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Questioning, Smart Education & Learning Analytics

Dr Jon Mason

November 17, 2016

北京师范大学未来教育高精尖创新中心

Beijing Advanced Innovation Center For Future Education

京师大厦
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北京师范大学国际学术交流中心
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星拱瑶枢

请香处

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OVERVIEW

- Research Agenda
- Questions First
- Historical Context & Future Trends
- Conceptual Models
- Questions Last

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PROBLEM

"Questioning, Smart Education, & Learning Analytics"

How to connect these ideas?

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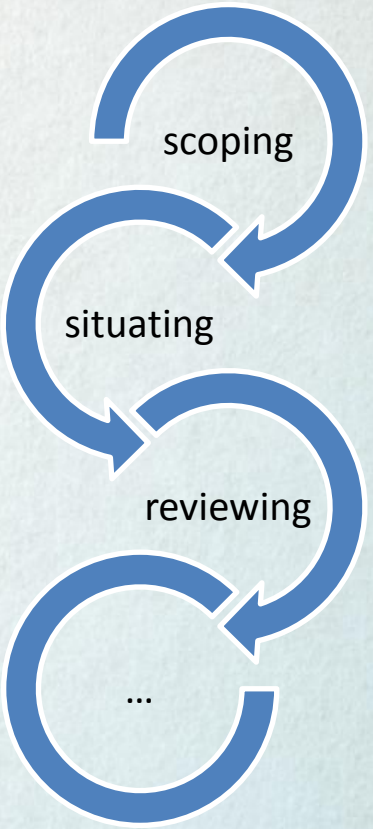
请提问-但不是投票 （尚）

RESEARCH AGENDA

- Inquiry
- Questioning
- The digital environment
- Human computer interface
- ICT standards
- Digital learning futures
- Sense-Making
- Knowledge & Data
- Wisdom & Lineage



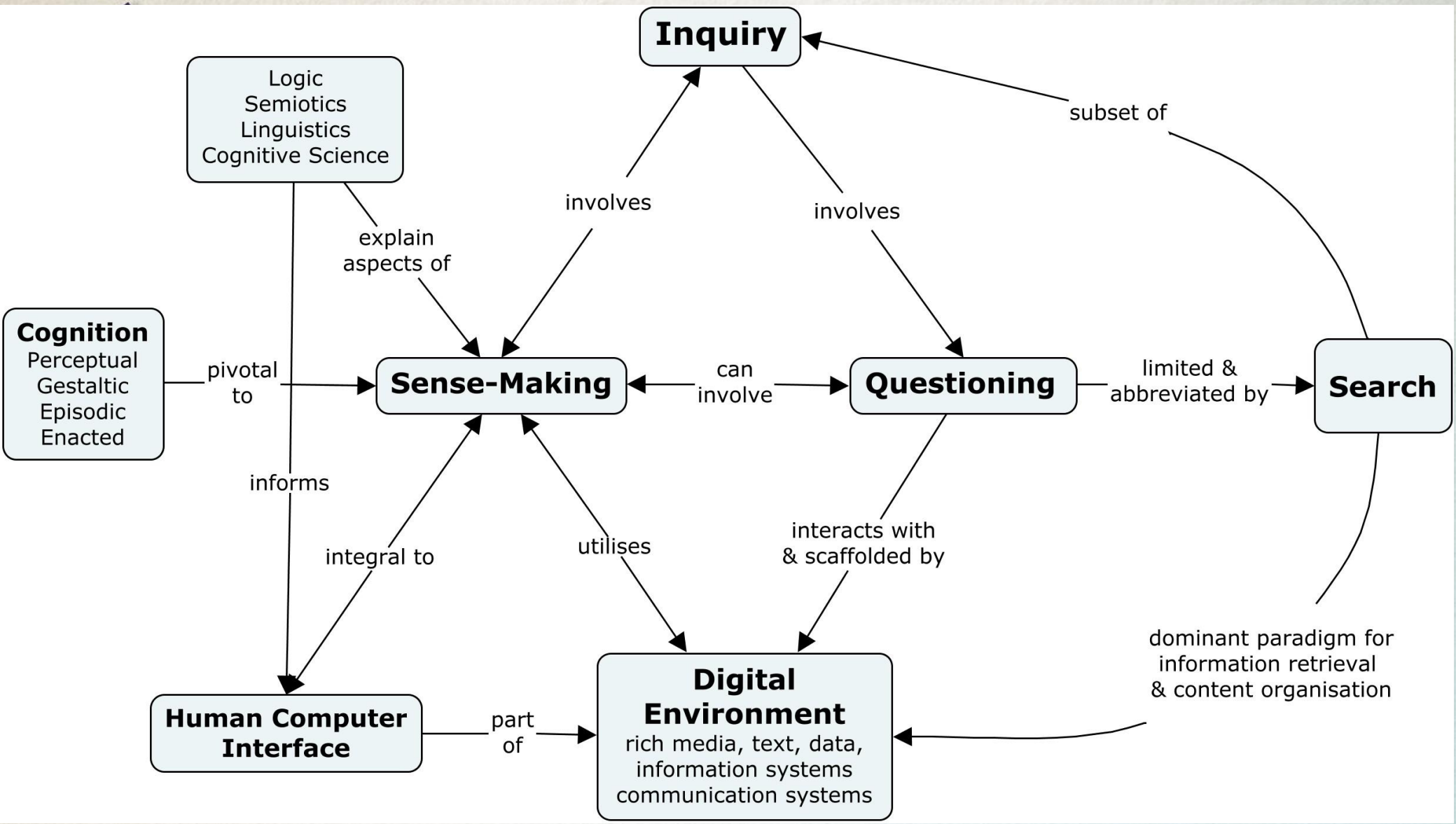


Figure 2. Conceptual map of emerging research agenda

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KEY POSITIONS

Sense-Making ≠ Meaning Making

Searching ≠ Questioning

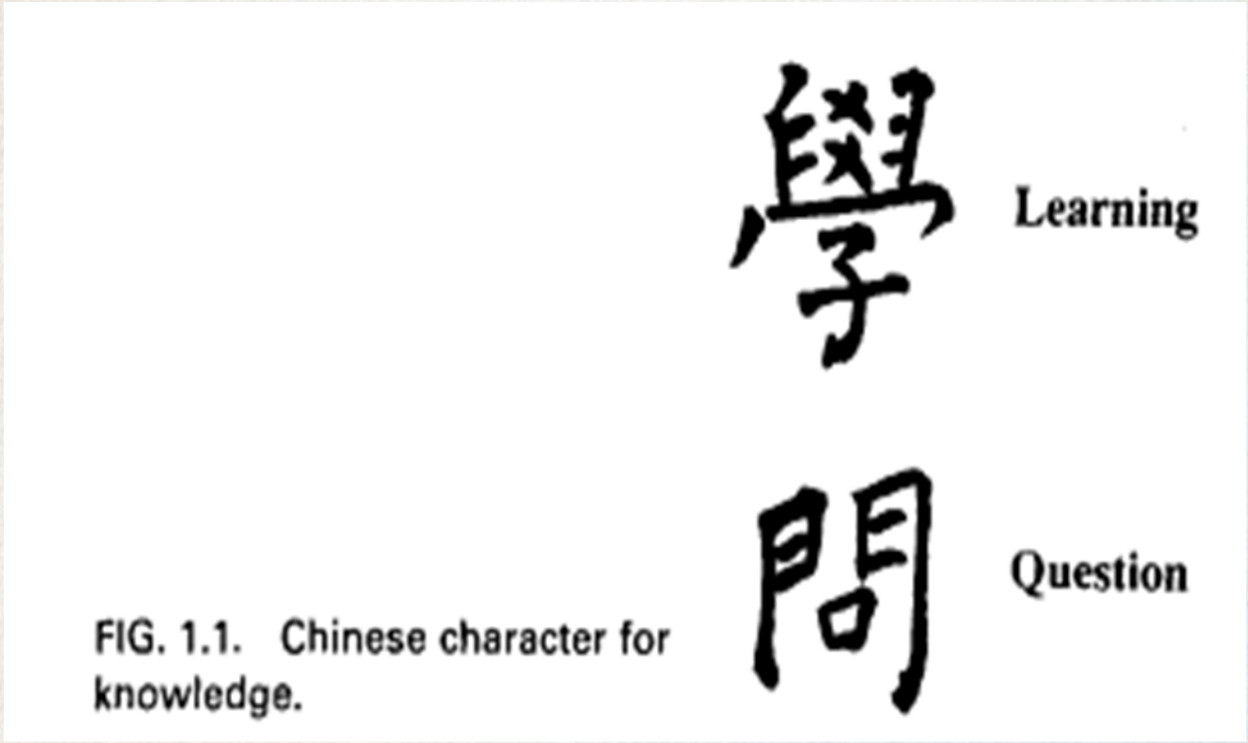
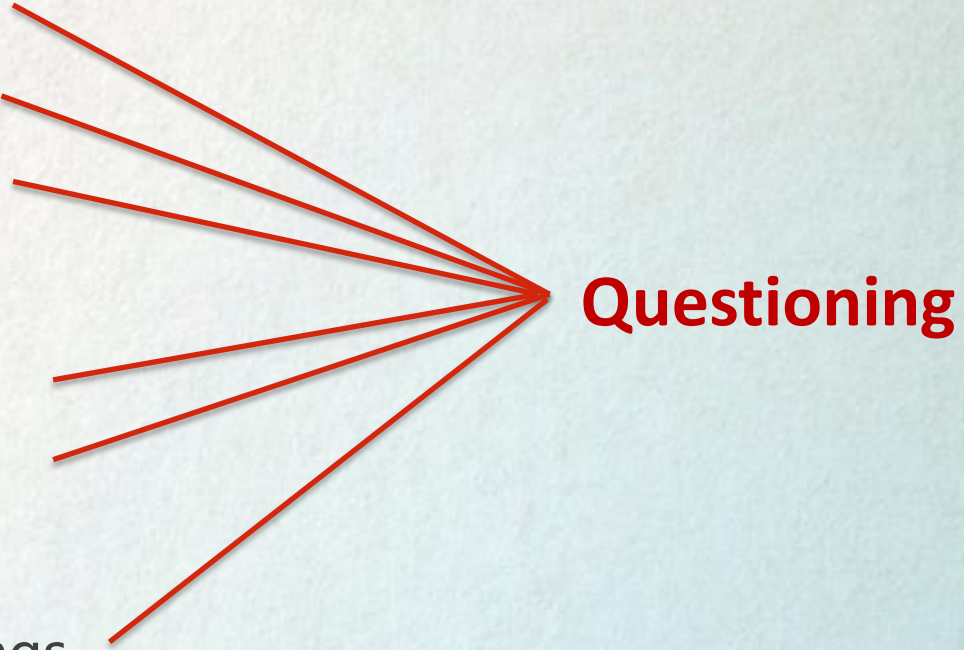


FIG. 1.1. Chinese character for knowledge.

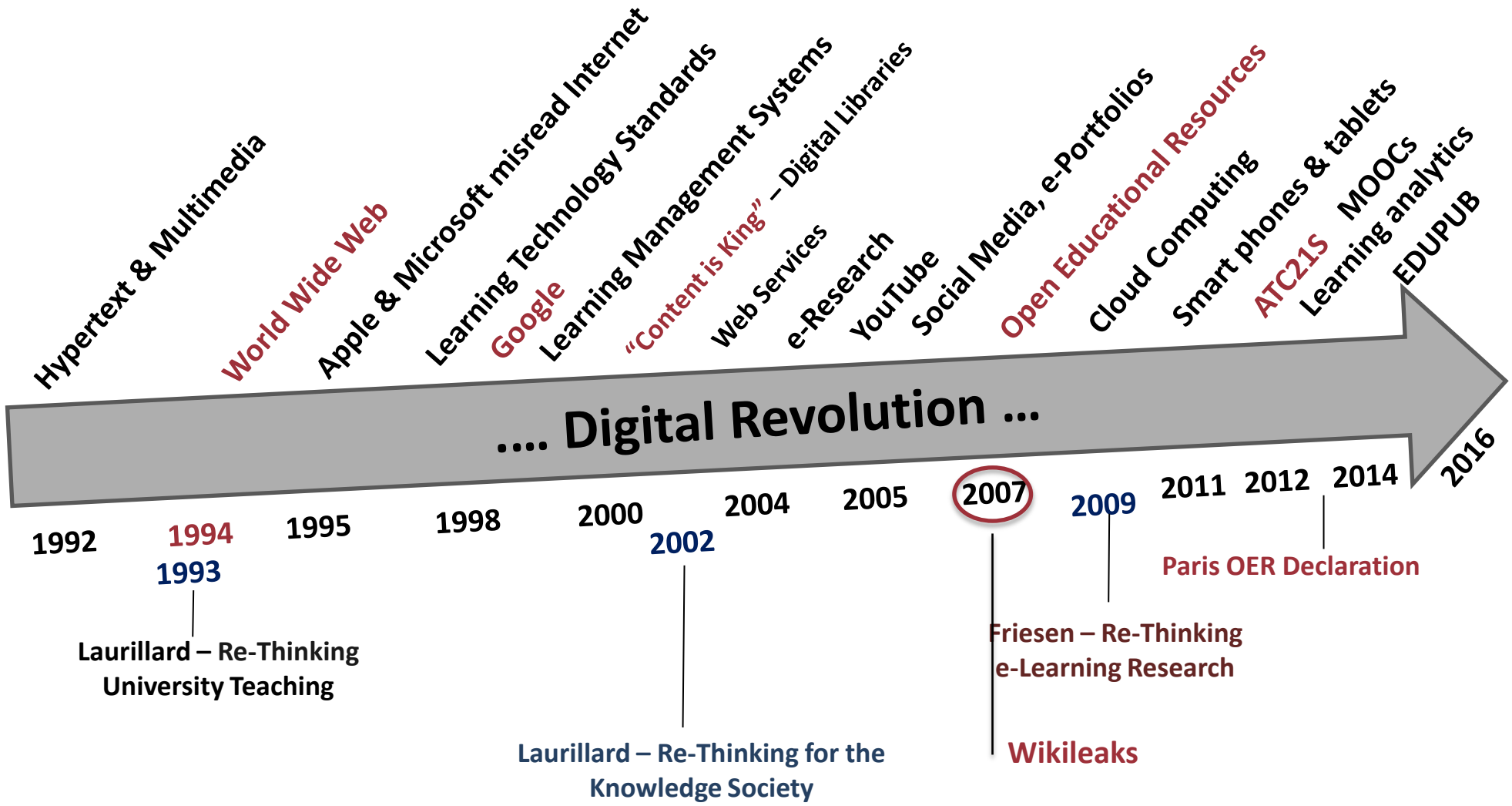
Lauer, T. W., Peacock, E., & Graesser, A. C. (2013). Questions and information systems. Psychology Press.

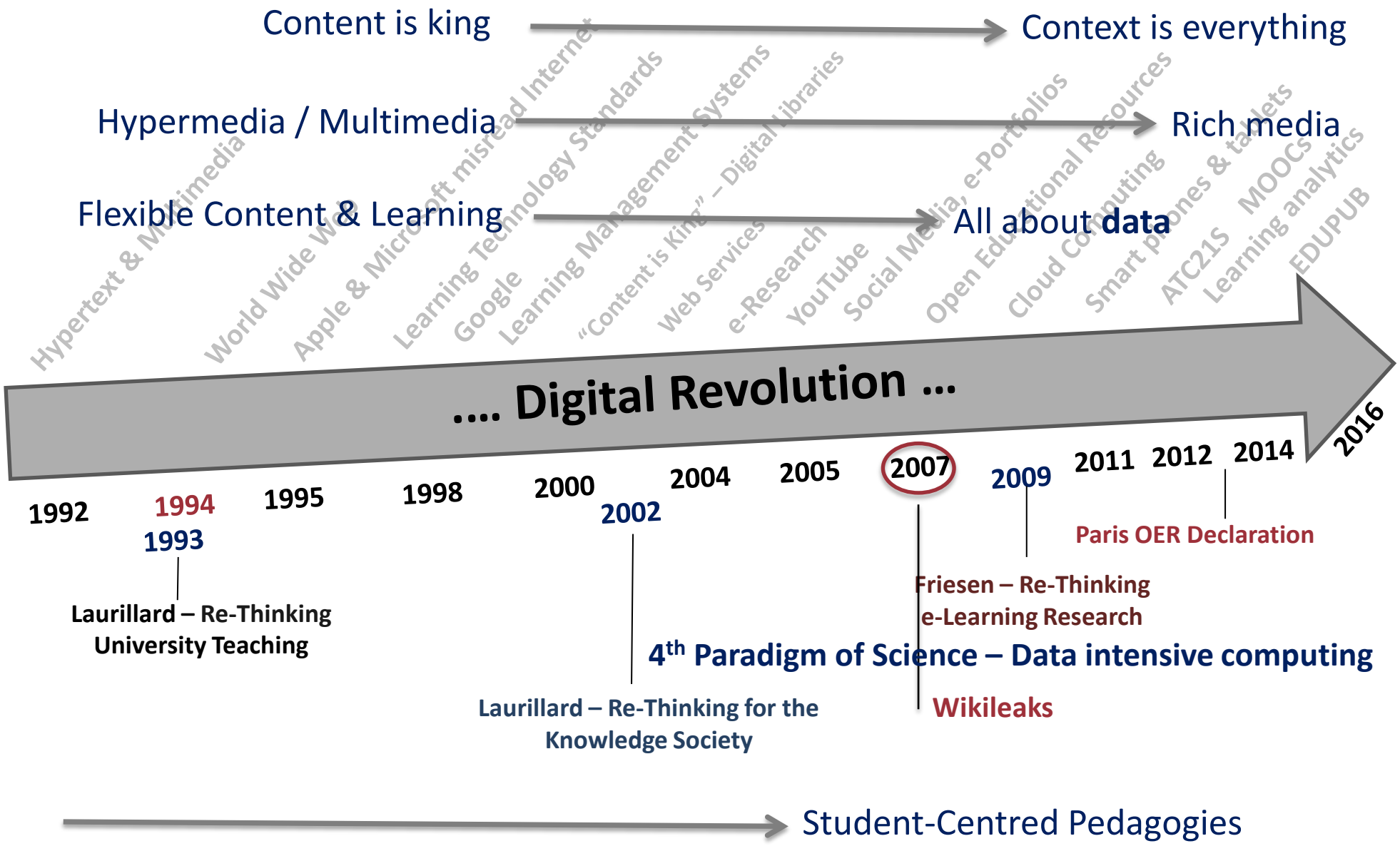
PEDAGOGY – EIGHT ACTS OF LEARNING

- Learning through inquiry
- Learning from experts
- Learning with others
- Learning through making
- Learning through exploring
- Learning through practising
- Learning from assessment
- Learning in and across settings



Luckin, R., Blight, B., Manches, A., Ainsworth, S., Noss, R., & Crook, C. (2012). *Decoding Learning: The proof, the promise and the potential of digital education*. London: Nesta.


Hypertext & Multimedia
World Wide Web
Apple & Microsoft misread Internet
Learning Technology Standards
Google
Learning Management Systems
"Content is King" – Digital Libraries
Web Services
e-Research
YouTube
Social Media, e-Portfolios
Open Educational Resources
Cloud Computing
Smart phones & tablets
ATC21S
MOOCs
Learning analytics
EDUPUB
.... Digital Revolution ...
1992
1994
1993
1995
1998
2000
2002
2004
2005
2007
2009
2011
2012
2014
2016
Laurillard – Re-Thinking University Teaching
Laurillard – Re-Thinking for the Knowledge Society
Wikileaks
Friesen – Re-Thinking e-Learning Research
Paris OER Declaration


Content is king
Context is everything
Hypermedia / Multimedia
Rich media
Flexible Content & Learning
All about data
Hypertext & Multimedia
World Wide Web
Apple & Microsoft mis-read Internet
Learning Technology Standards
Google
Learning Management Systems
"Content is King" – Digital Libraries
Web Services
e-Research
YouTube
Social Media, e-Portfolios
Open Educational Resources
Cloud Computing
Smart phones & tablets
ATC21S
MOOCs
Learning analytics
EDUPUB
.... Digital Revolution ...
1992
1993
1994
1995
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2011
2012
2014
2016
Laurillard – Re-Thinking University Teaching
Laurillard – Re-Thinking for the Knowledge Society
4th Paradigm of Science – Data intensive computing
Friesen – Re-Thinking e-Learning Research
Wikileaks
Paris OER Declaration
Student-Centred Pedagogies

EMERGING TRENDS

- Student-Centred Pedagogies
- (Smart) Learning, Education, Environments, …
- Big Data
- Analytics
- Artificial Intelligence
- Virtual Reality & Augmented Reality
- Internet of Things
- A growing “Open” Agenda

MITOPENCOURSEWARE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
ORCID
OPEN COURSEWARE CONSORTIUM
Connecting Research and Researchers
EnablingOpenScholarship
OPEN ACCESS
OPEN KNOWLEDGE INTERNATIONAL
Open Knowledge Initiative
OPEN SOCIETY FOUNDATIONS
OPEN {API} INITIATIVE
The Open University
COAR
Confederation of Open Access Repositories
OPEN Content Alliance
Building a digital archive of global con
for universal ac
PKP | PUBLIC KNOWLEDGE PROJECT
OERu
Open Learning Initiative
Transforming higher education through the science of learning.
open culture
The best free cultural & educational media on the web
Open Educational Resources
open source initiative
OPEN INQUIRY PROJECT
A PROJECT OF THE INSTITUTE FOR HUMANE STUDIES
Open Data Foundation
WIKIPEDIA
The Free Encyclopedia
OpenAIRE
Open Access Infrastructure for Research in Europe
OASIS
OPEN UNIVERSITIES AUSTRALIA
OER COMMONS
OPEN EDUCATIONAL RESOURCES
KHAN ACADEMY

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United Nations Educational, Scientific and Cultural Organization

MARCH 2004:
Openness Key Principle of Internet Governance

In The Information Debate, Openness and Privacy Are The Same Thing

Posted Jun 10, 2015 by Martin Tisné (@martintisne)

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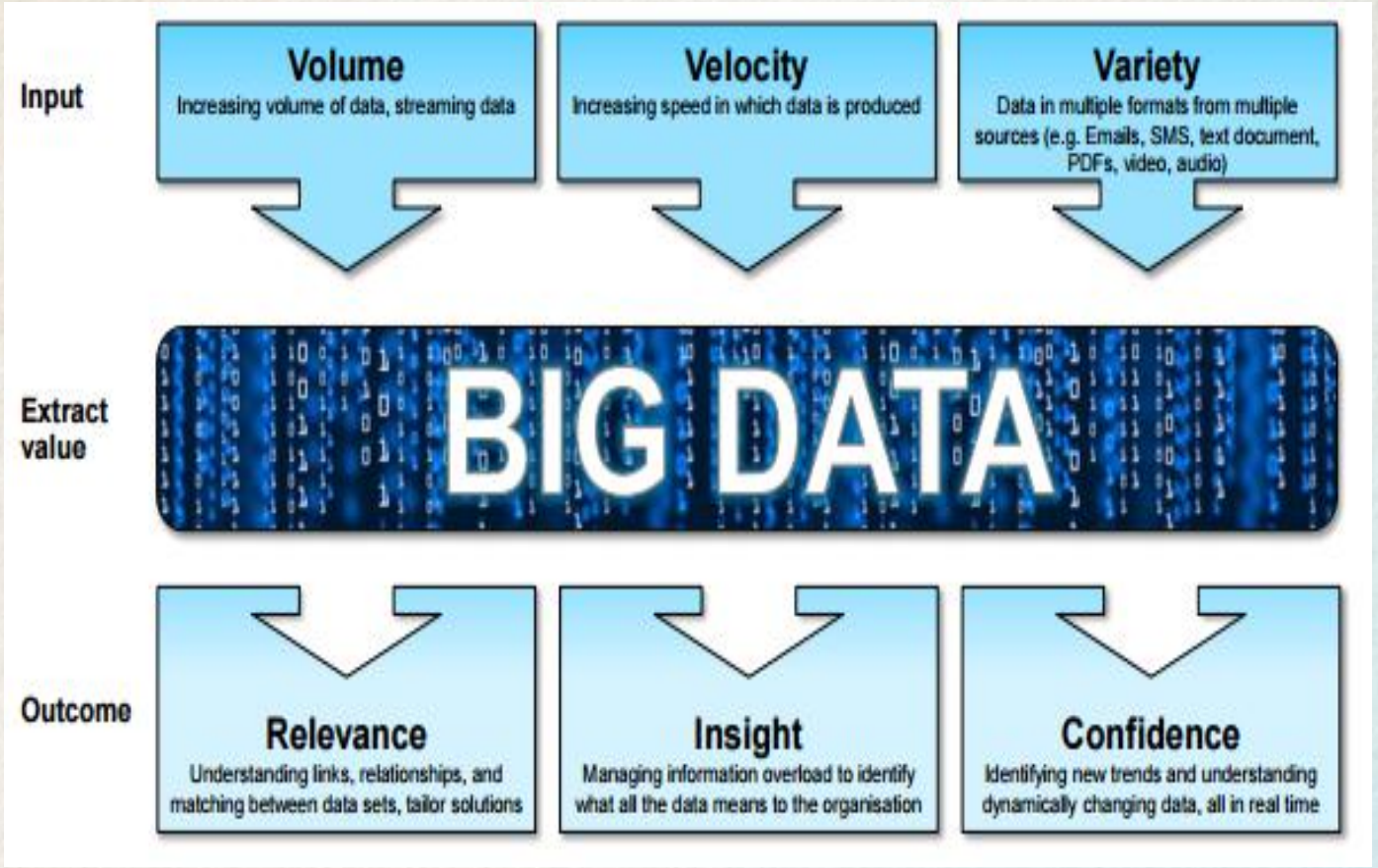
Beijing Advanced Innovation Center For Future Education

Master of Digital Learning Futures - Where Digital Technology and New Media Meet Education

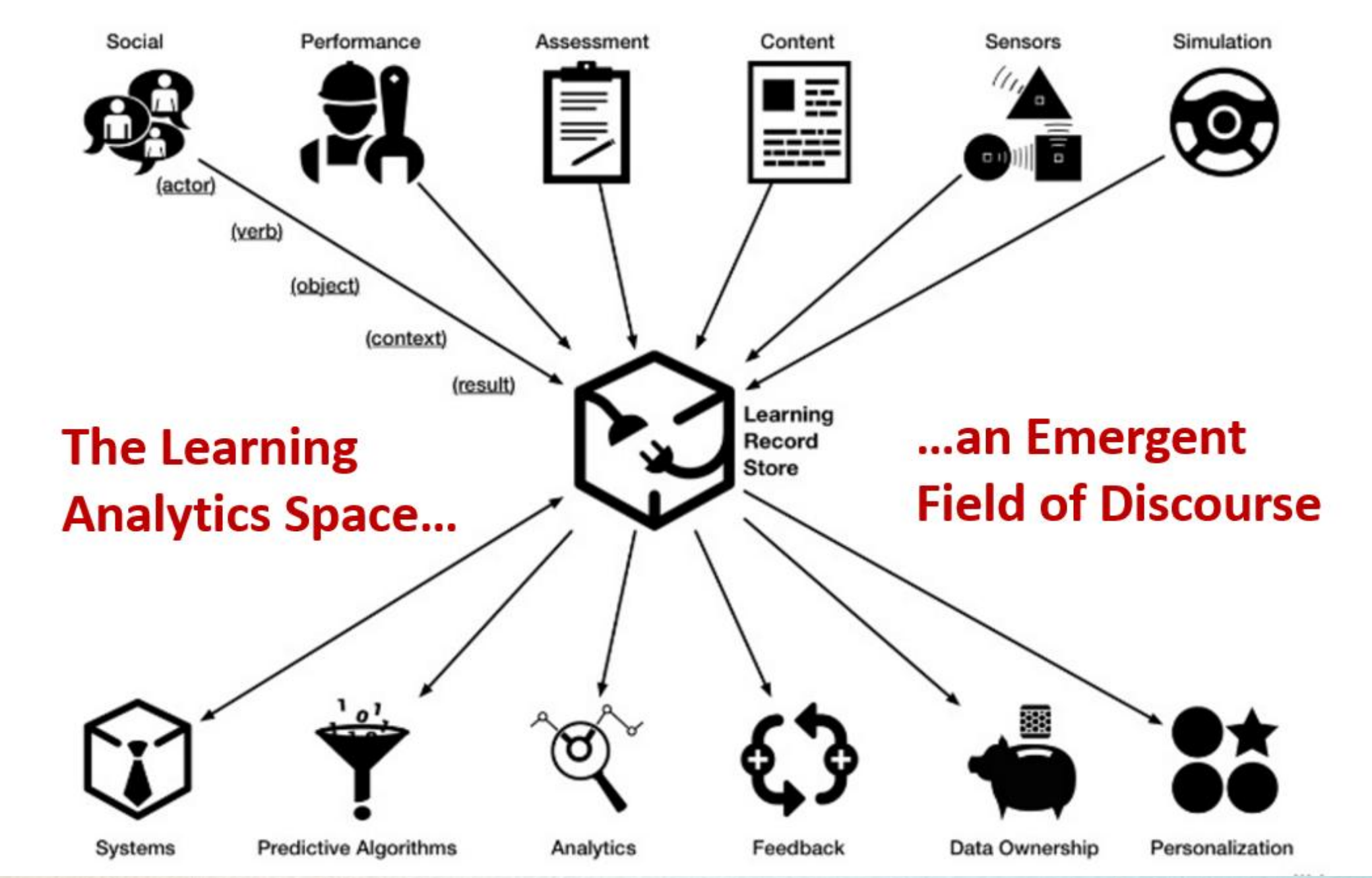
https://cdu.edu.au/education/courses-and-programs/mdlf



With over 80% of relevant data existing in **unstructured** form …
Structured data assists in answering "**what**" questions.
However, "**why**" questions and deeper insights require organisations to also factor in unstructured data.

Diviny, P., Morris, T., & Noble, P. (2013). Big Data: How can it enhance your strategy? http://www.spp.com.au/uploads/pdfs/Using_Big_Data_to_enhance_your_strategy_Final.pdf

Please Rate
English 中文 日本語 Bahasa Melayu
CHANGI
airport singapore
Please rate your experience
Excellent
Good
Average
Poor
Very Poor
Your Experience

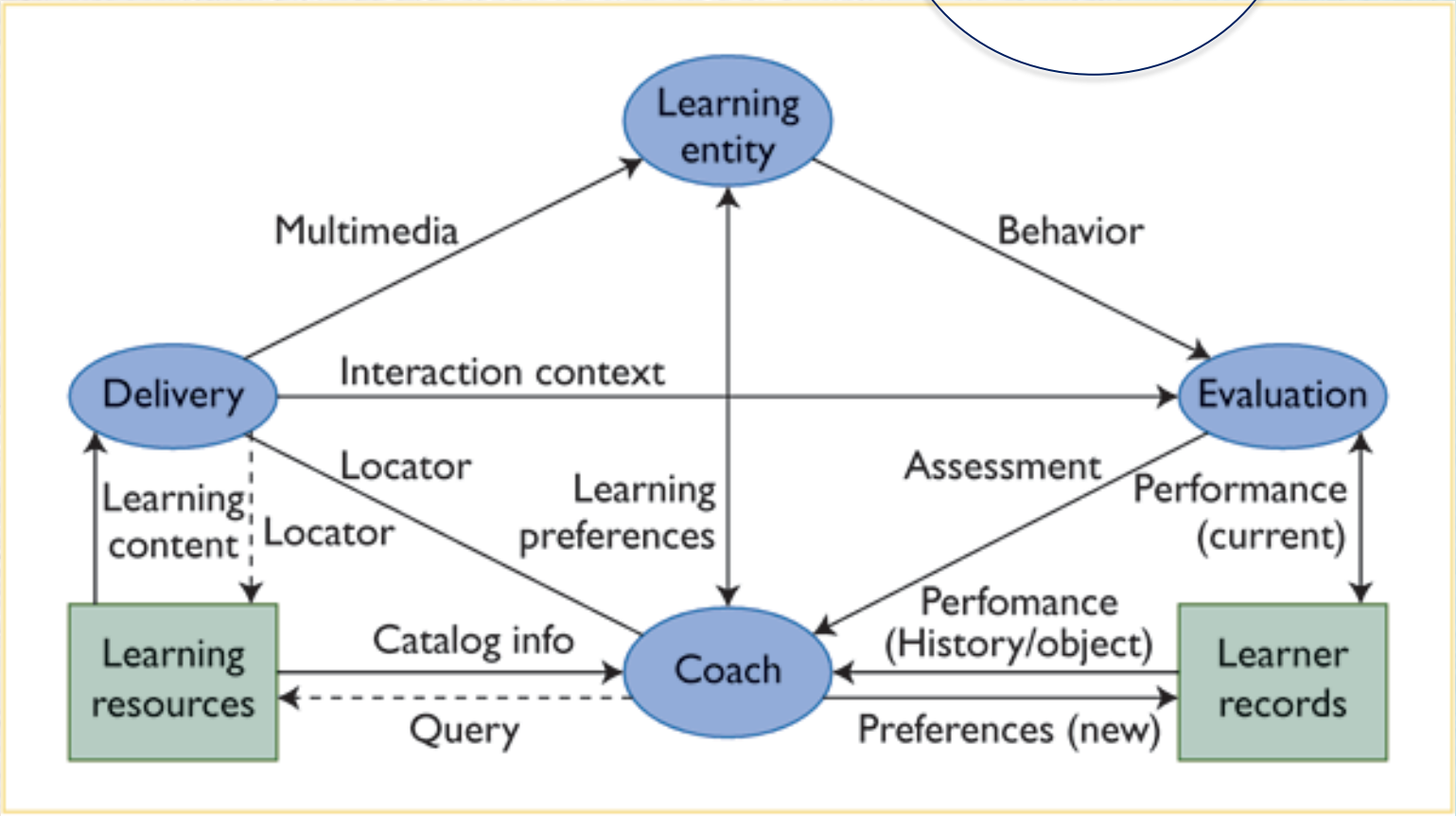

Social
Performance
Assessment
Content
Sensors
Simulation
(actor)
(verb)
(object)
(context)
(result)
Learning Record Store
The Learning Analytics Space…
…an Emergent Field of Discourse
Systems
Predictive Algorithms
Analytics
Feedback
Data Ownership
Personalization

IEEE STANDARD

1484.1-2003 - IEEE Standard for Learning Technology - Learning Technology Systems Architecture (LTSA)

Description: A high-level architecture for information technology-supported learning, education, and training systems that describes the high-level system design and the components of these systems is specified in this standard.

STATUS: Withdrawn Standard



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Training & Learning Architecture – Experience API (xAPI) – 2013

Big Data: A Revolution That Will Transform How We Live, Work and Think, by Viktor Mayer-Schönberger and Kenneth Cukier, *John Murray, RRP £20/Houghton Mifflin Harcourt, RRP$27, 256 pages*

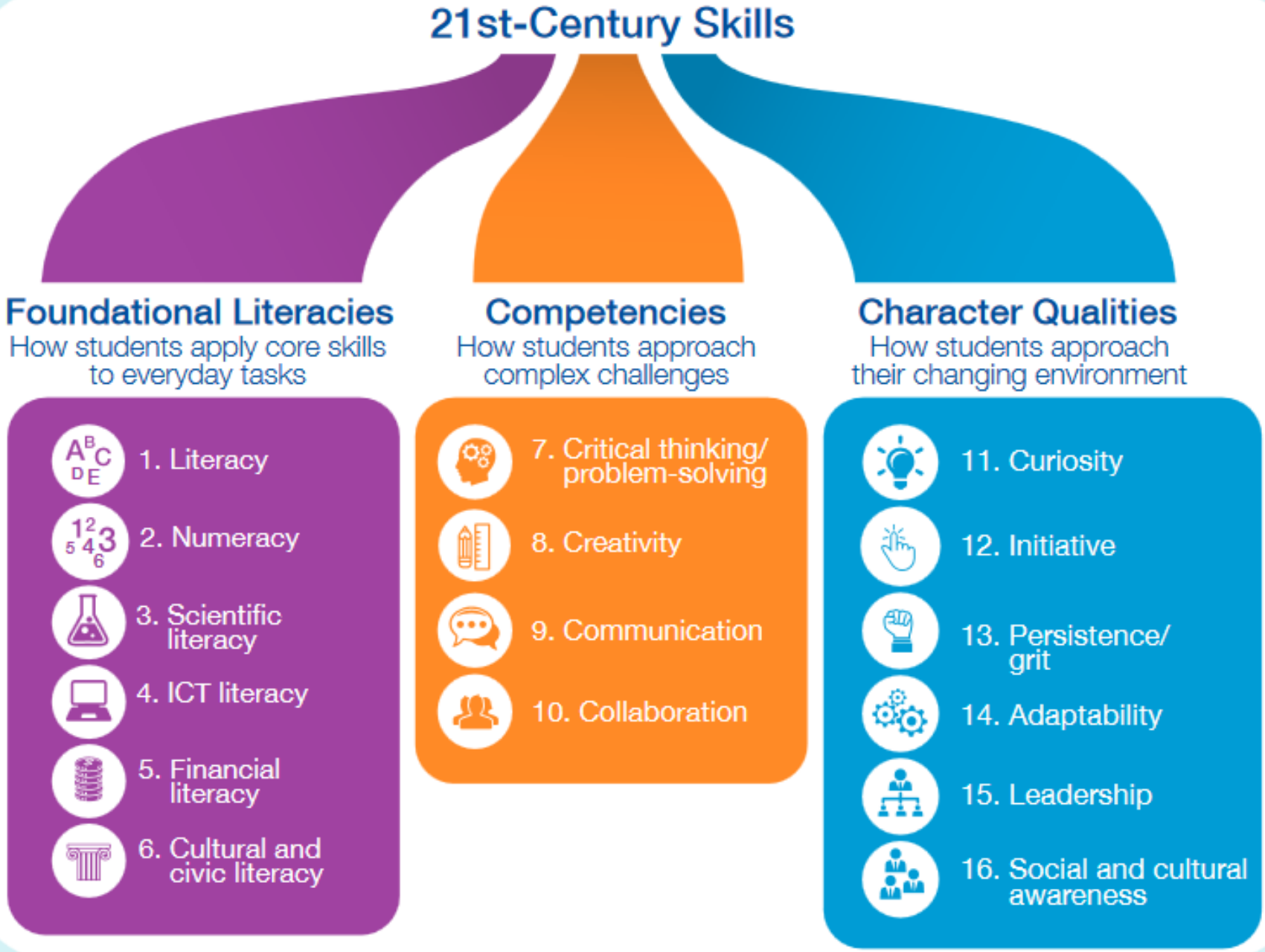
"Using a sample of 12,000 price observations … [the] "predictive model [was created that]… had no understanding of *why*, only *what*." p. 4

Experts are now developing the necessary tools to identify and compare non-linear correlations … in the age of big data, these new types of analyses will lead to a wave of novel insights … We will grasp complex technical and social dynamics that have long escaped our comprehension … But most important, these non-causal analyses will aid our understanding of the world by primarily asking *what* rather than *why*. At first, this may sound counterintuitive. After all, as humans, we desire to make sense of the world through causal links …" pp. 62-23

Causal reasoning no longer needed?

Mayer-Schönberger, V., & Cukier, K. (2013). *Big data: A revolution that will transform how we live, work, and think*. Houghton Mifflin Harcourt.

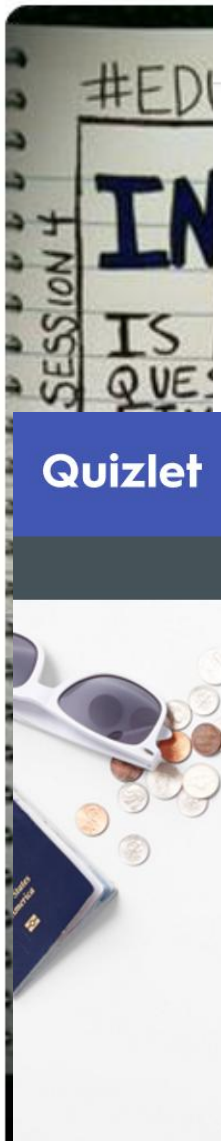
http://www3.weforum.org/docs/WEFUSA_NewVisionforEducation_Report2015.pdf



QUESTION TECHNOLOGIES

- Question-Answering Systems
- Automated Question Generation Systems
- Social Media

Teacher {QUESTIONING} Tools!



Could you elaborate further?

Quora

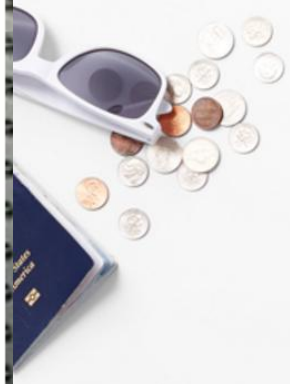
Search for questions, people, and topics

Epistemology | Knowledge | Philosophy of Everyday Life | Psychology of Everyday Life

What is the difference between having knowledge about something, and "knowing

Quizlet | Search | Create

Study anywhere with the Qui



Simple tools for learning anything

Join at

slido.com

#BAICEF

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ISO IEC JTC1 SC36

CELTSC 教育部教育信息化技术标准委员会 全国信息技术标准化技术委员会教育技术分技术委员会

Current SC36 Study Groups – Led by China

- Digital Badges
- **Smart Classrooms**
- MOOCs
- Reference Model for ICT Evaluation in Education

SMART LEARNING – SMART CLASSROOMS

- How to model this?
- What can we learn from established models?

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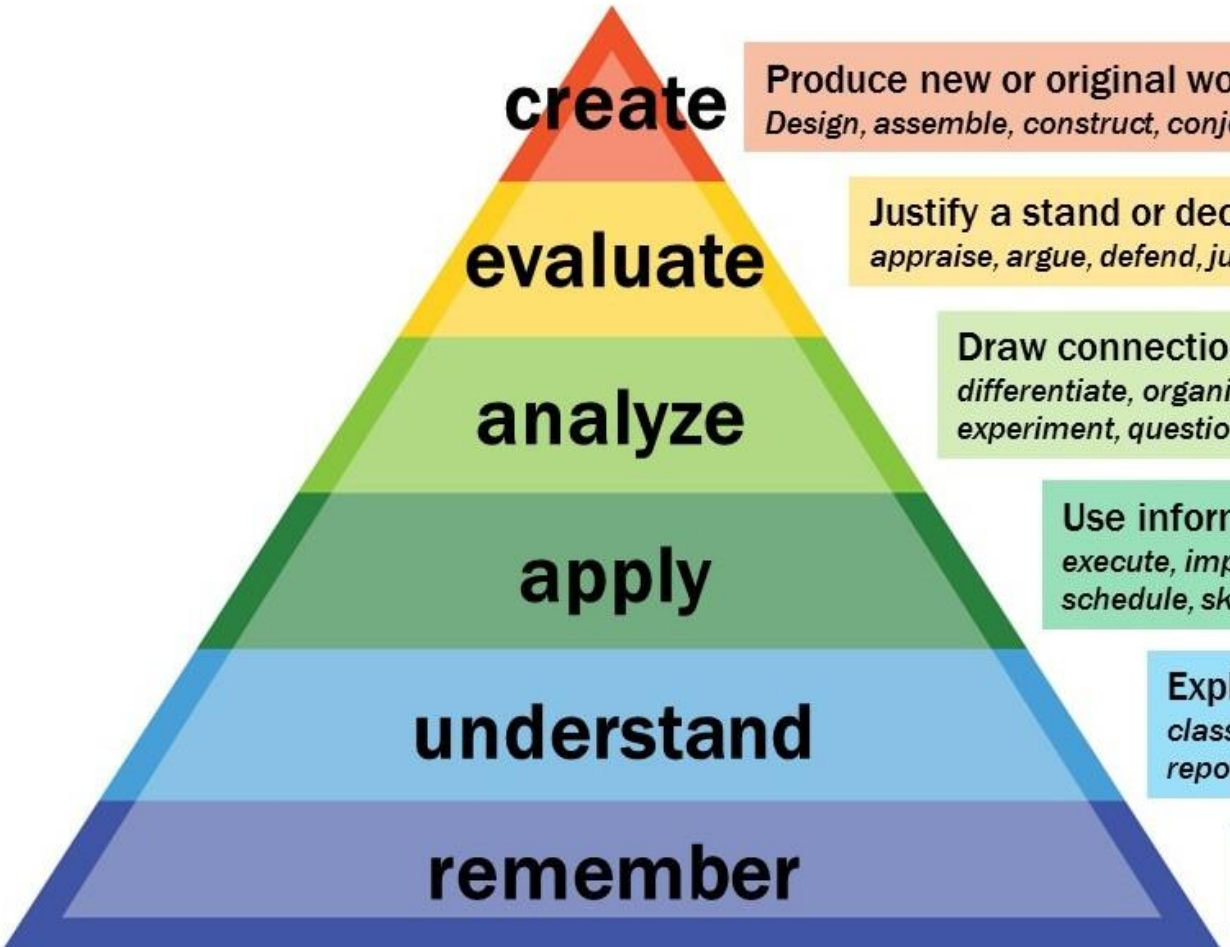
Bloom's Taxonomy



Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

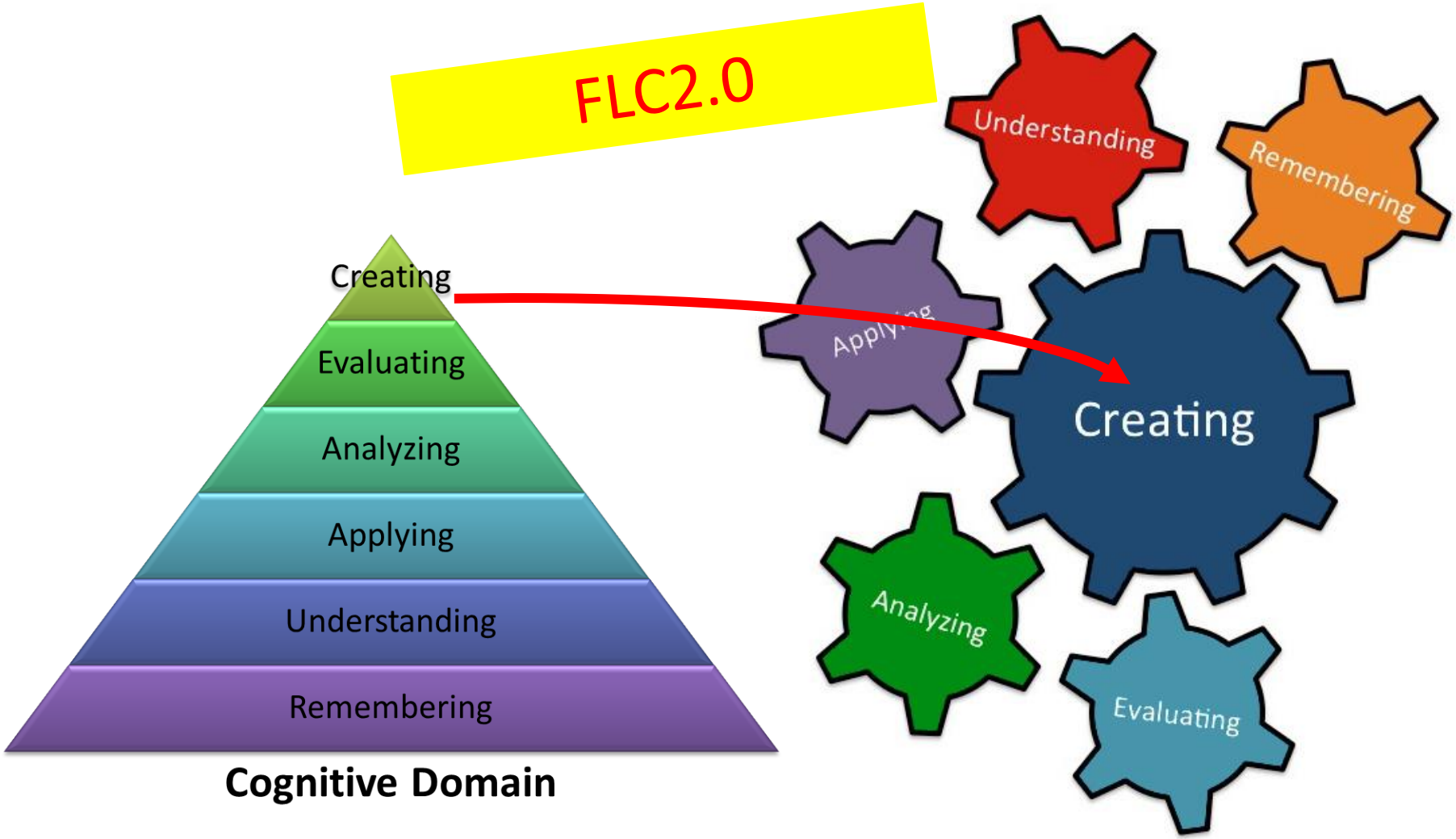
Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

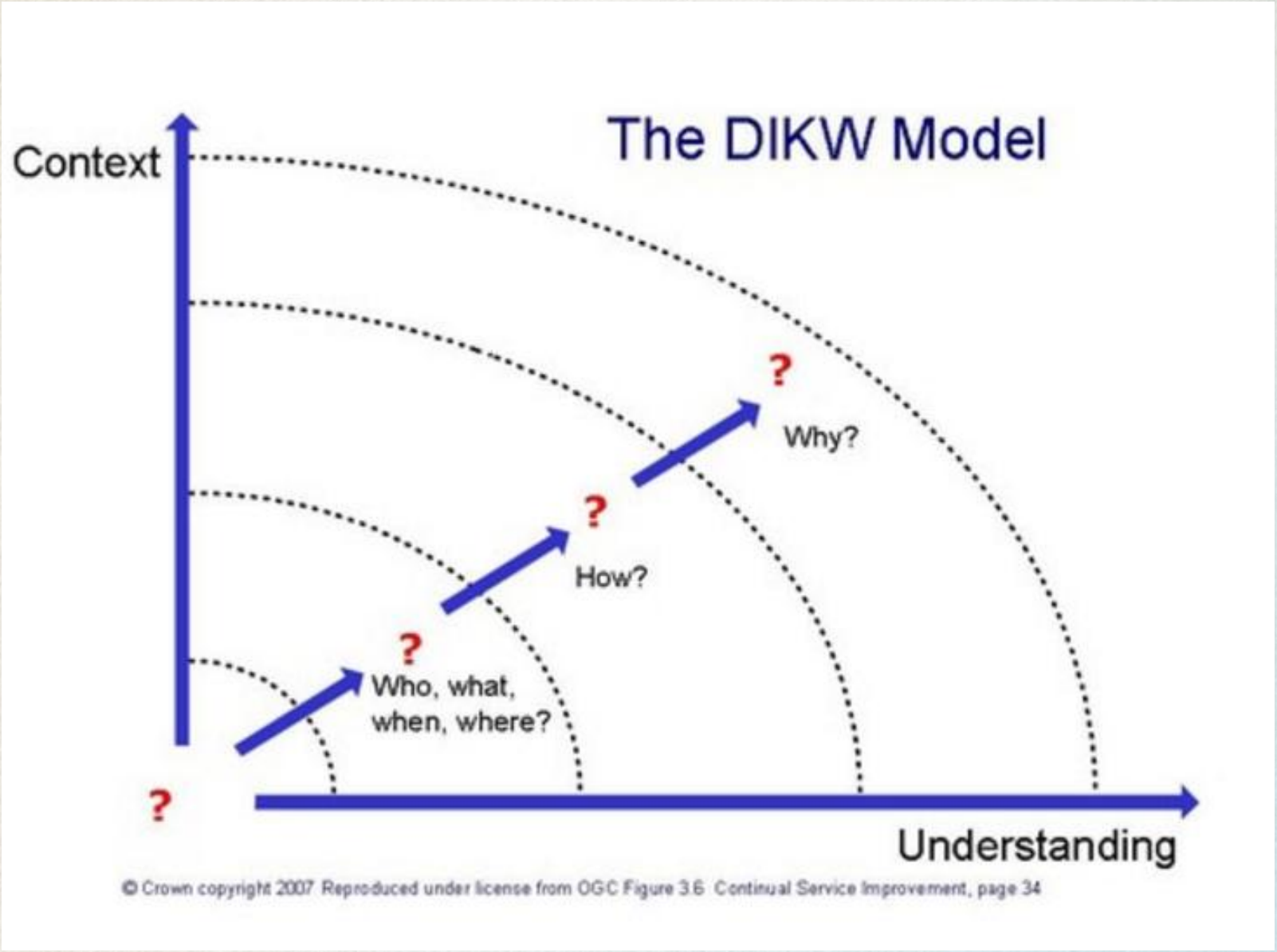
Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state

翻转课堂2.0：走向创造驱动的智慧学习
Flipped Classroom2.0: Moving to Creating-Driven Learning



- Is this model useful?
- Where might smart learning fit?
- Can this model mislead?



© Crown copyright 2007 Reproduced under license from OGC Figure 3.6 Continual Service Improvement, page 34

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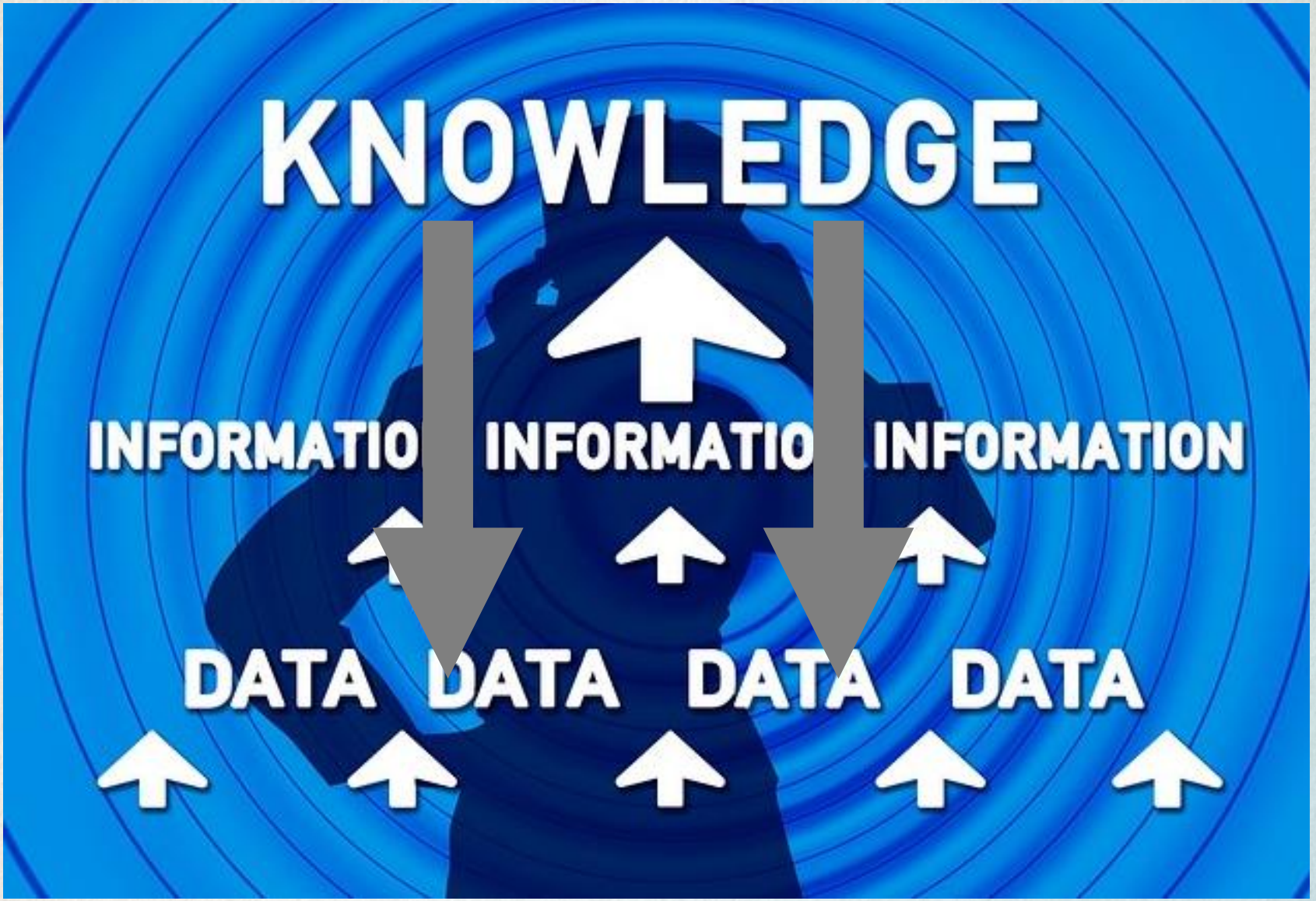

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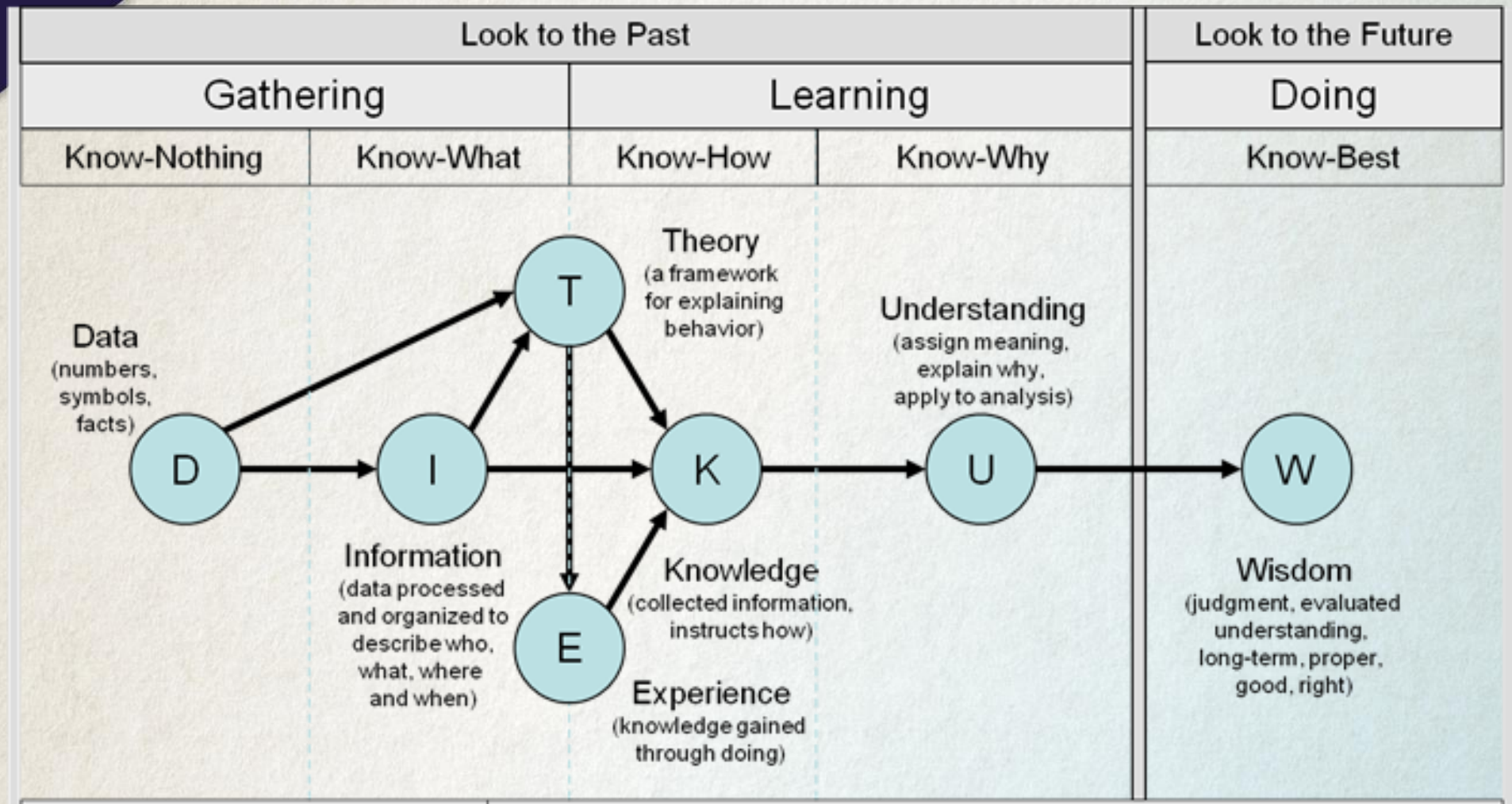

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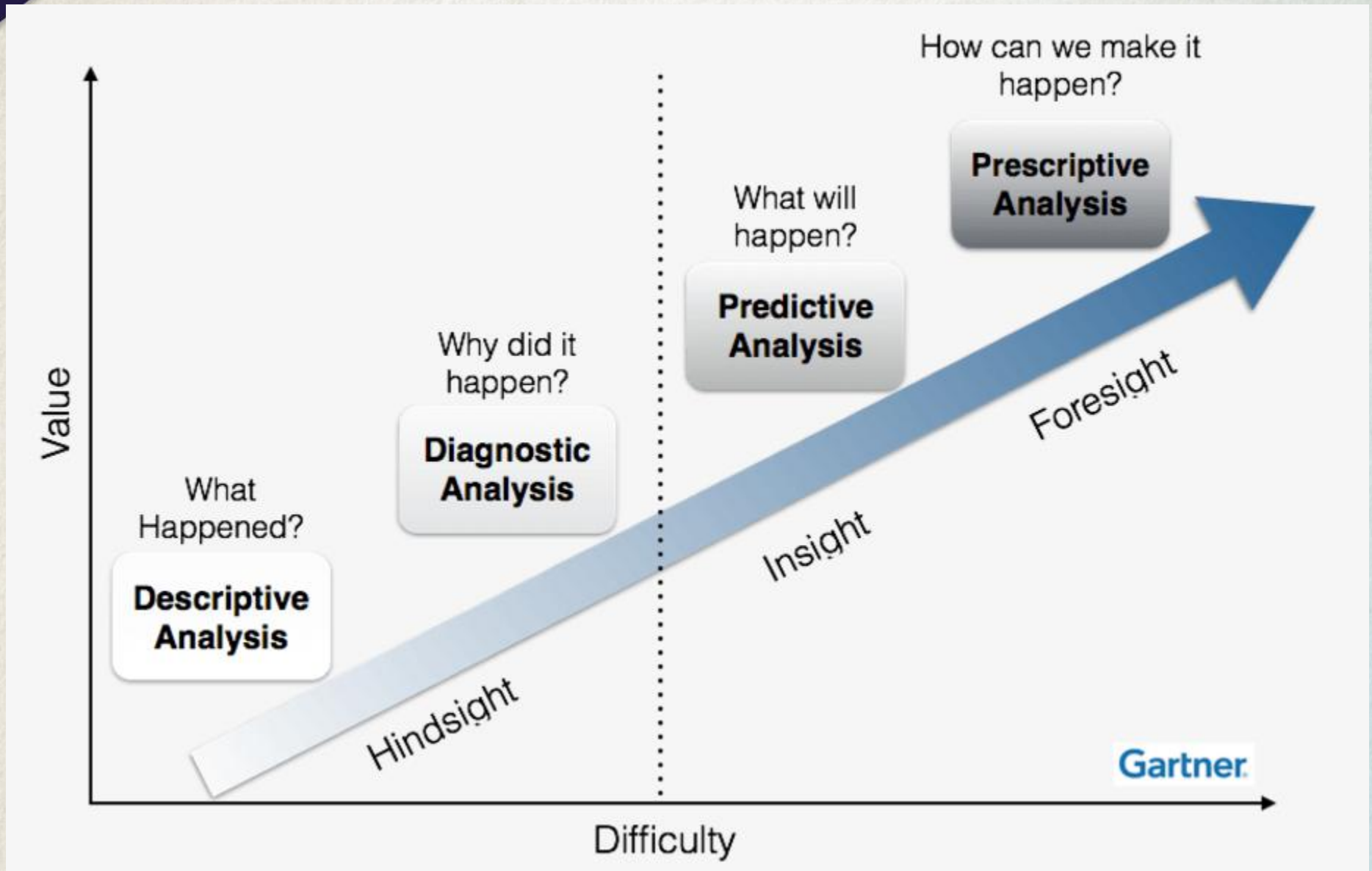

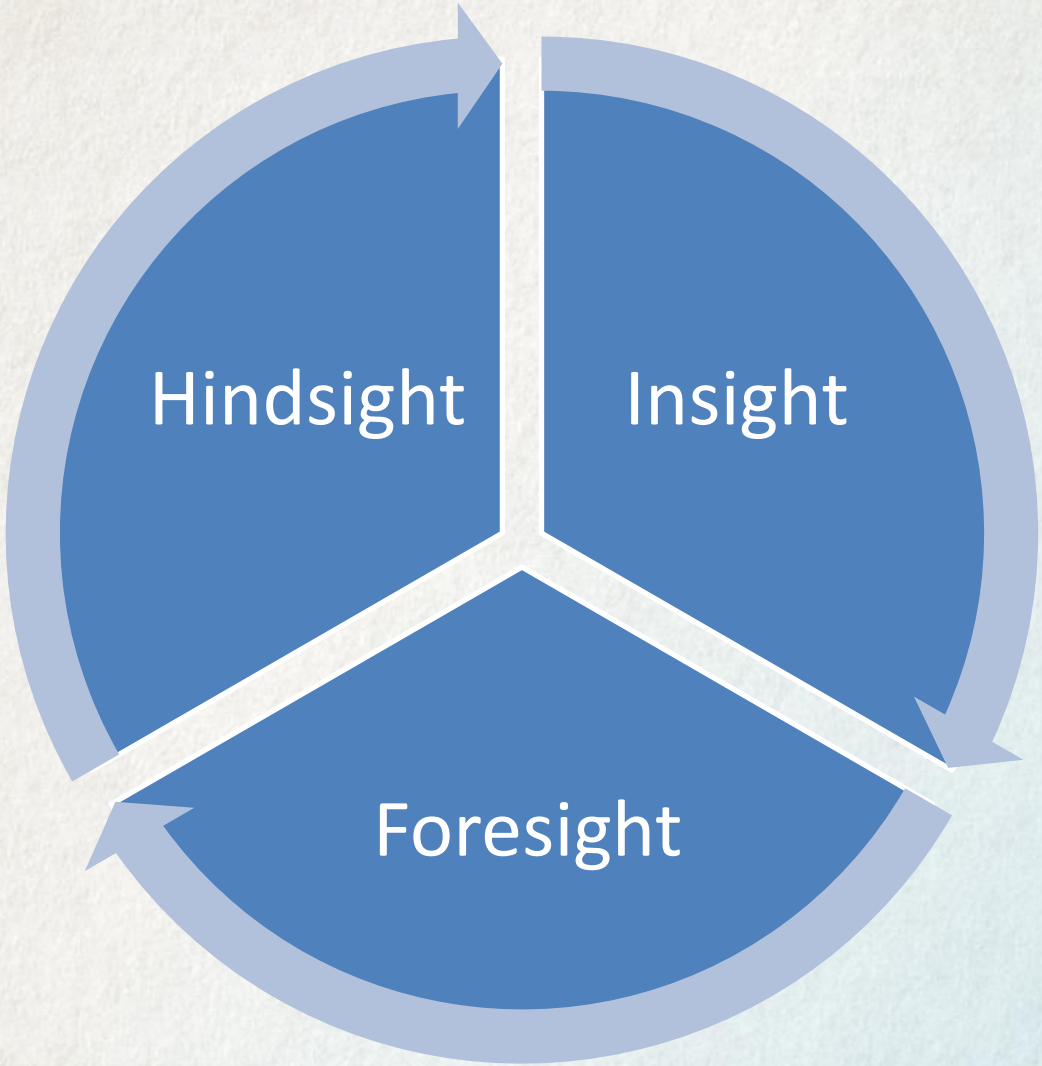
Hindsight
Insight
Foresight

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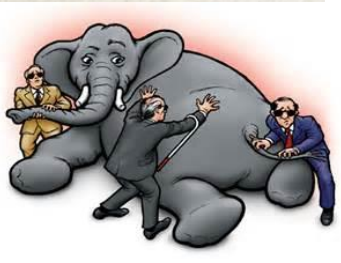
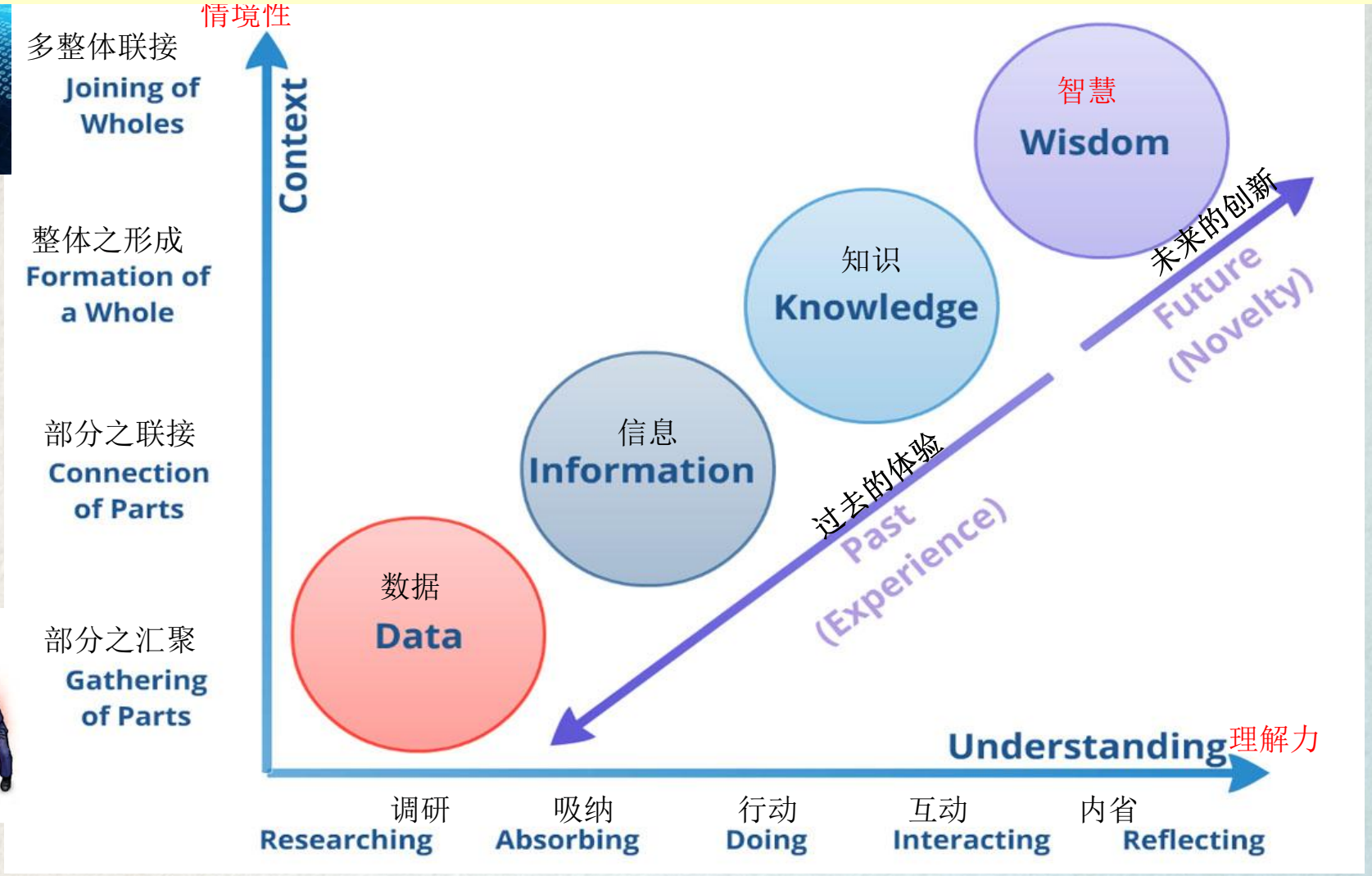
智慧教育的初步定义
A preliminary definition of Smarter Education as proposed

The essence of smarter education is to construct technology-infused environments and create finer ecology of pedagogies, so that higher achievements of teaching, better experiences of learning and personalized learning services could be enabled, and thus talents of wisdom who have better value orientation, higher thinking quality, stronger doing ability and deeper potentiality of creating could be fostered. (*Zhu Zhiting, 2012*)

智慧乃是高阶智力品性

The Chinese translation of SMART is closing to WISE,
…whereas wisdom involves advanced intellectual traits





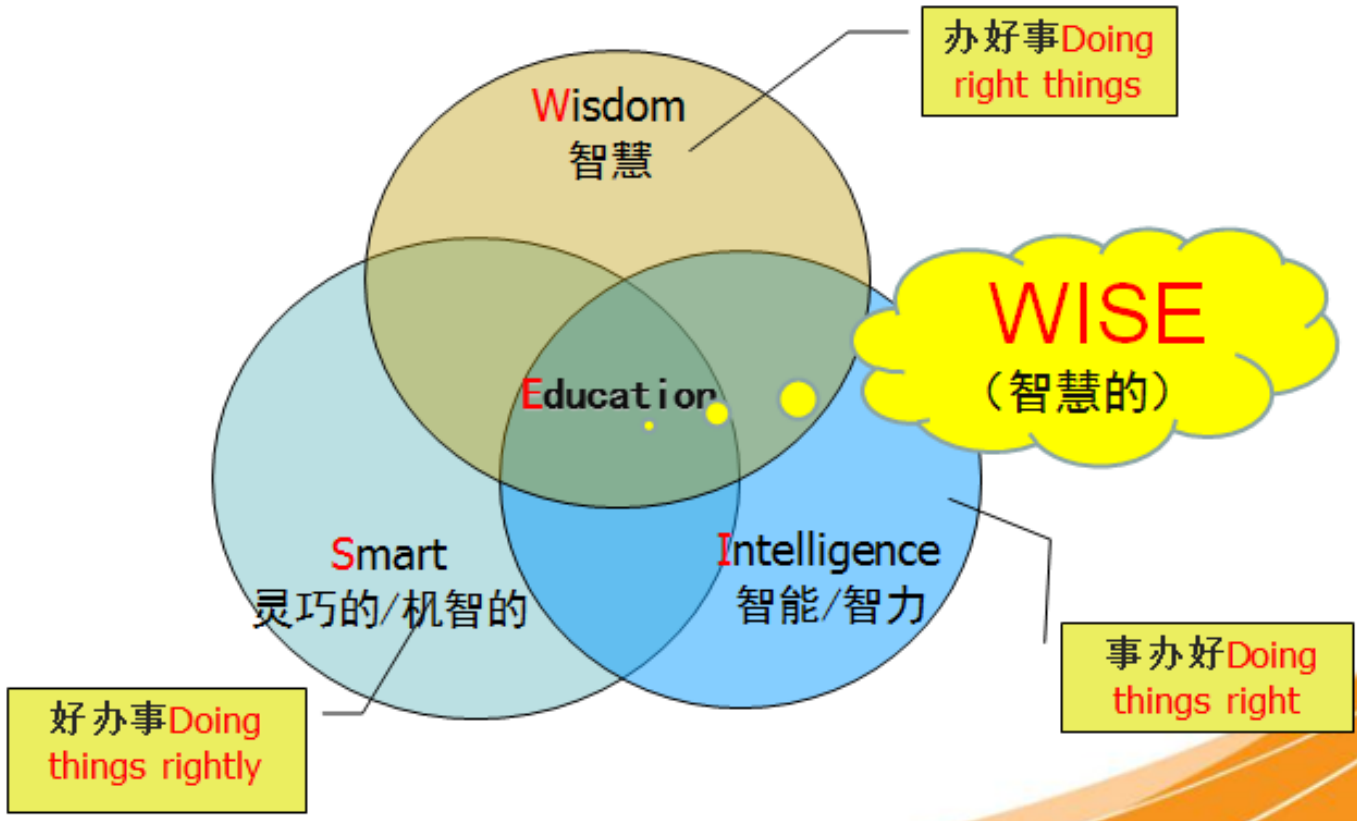
进一步丰富智慧教育的内涵
Enriching the implication of *Smart* education: Education for Wisdom

- Wisdom: The ability to use your knowledge and experience to make good decisions and judgments
(*Cambridge Dictionary*).

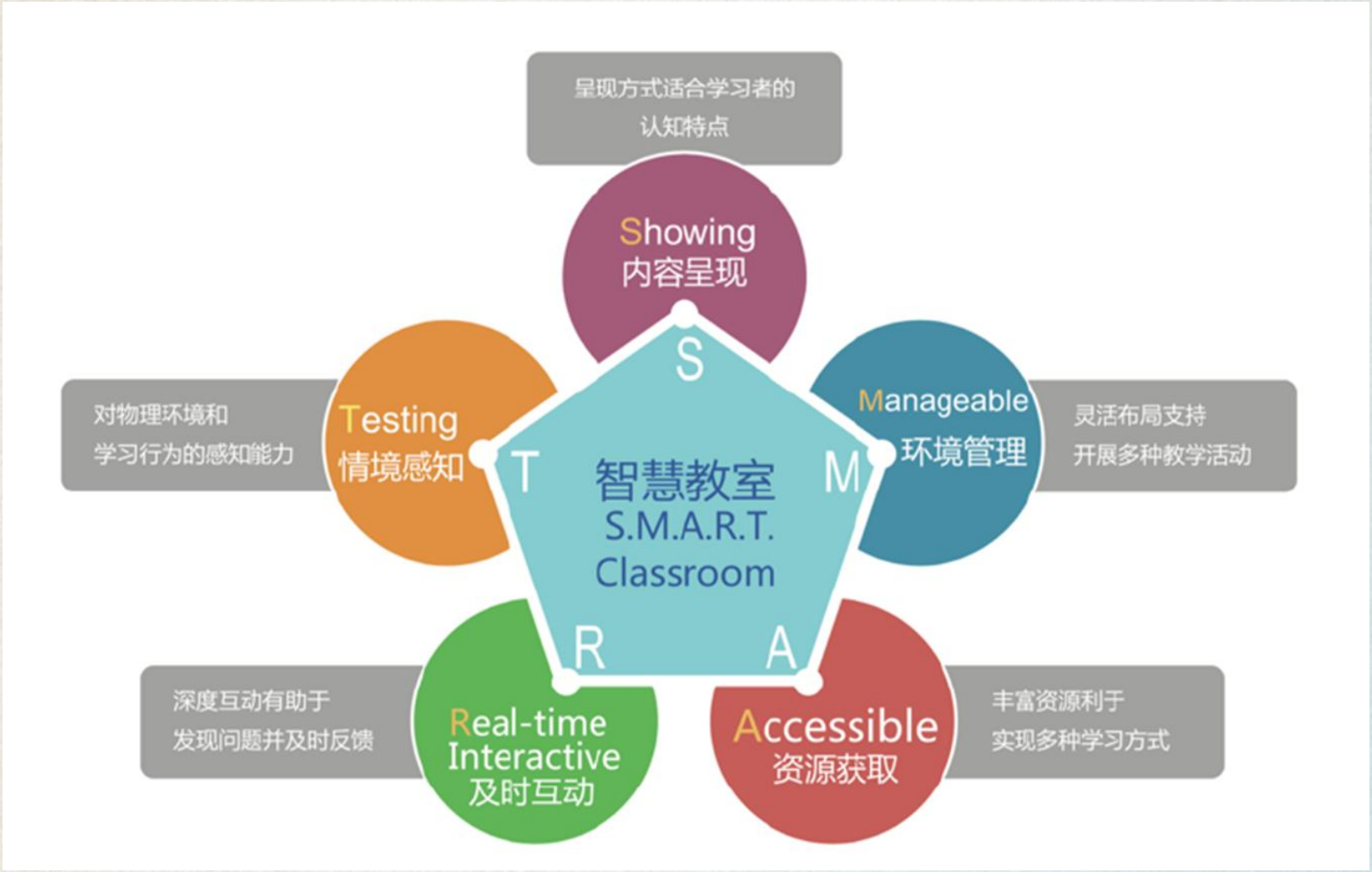
- According to Confucius, wisdom can be learned by three methods: reflection (内省， the noblest), imitation (模仿， the easiest) and experience (体悟， the bitterest)
(http://en.wikipedia.org/wiki/Wisdom)

综合理解智慧相关概念

Education Comprehending Smart, Intelligence and Wisdom



智慧教室功能模型
Functional model of Smart Classroom



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PROBLEM

"Questioning, Smart Education, & Learning Analytics"

→ How to connect these ideas?

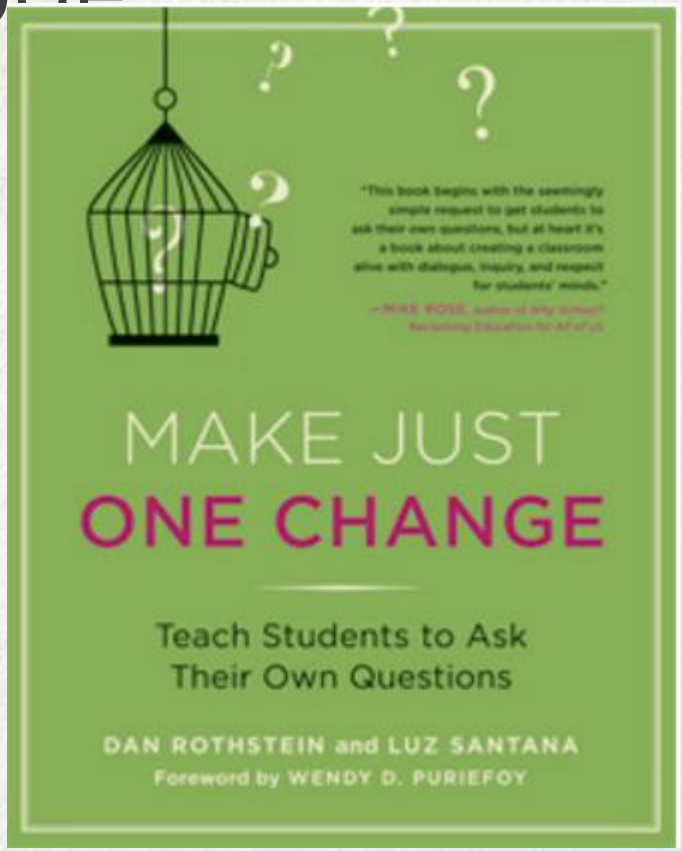
→ How will we be prepared for the future & the many different future that will emerge?

→ What questions do we need to ask?

THE QUESTION FORMULATION TECHNIQUE

optional mini-workshop

THE QUESTION FORMULATION TECHNIQUE



QFT STEP 1 – QUESTION FOCUS

QFT STEP 2 – THE RULES

- Ask as many questions as you can
- Do not stop to discuss, judge or answer any questions
- Write down every question exactly as it was stated
- Change any statements into questions

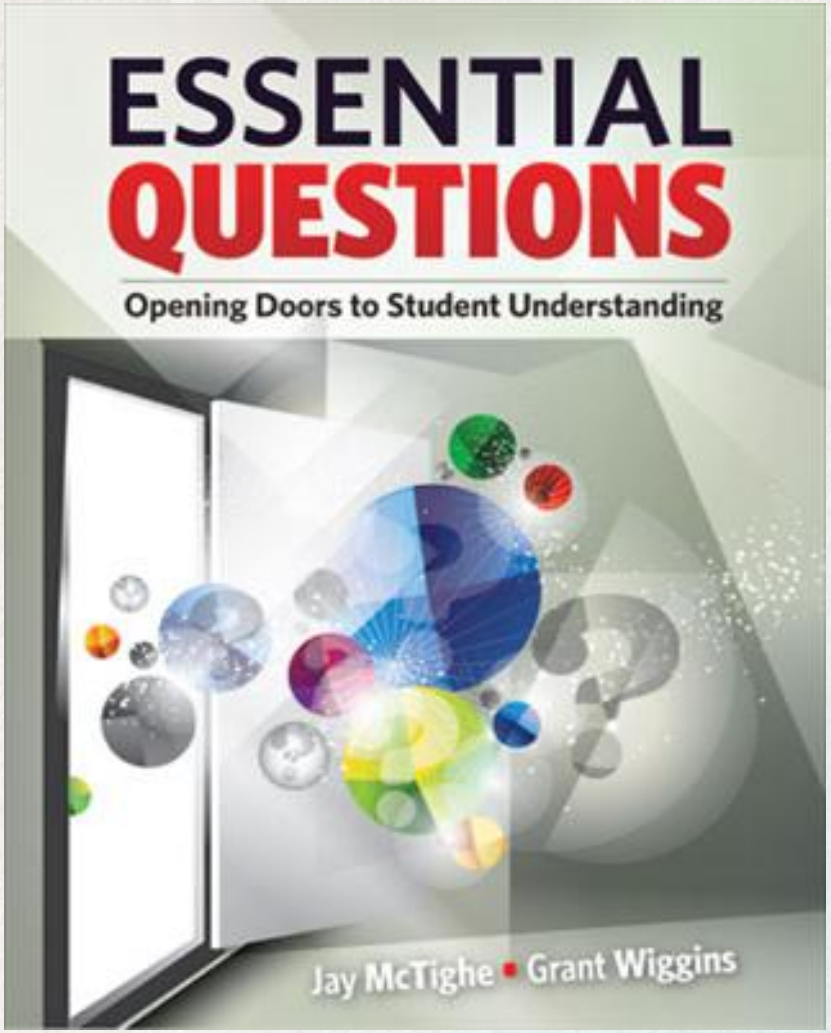
QFT STEP 3 – CATEGORISE THE QUESTIONS

- Open or Closed?
- What are the advantages & disadvantages of each?
- Transpose one to the other

QFT STEP 4 – PRIORITISE THE QUESTIONS

- **Engage**
- **Reflect**

Many ways to classify questions, & to reflect on them



http://essentialquestions.org/

ESSENTIAL QUESTIONS

- Asked to stimulate ongoing thinking & inquiry
- Raise more questions
- Spark discussion & debate
- Asked & raised throughout a unit of learning
- Demand justification and support
- “Answers” may change as understanding deepens

- In history and social studies:
  - How can we know what *really* happened in the past?
  - What is worth fighting for?
  - Whose "story" is it?
- In mathematics:
  - When and why should we estimate?
  - How does *what* we measure influence *how* we measure? How does *how* we measure influence *what* we measure (or don't measure)?
  - What do good problem solvers do, especially when they get stuck?
- In language arts:
  - Why am I writing? For whom?
  - How do effective writers hook and hold their readers?
  - How are stories about other places and times about me?
- In science:
  - How are structure and function related in living things?
  - Is aging a disease?
  - How do we decide what to believe about a scientific claim?
- In the arts:
  - What influences creative expression?
  - What's the difference between a thoughtful and a thoughtless critique?
  - If practice makes perfect, what makes perfect practice?

An essential question:

- has no right or wrong answer; it is meant to be argued
- is designed to provoke and sustain student inquiry
- addresses the conceptual or philosophical foundations of a field of study
- raises other important questions
- naturally and appropriately recurs throughout a discipline
- stimulates ongoing rethinking of big ideas, assumptions, and prior lessons

Examples of Essential Questions

Literature	Math	Science	Social Studies	The Arts
What makes a story great? Why read fiction? Does literature reflect or shape culture?	Can everything be quantified? What are the limits of mathematical models? How does what we measure influence how we measure it?	How do you study the unobservable? Can everything be known scientifically? What is the relationship between religion and science?	Is all history biased? Do things change more than they stay the same? What makes a good government?	What is art? Is the medium the same as the message? Do we need art? What does art tell us about ourselves?

http://www.nhcs.net/instruction/citw%20year%20I%20links/

QUESTIONS ABOUT ICT & QUESTIONING

- What can be learned from a focus on *questions as data*?
- How might question formulation be supported online?
- What can be learned from the structure, function, formulation, and intent of questions?
- What digital technologies are used to support sense-making?
- In what ways might human-computer interfaces be further developed in order to scaffold deep and prolonged in-session questioning?
- In what ways might ontologies of questioning support such an endeavour?

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谢谢您的关注