The Impact of Digital Age on Higher Education

Beyond Transformation from Physical to Digital Sphere

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Outline

1. Purpose of Study
2. Background Issue
3. Past Digitization Measure in HE
4. Consequences of Digitization on HE

COMPARISON

5. Discussion

Purpose of Study

Argument

- The digitization process had greater impact on higher education than merely digitization
- The current policy measure on higher education is failing to meet the impact of digitization

Method

- Comparing past measure on digitization with the currently observed impact of digitization

Background Issue

1. HE Reform in the past
2. The Digitization Process

Background:
Higher Education Reform since 1990s

- In response to the mass and universal access of higher education:
  - Globalization
    - Bologna Process
    - World University Rankings, Brain Gain
  - Marketization
    - Agile University Management
    - Governance Reforms
  - Massification of HE
    - Learning Outcome
    - Active Learning

Higher Education Reform …driven by Globalization

- Effect
  - Universities seen as global entity rather than national entity.
    - Universities need to position themselves in the world.
- Initiatives
  - Global Competition
    - World University Rankings
    - Brain Gain—international students & excellent researchers
    - Research funding, number of articles & citations
  - Harmonization & Alliance
    - Bologna Process—adjusting HE systems across countries in Europe
    - Englishization
    - World University Consortium & Alliances for research and education

Higher Education Reform …driven by Marketization

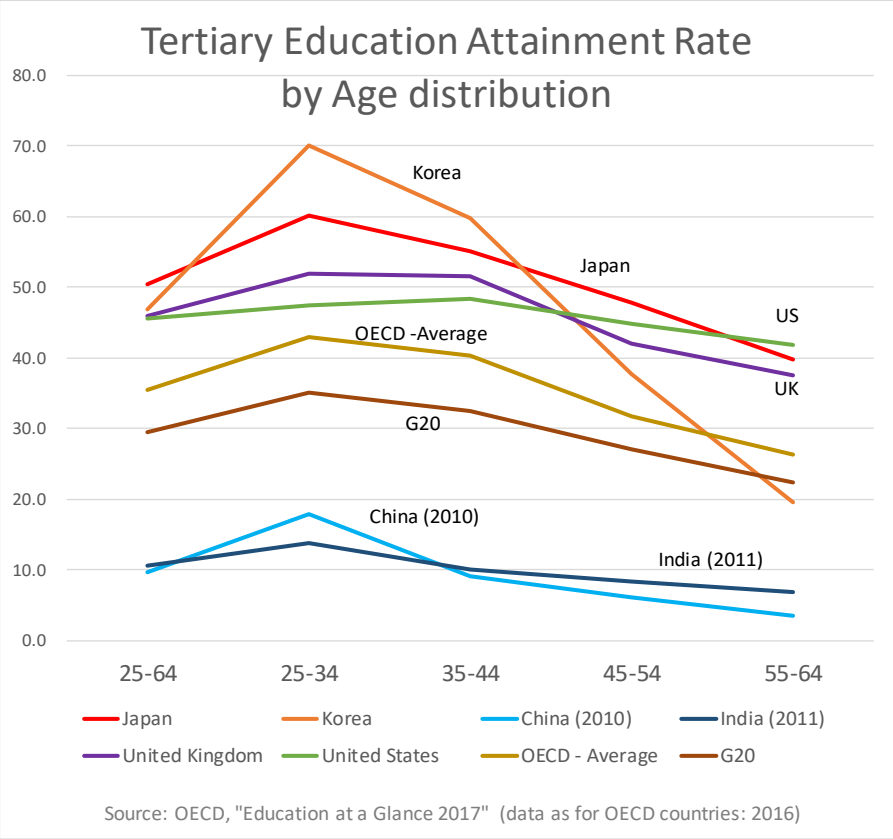
- Effect
  - Universities seen as an enterprise rather than social good.
    - Universities need to manage itself to keep afloat.
- Initiatives
  - University Management
    - Governance Reform—Corporatization, Leadership
    - Fund Raising—Endowment, Gifts, University-Industry Linkage
    - Evidence-based decision making, Institutional research
    - Commercialization—University sports, tuition rise
  - Accountability Issues
    - Accreditation, University Evaluation
    - Performance-based funding—input to output-based funding

Elite to Mass to Universal Student Access

- Proposed by Martin Trow in 1973
- Describing the transition in higher education according to HE Enrollment rate

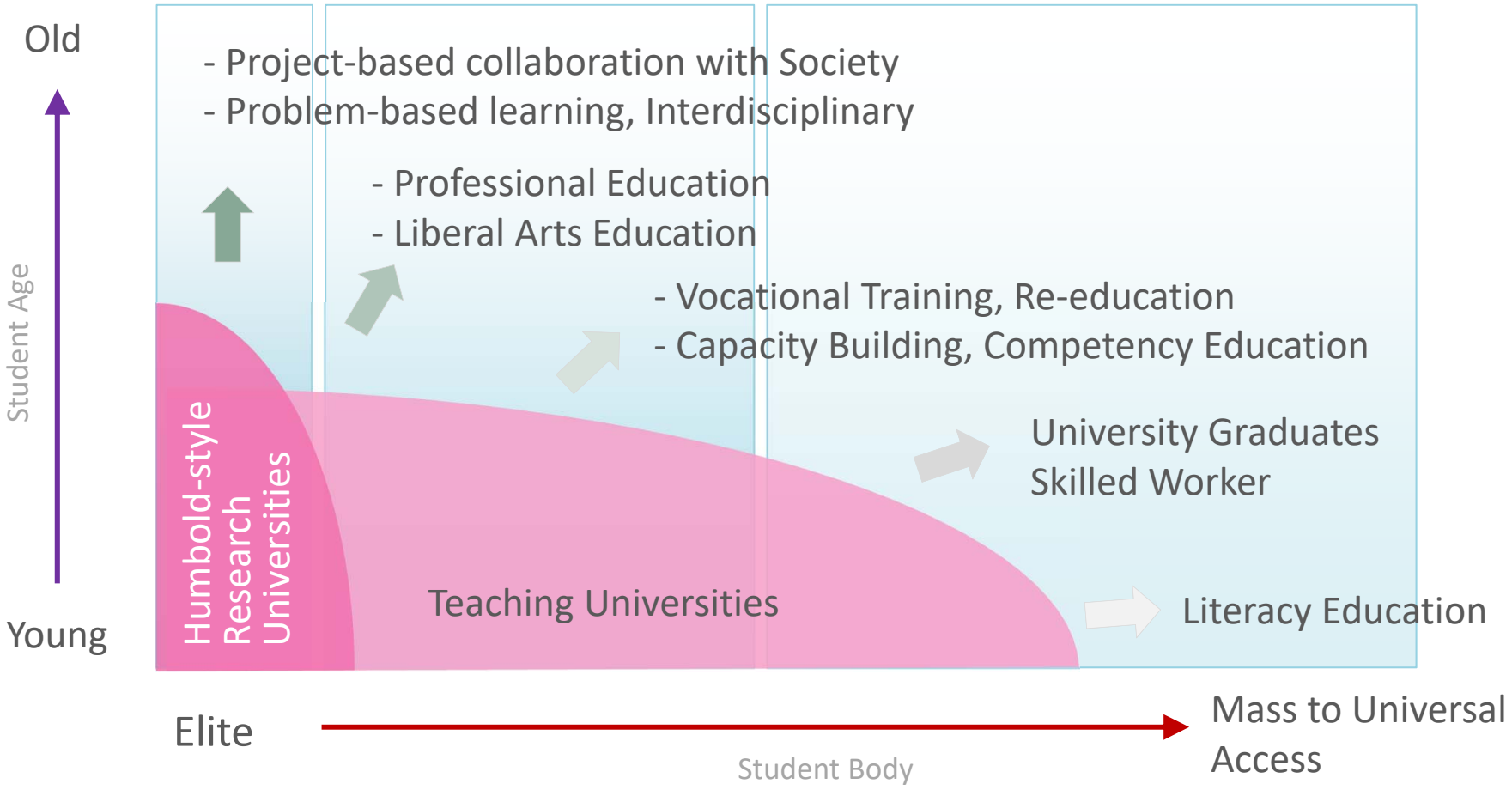
Stages of Higher Ed	Elite	Mass	Universal
Higher Ed Enrollment	-15%	15% - 50%	50% -
Access	Privilege	Right	Obligation
Student Body	Uniform	Diverse	Estremely Diverse
Governance	Consensus making by academics	Professional Staff & Bureaucracy	Administration

The shrinking gap between society and the academia

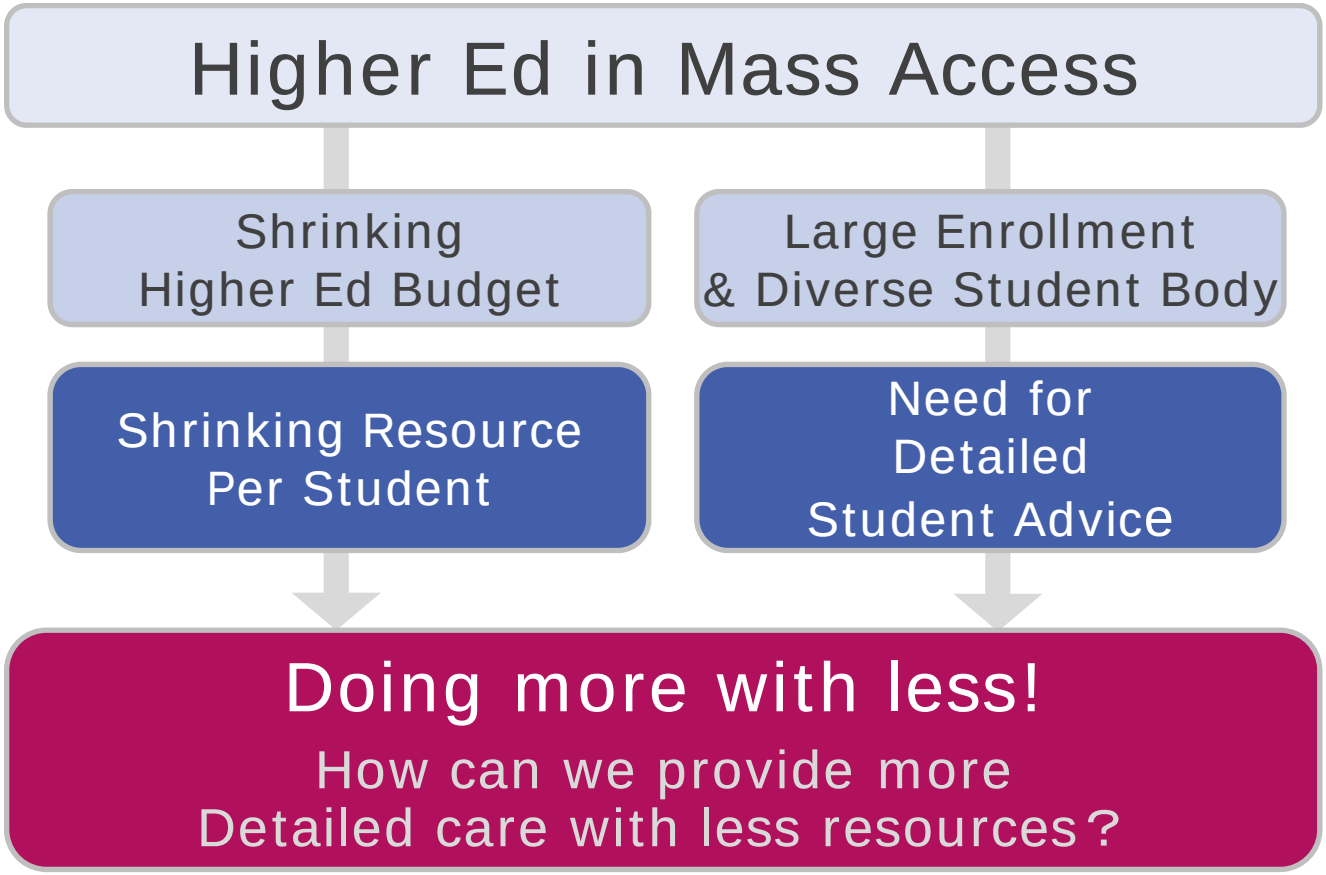


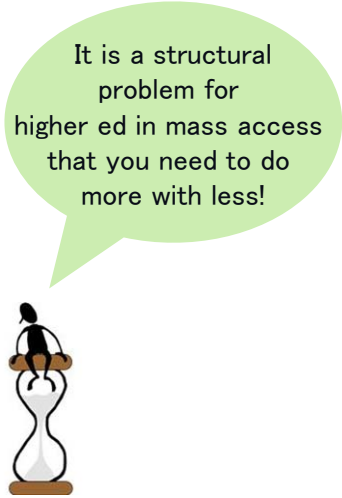
- Tertiary education attainment rate is rising, especially for younger generation.
- Thus, citizens literacy and analytical skills are getting comparable to the academia.
- This results in stronger demand for accountability and societal problem-solving.

The Changing Landscape of HE by the change of student body



The Issues of Higher Education in the era of Mass Access





The Consequence of the shift from elite to mass/universal access of HE

- Greater HE Attainment led to:
  - Deficit in HE Budget
    - Need for Agile University Management
    - Greater Competition among Universities
  - Diverse Student Body
    - Need for Greater Student Care
    - Need to transform the focus from elite students to ordinary students

Higher Education Reform …driven by HE Massification

- Effect
  - Universities need to prepare students for work rather than holistic education.
- Initiatives
  - Active Learning & Preparing for Work & Coping with mass
    - 21st Ctr. Skills, Competency-based education
    - High-Impact Educational Practices (AAC&U)—First-Year Experiences, Service Learning, Undergraduate Research, Global Learning, Learning Communities…
    - Career Education, Internship, Dual Course, Professional Training
    - Personalized Learning, Online Learning, MOOCs
    - Unbundling of HE, Modularlization, from Credit-time to Competency-based
  - Student Advising
    - Student Center, Student Advising, Remedial Education, Mental Care
    - Educational Institutional Research
    - Faculty Development

The current university administrations are just **overwhelmed and exhausted** by the university reforms driven by globalization, marketization, and HE massification!

The Digitization Process

- 1950s:
  - Introduction of Electronic Computers
    - Only few professionals involved
- 1970-80s:
  - Introduction of Supercomputers and Workstations
    - Broader but still limited people at large companies, public institutions, universities have access to computers.
- 1990s-:
  - Introduction of Personal Computers
  - The Internet open for civilian use
    - Start of Information Society

Information Society in Full Swing

- Digital technology as communication tools
  - E-mails, Blogs, SNS, e-shopping, news sites, search engines, portal sites, etc.
  - Computer use beyond document creation and computation needs.

Digitization Process in Higher Education

- Supercomputers for Large-scale computation needs
- Establishment of Computer Science Department
- Personal Computer and Internet Access for every staff
- Electronic Database and Journals
- Information System for University Management

Past Digitization Measure in HE

1. Forming Departments in Computer Sciences
2. Introduction of Information Literacy Education
3. Establishing the IT infrastructure
4. Establishing Information System and Archiving Documents
5. Establishing Legal Framework for Digital Practices

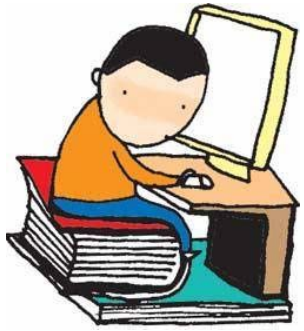
Past Digitization Measure in HE:
Forming Departments in Computer Sciences

- 1940-50s:
  - Development of computers and related research
    - Skeptical views whether a discipline around computers can be formed
- 1960s:
  - "Computer Science" as an academic discipline
    - Computers not only for numerical processing but also for various information processing

Past Digitization Measure in HE:
Forming Departments in Computer Sciences …Japan's case

- 1950s:
  - WS and Training session on the use of computers and information processing
- 1970s:
  - Various theories on "Information Societies" emerge (情報社会論)
    - Japanese government makes forecast on the demand of computer engineers and departments
- 1980s:
  - Rapid Growth in Microelectronics and VLSI
    - Deficit in computer engineers result in vocational schools
- Now:
  - Still deficit in computer engineers, especially quality engineers
    - University-Industry linkage for raising computer engineers

Past Digitization Measure in HE: Information Literacy Education …Japan's case



- 1980s:
  - Information Processing Courses at Japanese research universities
    - Computer programming, numerical calculations
- 1990s:
  - Computer Literacy Courses at most Japanese universities
- After 2006:
  - Entrance of students who had compulsory "information" courses at high schools
  - Dropping "computer literacy", and introducing "academic literacy"
    - "locating information," "processing information," and "expressing with information"

Past Digitization Measure in HE: Establishing IT Infrastructure …Japan's case

- Introduction of Personal Computers
  - Initially in shared use, then for individual use
  - Educational computer centers for students
- Information Networks
  - Nationwide Network
  - Local are network at each universities
    - 1990s to beginning 2000s

Past Digitization Measure in HE: Information System and Archiving Documents …Japan's case

SCHOLARLY COMMUNICATION

- Japan Information Center for Science and Technology (JICST)
  - Journal articles on demand service in print (1957)
  - Online service (1976)
- National Center for Science Information Systems (NACSIS)
  -> National Institute of Informatics (NII)
  - Bibliographic Catalogue System (1976-)
  - NACSIS-IR (1991), NACSIS-ELS (1997), Webcat (1998)
  - CiNii (2005), KAKEN (2005)
  - JAIRO-Cloud (2012)
- Information Systems for University Management
  - Accounting System
  - Human Resources System, etc.

Past Digitization Measure in HE:
Legal Frameworks for Digital Practices …Japan's case

- Legal Framework for e-learning
  - On campus education
    - Limited to 30 credits of 124 credits
  - Distance education
    - Face-to-face education needed at least 30 credits
    - Now, allowed to provide all credits through any media
- Intellectual Property Law
  - Incorporate digital needs
  - Still not largely changed as to affect academic activities at universities

CONCLUSION:
Past Digitization Measure in HE:

- Transformation from physical to digital sphere
  - Nurturing human resources
  - Establishing IT infrastructure

1. Forming Departments in Computer Sciences
2. Introduction of Information Literacy Education
3. Establishing the IT infrastructure
4. Establishing Information System and Archiving Documents
5. Establishing Legal Framework for Digital Practices

Consequences of Digitization on HE

1. Evidence-based decision-making and strategic university
2. Quantification of Research Evaluation
3. Increased Fraud and Enhanced Detection
4. Change in the Power Balance of Scholarly Communication
5. Modular and flexible higher education

Consequences of Digitization on HE: Evidence-based & Strategic Mgmt

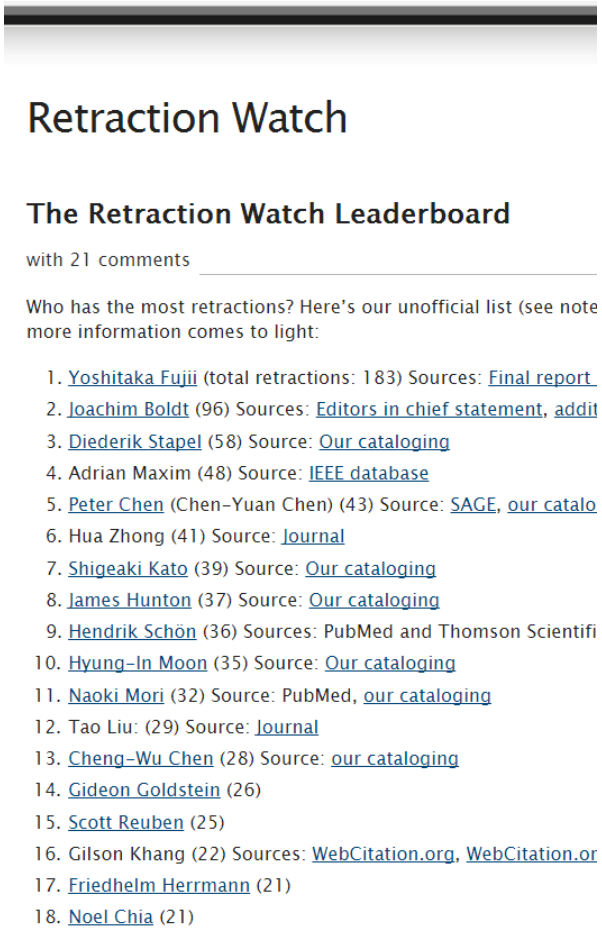
- Emphasis on Evidence-based Management
  - Initially driven by Marketization and Demand for Accountability
  - Digitization accelerated this through information system and data warehouse
- Organizational Structure for Strategic Mgmt
  - Institutional Research Offices
  - CIOs

Consequences of Digitization on HE: Quantification of Research Evaluation

- Quantification of Research Evaluation
  - Impact Factor, Citation Index, h-index
  - University Rankings
- Emergence of Altmetrics
  - Creation and study of new metrics based on the Social Web for analyzing, and informing scholarship.

Consequences of Digitization on HE: Increased Fraud and Enhanced Detection

- Ease of Fabrication, falsification, and plagiarism
  - Scientific Misconduct
  - Cheating and Plagiarism in coursework and exams
- Ease of detection
  - Plagiarism detection tools
  - PID-Persistent Identifiers
- Social Impact
  - Fast Spread of Mouth by SNS
  - Accountability and Investigation Load



Retraction Watch

The Retraction Watch Leaderboard

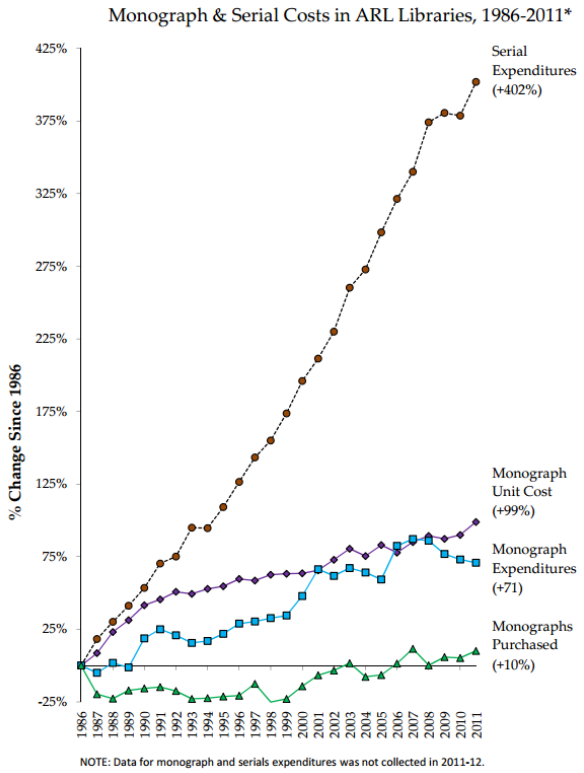
with 21 comments

Who has the most retractions? Here's our unofficial list (see note more information comes to light:

1. Yoshitaka Fujii (total retractions: 183) Sources: Final report
2. Joachim Boldt (96) Sources: Editors in chief statement, addit
3. Diederik Stapel (58) Source: Our cataloging
4. Adrian Maxim (48) Source: IEEE database
5. Peter Chen (Chen-Yuan Chen) (43) Source: SAGE, our catalo
6. Hua Zhong (41) Source: Journal
7. Shigeaki Kato (39) Source: Our cataloging
8. James Hunton (37) Source: Our cataloging
9. Hendrik Schön (36) Sources: PubMed and Thomson Scientifi
10. Hyung-In Moon (35) Source: Our cataloging
11. Naoki Mori (32) Source: PubMed, our cataloging
12. Tao Liu: (29) Source: Journal
13. Cheng-Wu Chen (28) Source: our cataloging
14. Gideon Goldstein (26)
15. Scott Reuben (25)
16. Gilson Khang (22) Sources: WebCitation.org, WebCitation.or
17. Friedhelm Herrmann (21)
18. Noel Chia (21)

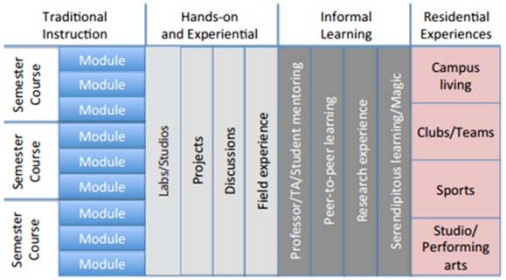
Consequences of Digitization on HE: Change in Power Balance of Scholarly Communication

- Publisher and IT-Platform Provider gaining power over Academia
  - Rising Subscription Fee of Electronic Journals, Rising Cost of Textbooks
  - Provision of Research Metrics
  - Provision of working envinroment
- Open Movement
  - Open Access of Journal Articles
  - Open Research Data
  - Open Science

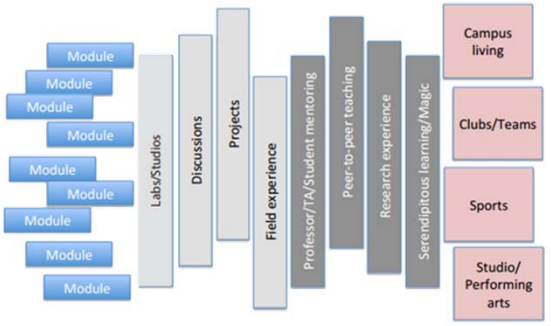


Consequences of Digitization on HE:
Modular and Flexible Higher Education

- Unbundling of Higher Education
  - Online Modules, MOOCs
  - Future of MIT Education



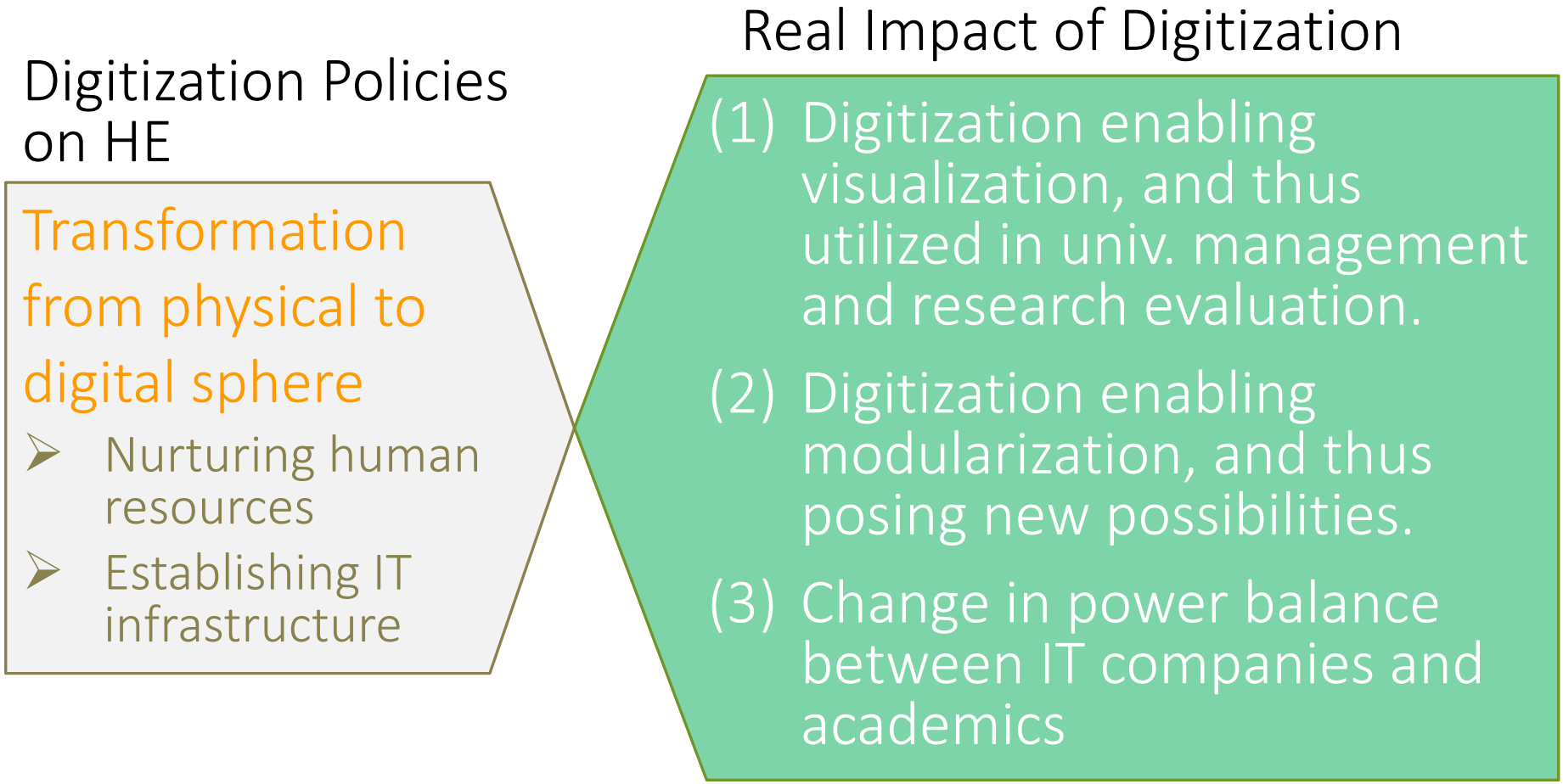
- Competency-based Education through Direct-Assessment Method
  - No teaching, only learning material provided
  - Directly assessing competency and providing credits
  - “Credit hours” might go away!?



DISCUSSION

1. Comparison of Assumed Digitization and the Real Impact
2. Relation between the Digitization of HE and the University Reform
3. University Reform in the Future

Comparison of Assumed Digitization and the Real Impact



Real Impact of Digitization on HE:
(1) Digitization utilized in university management and research evaluation

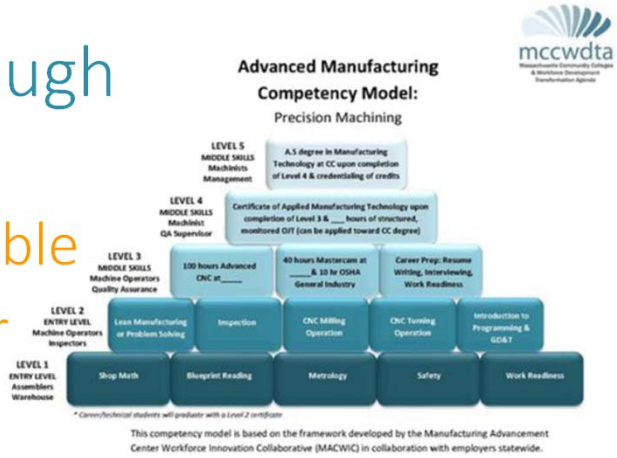
- Advantage
  - Objectiveness
- Disadvantage
  - Distorts decisions and human behavior
    - People tend to maximize the indices
      - Publishing and International collaboration
      - Global Competition induced by University Rankings

Digital Age:

Emphasizing numerical output indices over input pre-conditions, such as history or culture

Real Impact of Digitization on HE: (2) Digitization enabling modularization, and thus posing new possibilities.

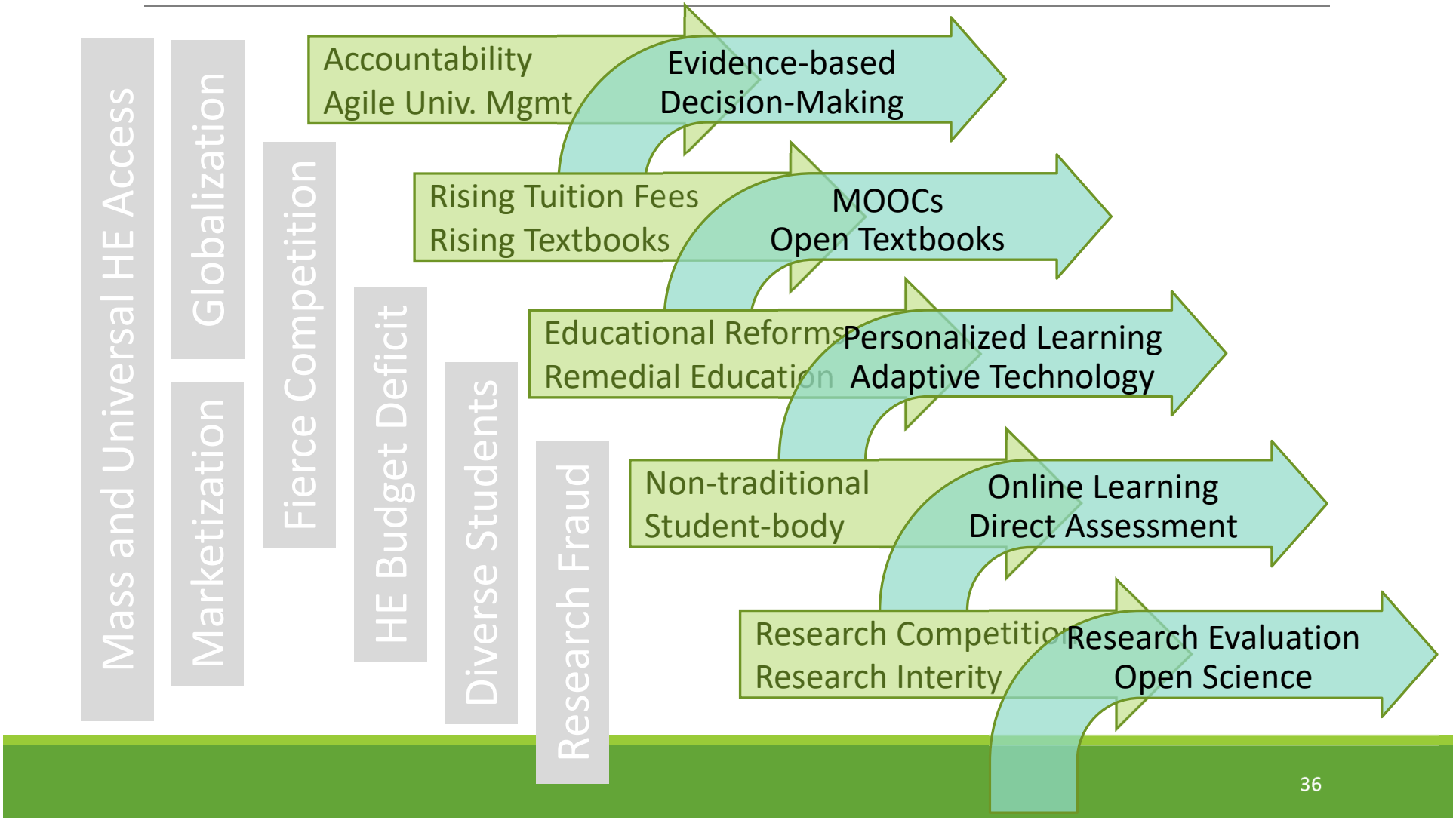
- Unbundling of HE, still not happened
- But strong drive to make it happen
  - Move towards "Competencies"
    - OECD "Core Competencies," ACT21s, Tuning, 学士力、社会人基礎力
  - Competency-based Education through Direct-Assessment Method
    - Assuming competencies to be stackable
    - "Stackable Credentials" especially for Industry-specific Career Pathways



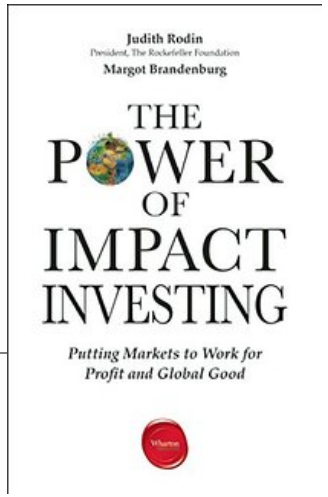
Real Impact of Digitization on HE: (3) Change in power balance between IT companies and academics

- Platform providers have more knowledge and leverage than individual content providers
- They have also the power to shape the academic world and set the price!
  - Citation and Impact Factors calculated by Web of Science.
  - Learning Analytics by publishers and online learning providers

Relation between the digitization of HE and university reform:
Digitization accelerating the reforms and even taking over!



Relation between the digitization of HE and university reform:
IT industries and foundations accelerating the change



- Too simple story to revive HE:

  - Online Learning and Personalized Learning are the only way to overcome the financial deficit of HE and diverse student body!
  - Open Science will lead to industrial innovation and social problem solving.

  - Money flow targeted to digitization
  - Universities taking the chance to acquire funding, and thus accelerating change.

Conclusion:
FUTURE HE REFORMS

- HE reforms around globalization, marketization, massification of HE has almost saturated.
- Digitization process started independently from HE reform process, but then got to facilitate and accelerate the process.
- Digitization is even shaping the higher education in the future.
- Isn't it time to get the grip on digitization in HE to get strategically ahead?

FUTURE THOUGHTS
How would the higher education look:

- If HE would proactively embrace online learning and HE unbundling? What possibilities are there?
- If HE would proactively work on Open Science (open publishing, data sharing, etc.)? Could HE escape the influence of commercial publishers?
- If HE would proactively use qualitative measures instead of relying fully on quantitative measures? Is it feasible?
- If HE would proactively avoid the use of commercial platform providers? Or will it be the same, if similar services are to be provided by the academia?
- How could HE balance the massification of HE and the quintessence of HE, namely the excellence and uniqueness of research and education?