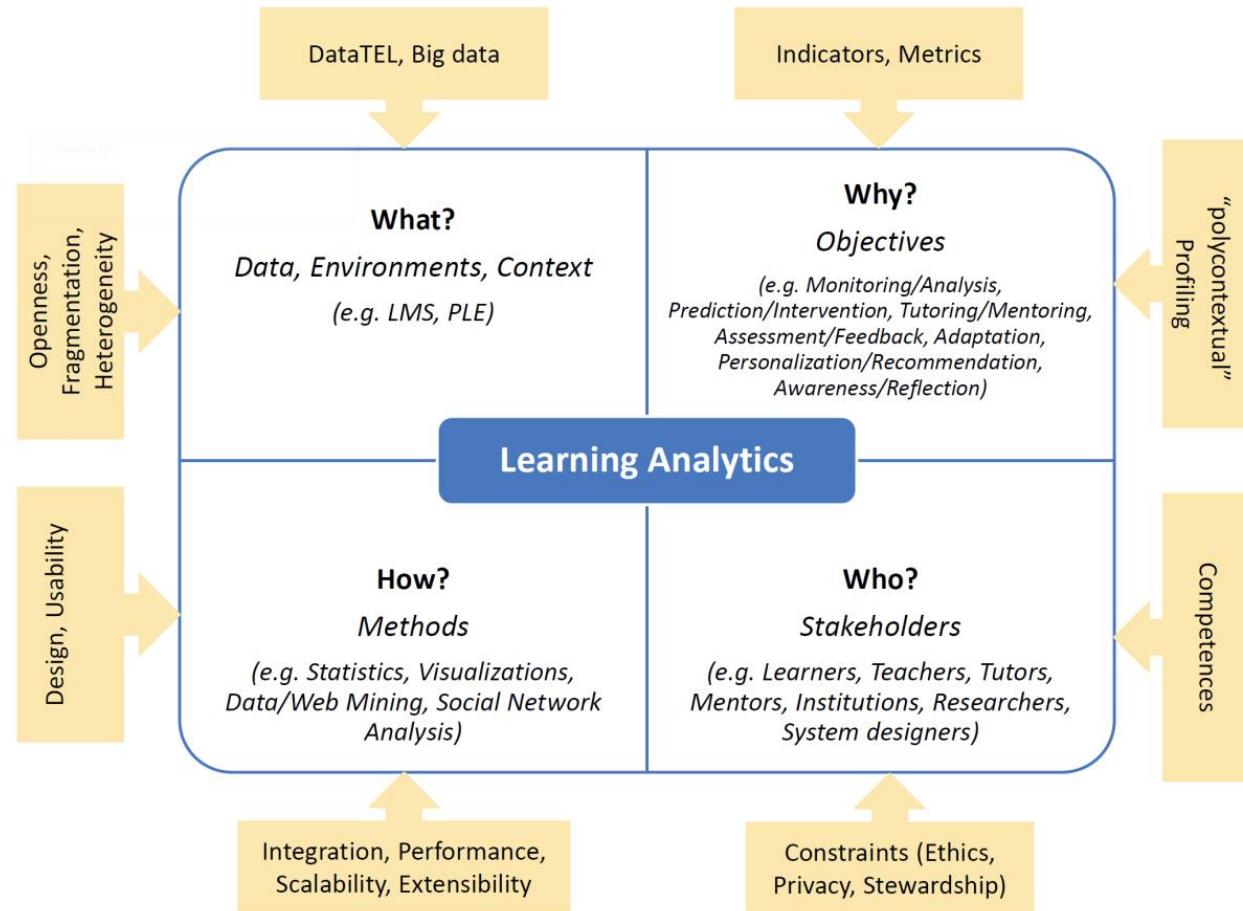
Figure 1: Three Broad Domains of Analytics by Example.

The overall process of “developing actionable insights through problem definition and the application of **statistical models** and analysis against existing and/or simulated future data.” (Cooper, 2012)

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.269.7294&rep=rep1&type=pdf>

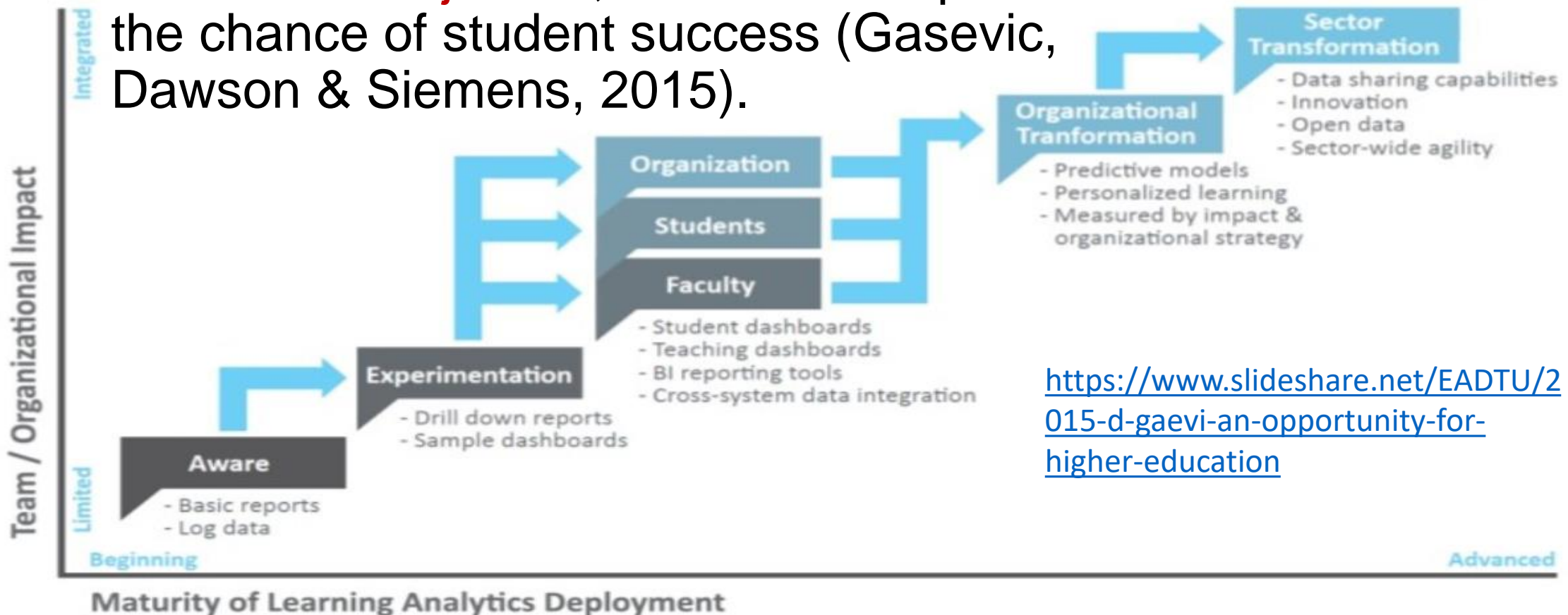
By 'Analytics' We Mean...

The focus of this course is the use of analytics as applied to learning and education (typically called 'learning analytics').



By 'Analytics' We Mean...

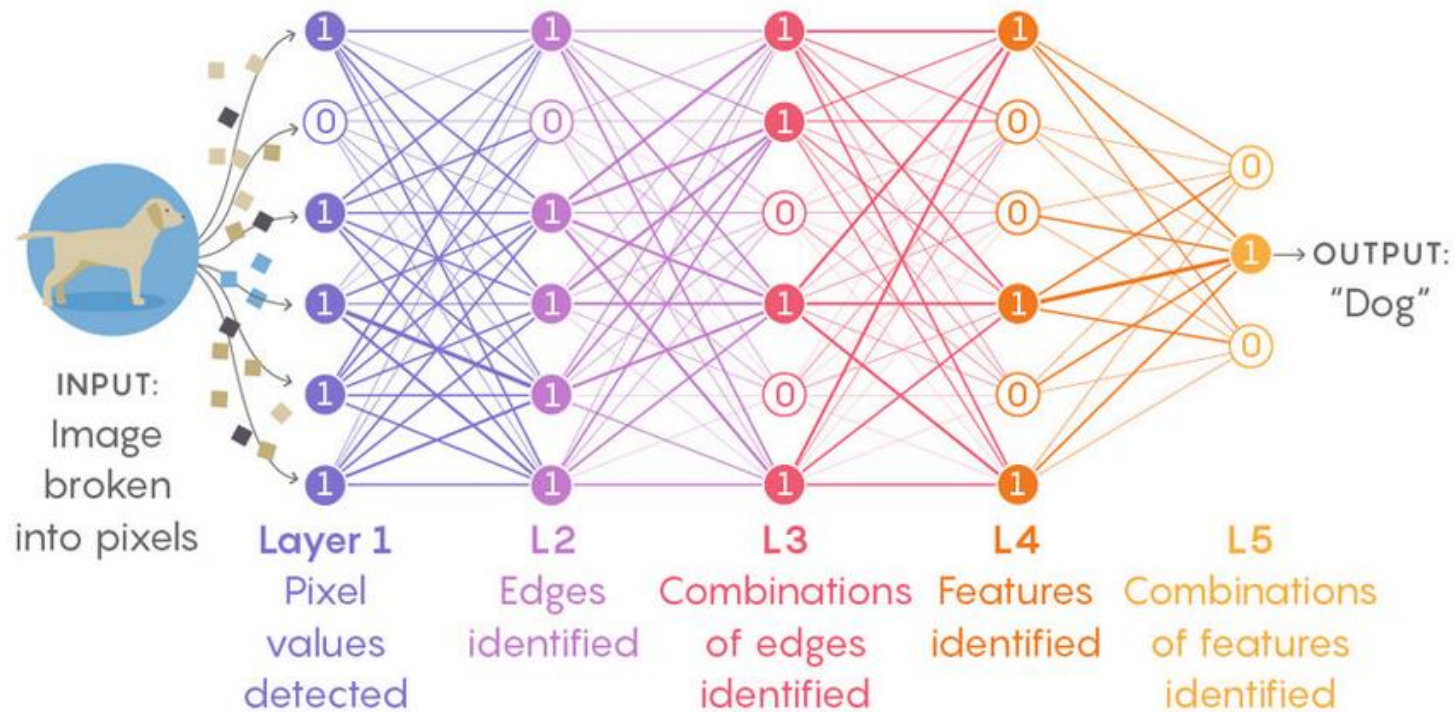
Learning analytics is typically defined in terms of its **objective**, which is to improve the chance of student success (Gasevic, Dawson & Siemens, 2015).



<https://www.slideshare.net/EADTU/2015-d-gaevi-an-opportunity-for-higher-education>

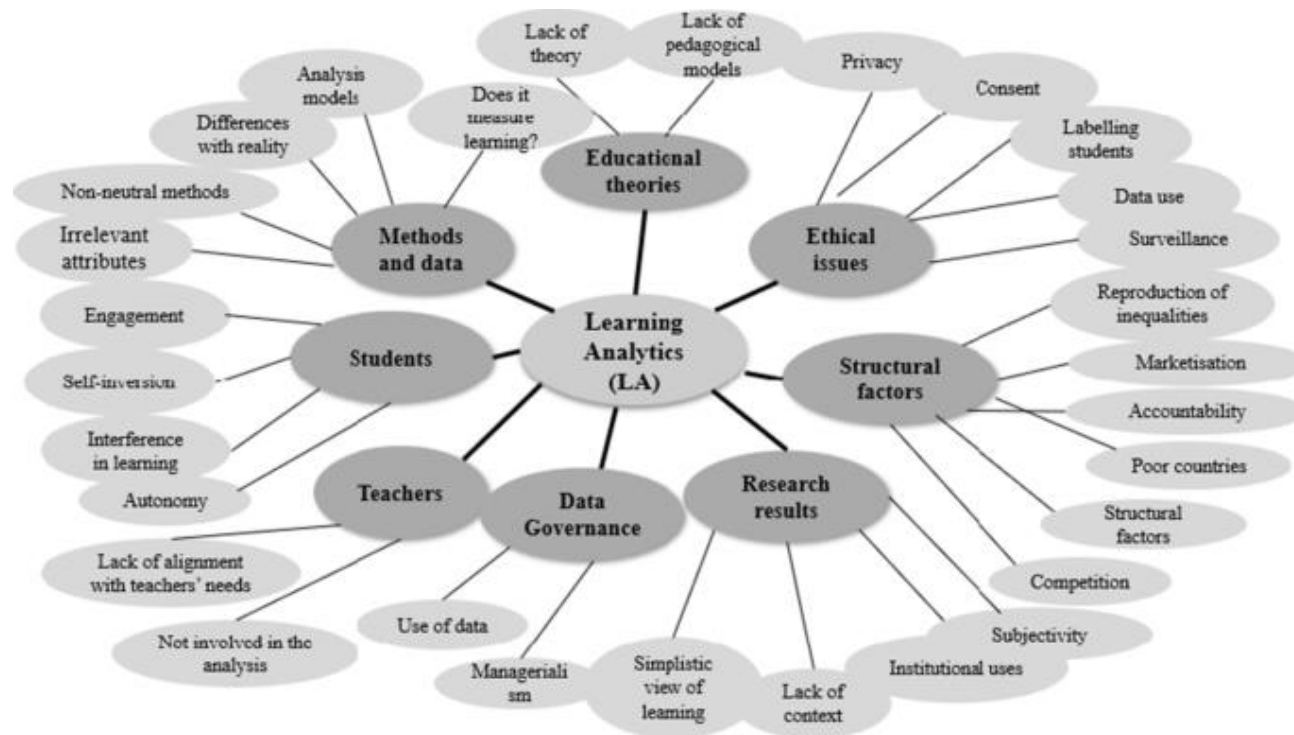
By Analytics We Mean...

There's also a **scientific goal**, to “to open up what is sometimes called the ‘black box of learning’” (Self, 1999).



<https://www.quantamagazine.org/new-theory-cracks-open-the-black-box-of-deep-learning-20170921/>

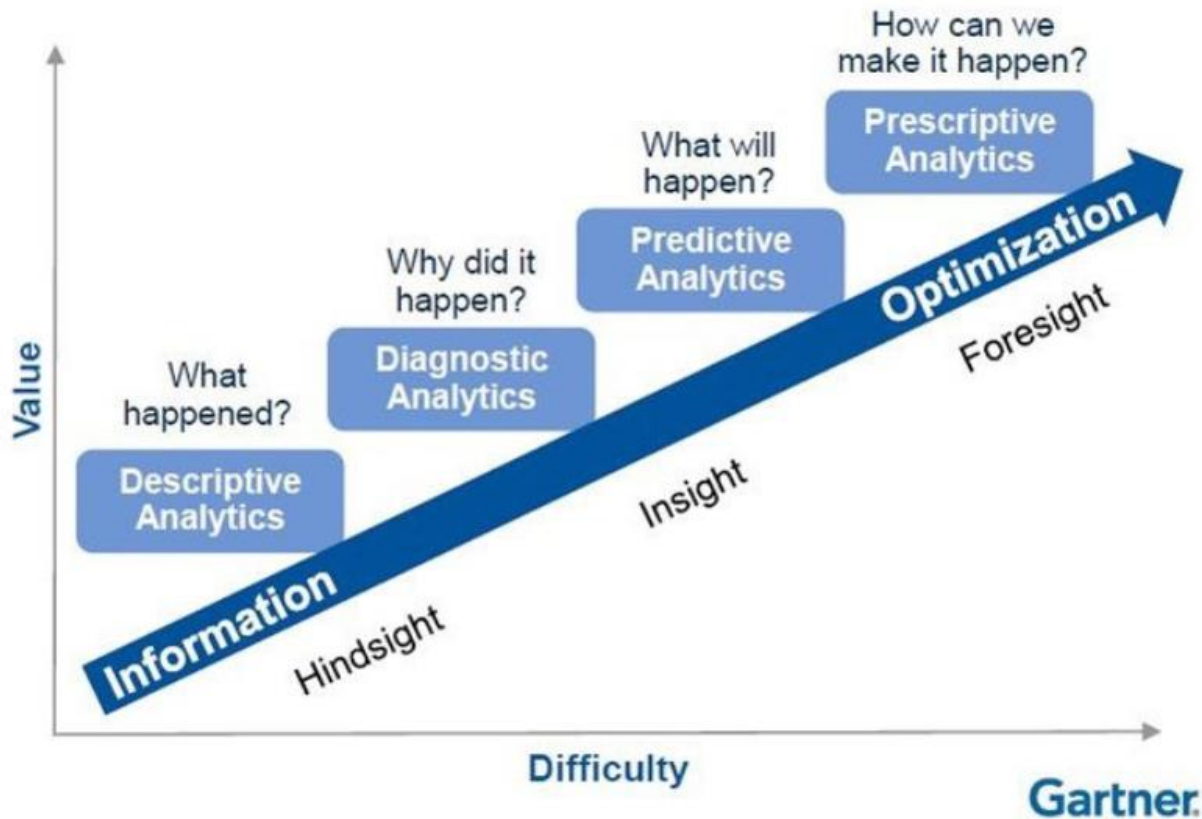
By 'Analytics' We Mean...



“The measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of **understanding and optimizing learning** and the environments in which it occurs.” (Siemens, 2012)

A Broad Scope

Analytics can be divided according to the type of question being answered.



A Broad Scope

The focus of learning analytics is often described from the institutional perspective.

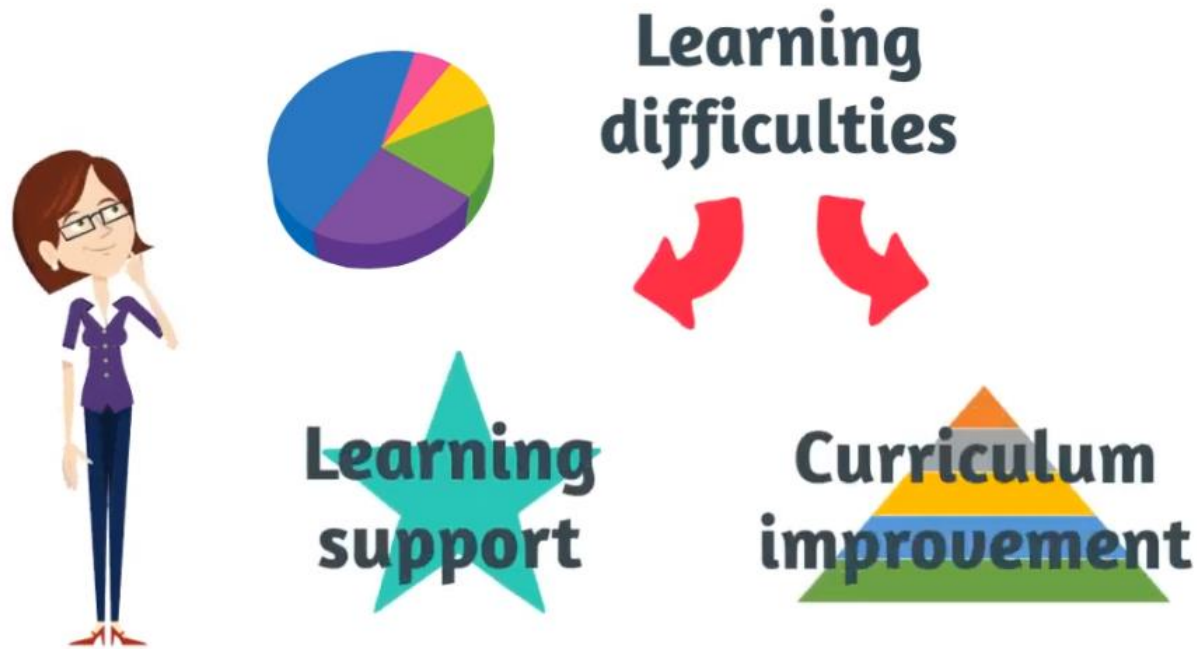
For example, as Slade and Tait (2019) write, “The UK-based Higher Education Academy states that learning analytics offers the potential to provide educators with quantitative intelligence to make informed decisions about student learning... as well as to inform pedagogy, allocate resources and inform institutional strategy (Rienties, et.al. 2016).”

https://www.researchgate.net/publication/341425959_Global_guidelines_Ethics_in_Learning_Analytics/link/5ebf961392851c11a86c410b/download



A Broad Scope

What we mean by 'learning and education' might be very different depending on who is being asked (Tsai, et.al., 2018).



A Broad Scope

- “...it might be a case that we keep them, we retain them, but also, we’re able to provide them with better support.” – Institutional leader
- “...you can reflect on what works, what doesn’t. What should I keep doing, what do I need to change?” – Teacher
- “I’m always curious about which areas I’m struggling in and which areas I am doing better in.” – Student



A Broad Scope

The domain is often subdivided between institutional, student support and instructional **applications** (Zeide, 2019).

Institutional	Teaching	Learning
<ul style="list-style-type: none">- aka 'academic analytics'- to support operational and financial decision making	<ul style="list-style-type: none">- pedagogy- learning design- curriculum	<ul style="list-style-type: none">- learning strategies- feedback

A Broad Scope

Here we identify the different areas in which analytics is **used**.

The UC Berkeley Human Rights Center Research Team (2019) divides the domain into three categories: “AI tools fall into three categories: learner-facing, teacher-facing and system-facing.” However it quickly becomes apparent that the same tool will most probably have multiple faces

<https://humanrights.berkeley.edu/about/about-us>



A Broad Scope

There are in fact numerous types, applications, and domains of analytics research in education (Guan, Mou & Jiang, A twenty-year data-driven historical analysis, 2020)

<https://reader.elsevier.com/reader/sd/pii/S2096248720300369?token=9A29D3427A79DD70B346CAD57DEE3CFB1935B2E9D6B4CF2A28125A5AA95856954575CB41F018D7F414CFF2029BF77D9E&originRegion=us-east-1&originCreation=20211015143732>

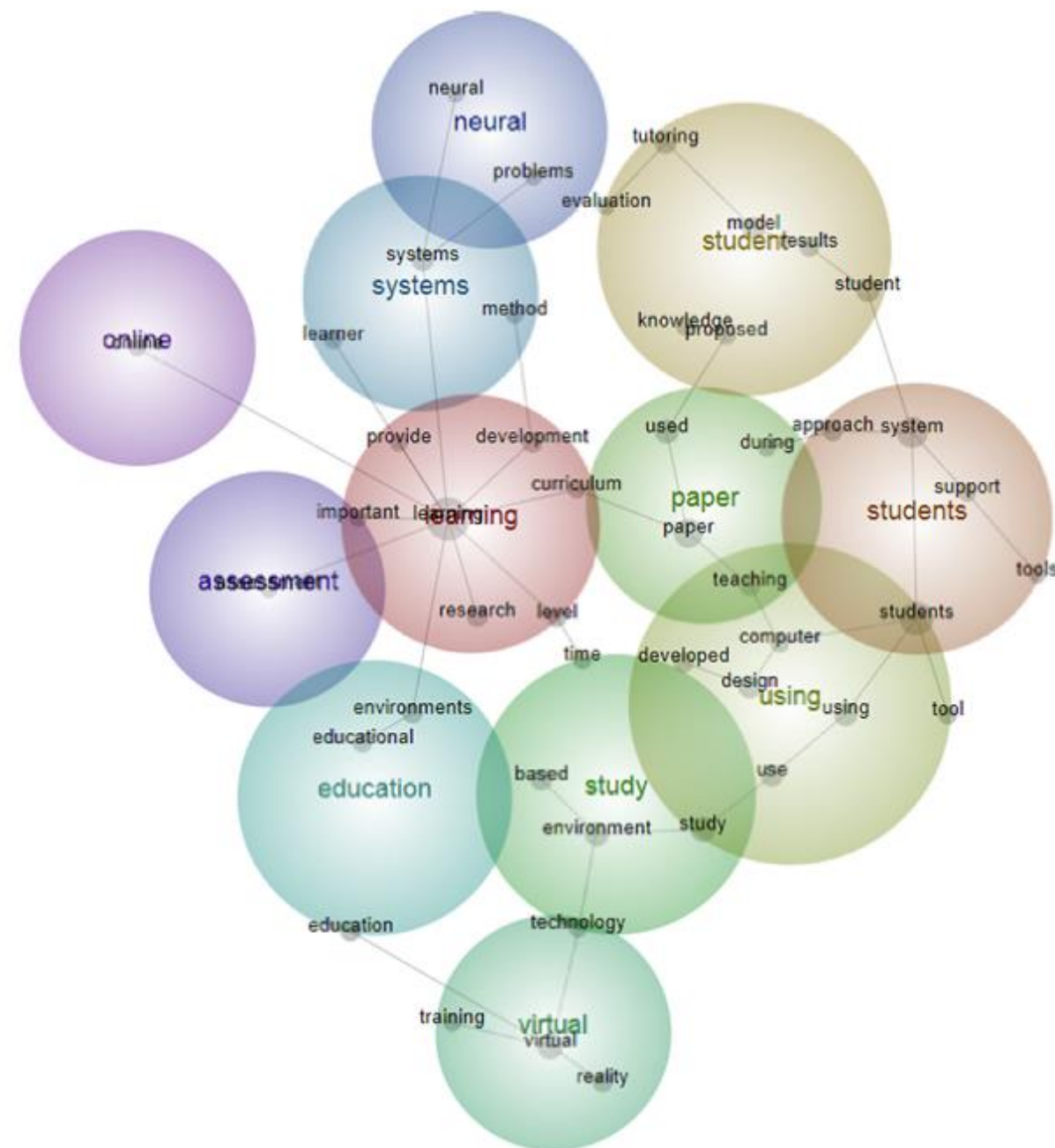


Fig. 2. Concept map for the time period between 2000 – 2009 (n = 114 articles).

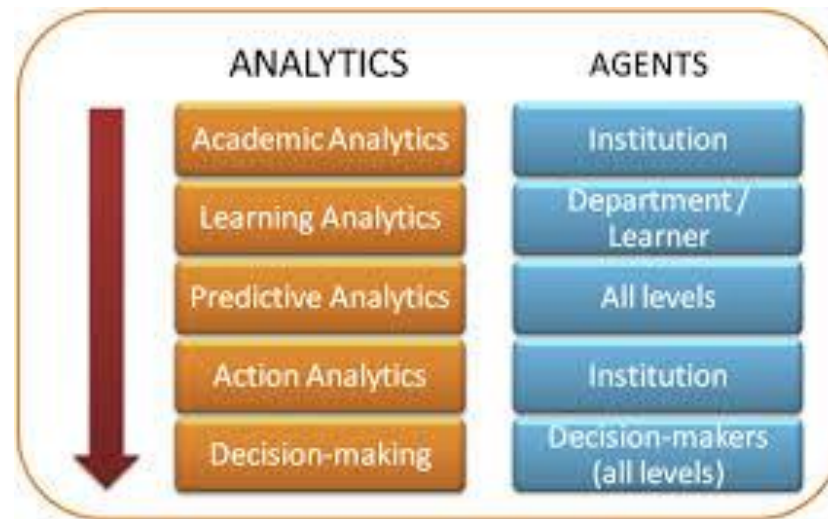
A Broad Scope

A wider definition not only avoids the difficulties of establishing a more narrow definition, but also ensures we do not disregard potential ethical implications simply because the practice is ‘outside the scope of learning analytics’.

For example:

http://eprints.hud.ac.uk/id/eprint/16829/3/EllisBroadeningBJET_submission.pdf and

https://www.researchgate.net/publication/314105426_Expanding_the_scope_of_learning_analytics_data_preliminary_findings_on_attention_and_self-regulation_using_wearable_technology

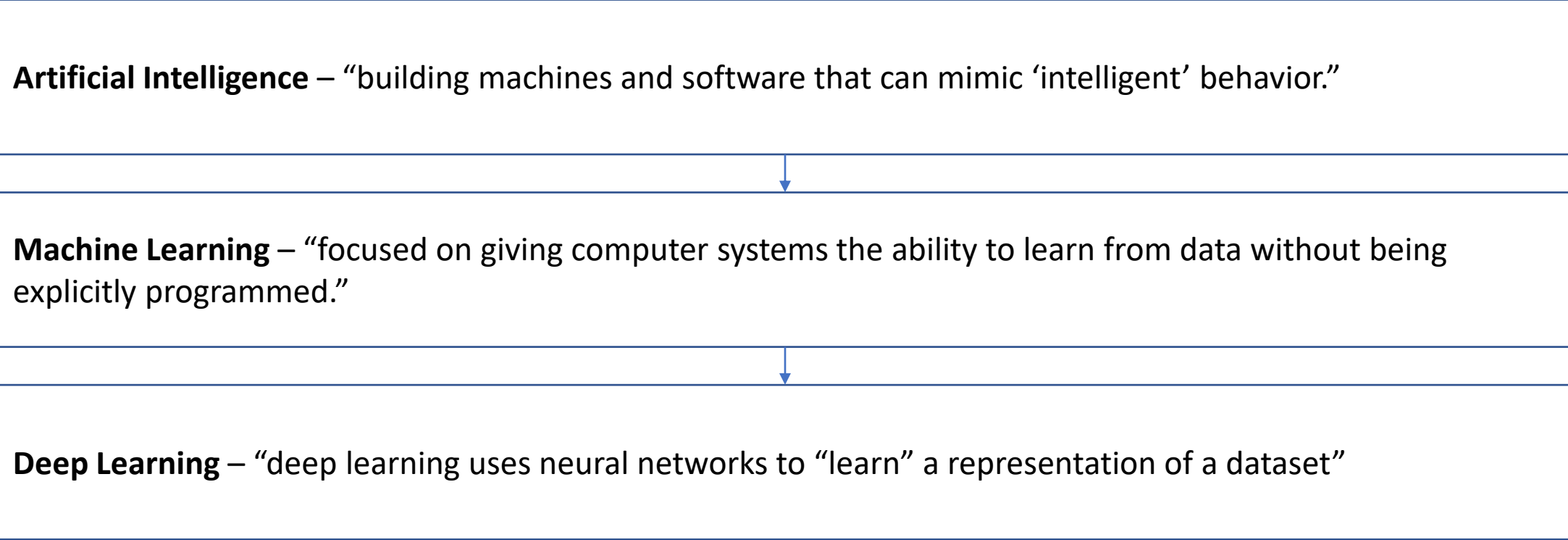


<https://onlinelearningconsortium.org/wp-content/uploads/2016/02/1-s2.0-S074756321300188X-main.pdf>

Analytics and AI

Terminologies and Concepts

Artificial Intelligence – “building machines and software that can mimic ‘intelligent’ behavior.”



Machine Learning – “focused on giving computer systems the ability to learn from data without being explicitly programmed.”

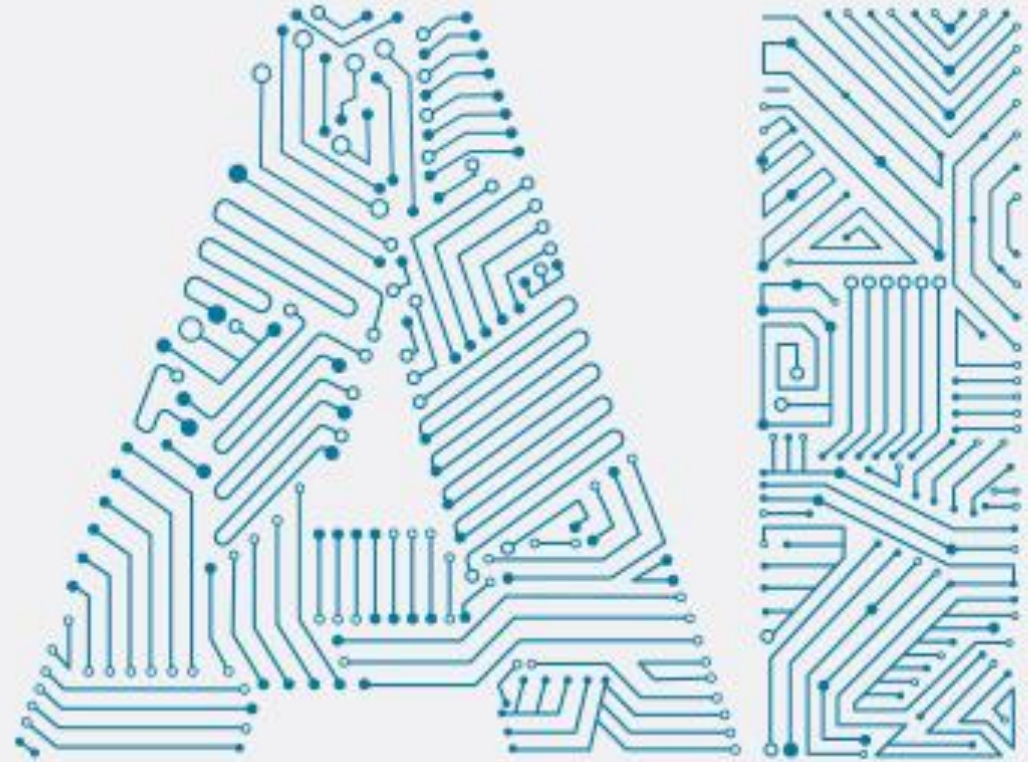
Deep Learning – “deep learning uses neural networks to “learn” a representation of a dataset”

<https://www.unicef.org/innovation/media/10501/file/Memorandum%20on%20Artificial%20Intelligence%20and%20Child%20Rights.pdf>

Analytics and AI

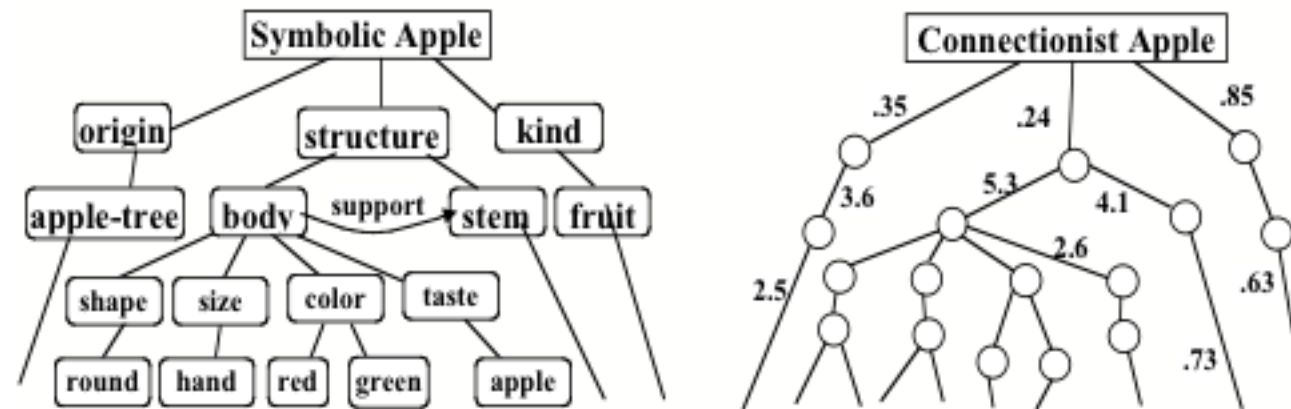
We take ‘analytics’ to include artificial intelligence (AI).

“Artificial intelligence (AI) systems are software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to take to achieve the given goal.” (European Commission’s High-Level Expert Group on Artificial Intelligence, 2019: 36)



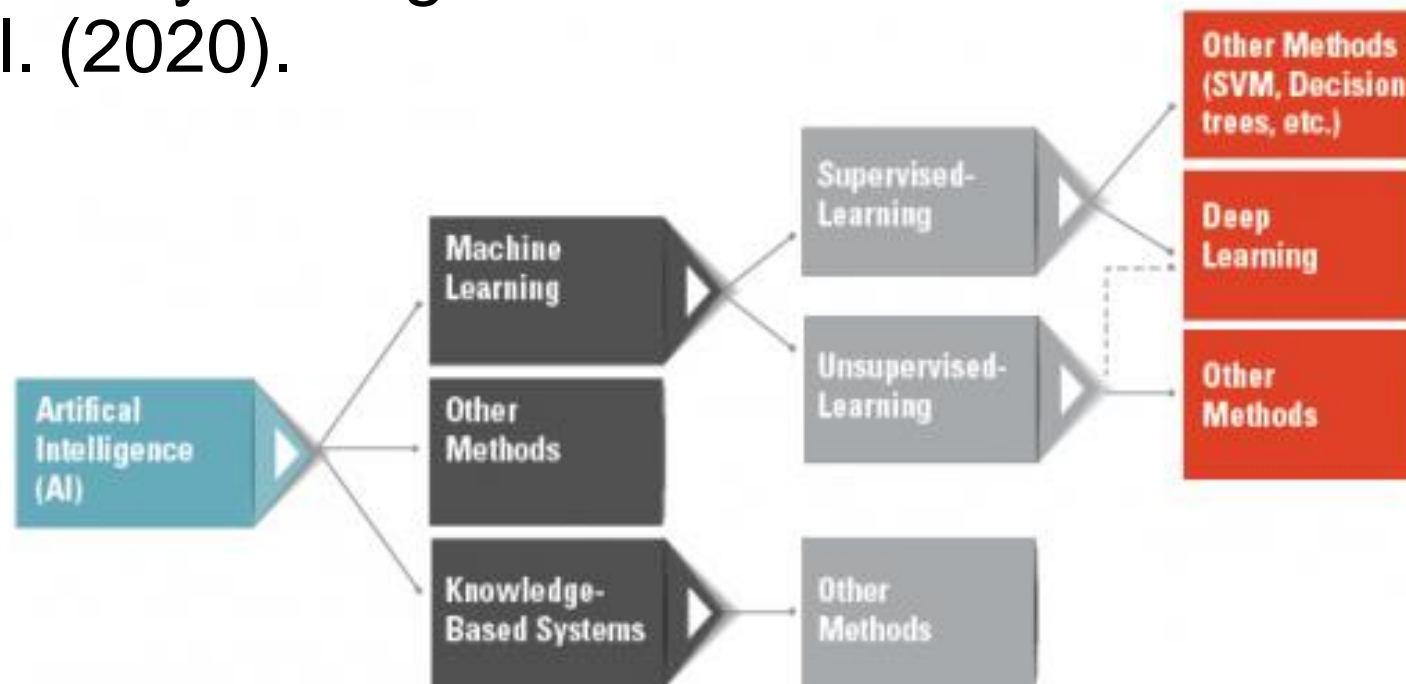
Analytics and AI

The AI and analytics under consideration in this paper are not based on symbolic rules, as the field has mostly turned away from such systems.



Analytics and AI

When we need to be precise we will be. But will generally use the global terms 'AI' and 'Analytics' interchangeably. "It is often difficult to clearly distinguish LA from AI in the field of education"
Renz, et.al. (2020).

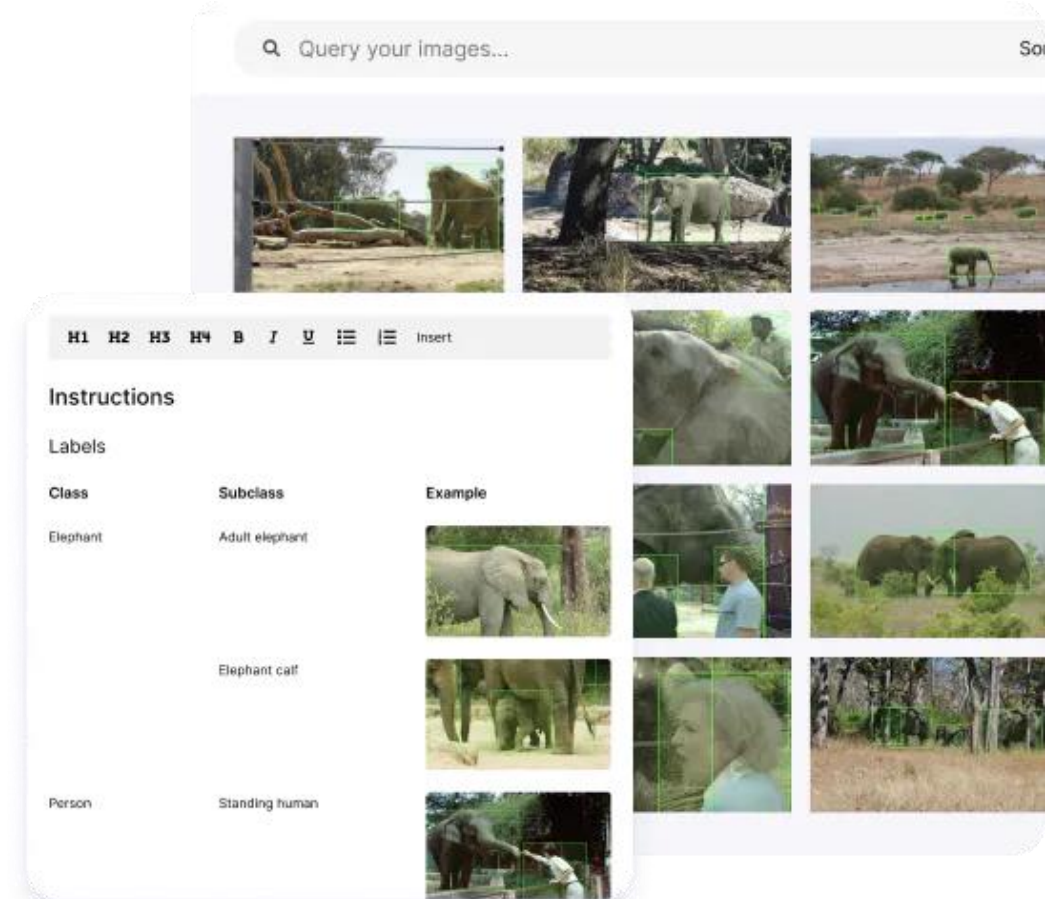


What Makes Digital Different?

Ware, et.al. (1973), for example, wrote that the dangers of digital technology stem from three effects (quoted):

- Scale - Computerization enables an organization to enlarge its data-processing capacity substantially.

<https://scale.com/>



What Makes Digital Different?

- Access - Computerization greatly facilitates access to personal data within a single organization, and across boundaries that separate organizational entities.



<https://www.nvidia.com/en-us/deep-learning-ai/solutions/ai-at-the-edge/>

What Makes Digital Different?

- Function - Computerization creates a new class of record keepers whose functions are technical and whose contact with original suppliers and ultimate users of personal data are often remote.

<https://www.pionline.com/editorial/record-keepers-making-changes-long-haul>

