Digital Tools and Solutions for Inquiry-Based STEM Learning

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Outline

- Motivation of the project
- The first book: Digital Tools and Solutions for Inquiry-Based STEM Learning
- The second book: Optimizing STEM Education with Advanced ICTs and Simulations
- The project discusses:
  - Emerging technologies
  - Scientific practices
  - STEM education areas
- Digital Triad in Science Education Practices
- Conclusions

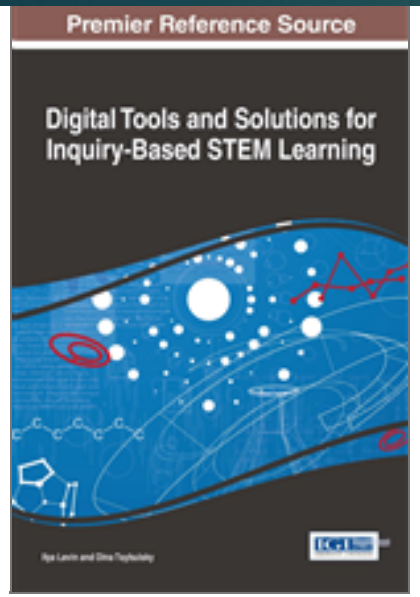
The main motivation of the project

1. Our realization that STEM education is transforming in the digital era
2. Such transformation affects fundamentals of science and science education
3. The digitalization of STEM is becoming a field of intensive interdisciplinary research

We asked ourselves:

What are the changes and the corresponding directions that STEM education can pursue in light of the digital turn?

Our two books tried to answer this question by curating a selection of recent and interesting research studies in the corresponding fields



Digital Tools and Solutions for Inquiry-Based STEM Learning

Ilya Levin (/affiliate/ilya-levin/243018/) (Tel Aviv University, Israel) and Dina Tsybulsky (/affiliate/dina-tsybulsky/318726/) (Tel Aviv University, Israel)

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Pages: 371

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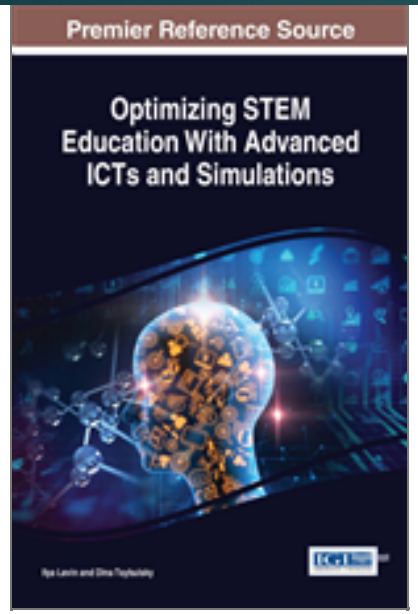

Optimizing STEM Education With Advanced ICTs and Simulations

Ilya Levin (/affiliate/ilya-levin/243018/) (Tel Aviv University, Israel) and Dina Tsybulsky (/affiliate/dina-tsybulsky/318726/) (Tel Aviv University, Israel)

Release Date: June, 2017

Pages: 344

ISBN13: 9781522525288
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DOI: 10.4018/978-1-5225-2528-8

Editorial Advisory Board

Statistics

- Published: 22 (11+11) chapters
- Authors of the Chapters are from:
  - ✓ USA - 12
  - ✓ Israel - 4
  - ✓ Canada - 2
  - ✓ France - 1
  - ✓ Italy - 1
  - ✓ Russia - 1
  - ✓ Cyprus - 1

The books deal with the emerging technologies:

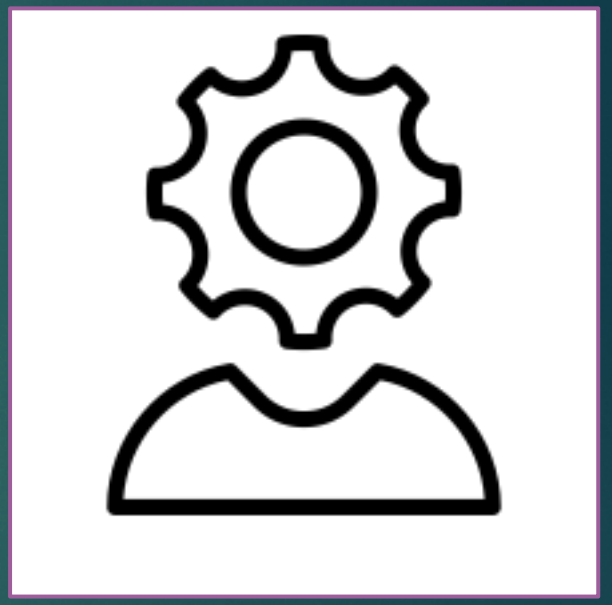
- Mobile and Wearable Technologies
- Cloud Computing
- Social Computing
- Big Data and Network Analytics
- Augmented Reality
- Modeling and Simulation

The books deal with educational practices:

- Simulations-Based Inquiry
- Wikigrams-Based Social Inquiry
- Web-Based Inquiry
- STEM Inquiry through mobile games
- Scientific Argumentation through Social Media
- Collaborative Design-Based projects
- Project-Based MOOCs
- Scientific Analysis of virtual and real Big Data
- Virtual Labs

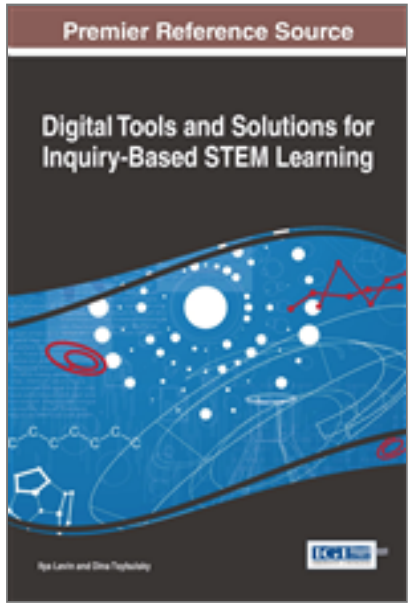
The books deal with aspects of education:

- Motivation
- Assessment
- Knowledge Construction
- Understanding of Scientific Concepts
- Special Needs Education



The books deal with STEM in:

- Preschool Education
- K-12 Education
- Higher Education
- Teachers' Training



Inquiry-Based Science Education and the Digital Research Triad

Dina Tsybulsky (Tel Aviv University, Israel & Mofet Institute, Israel) and Ilya Levin (/affiliate/ilya-levin/243018/) (Tel Aviv University, Israel)

Source Title: Digital Tools and Solutions for Inquiry-Based STEM Learning (/book/digital-tools-solutions-inquiry-based/176480)

Pages: 26

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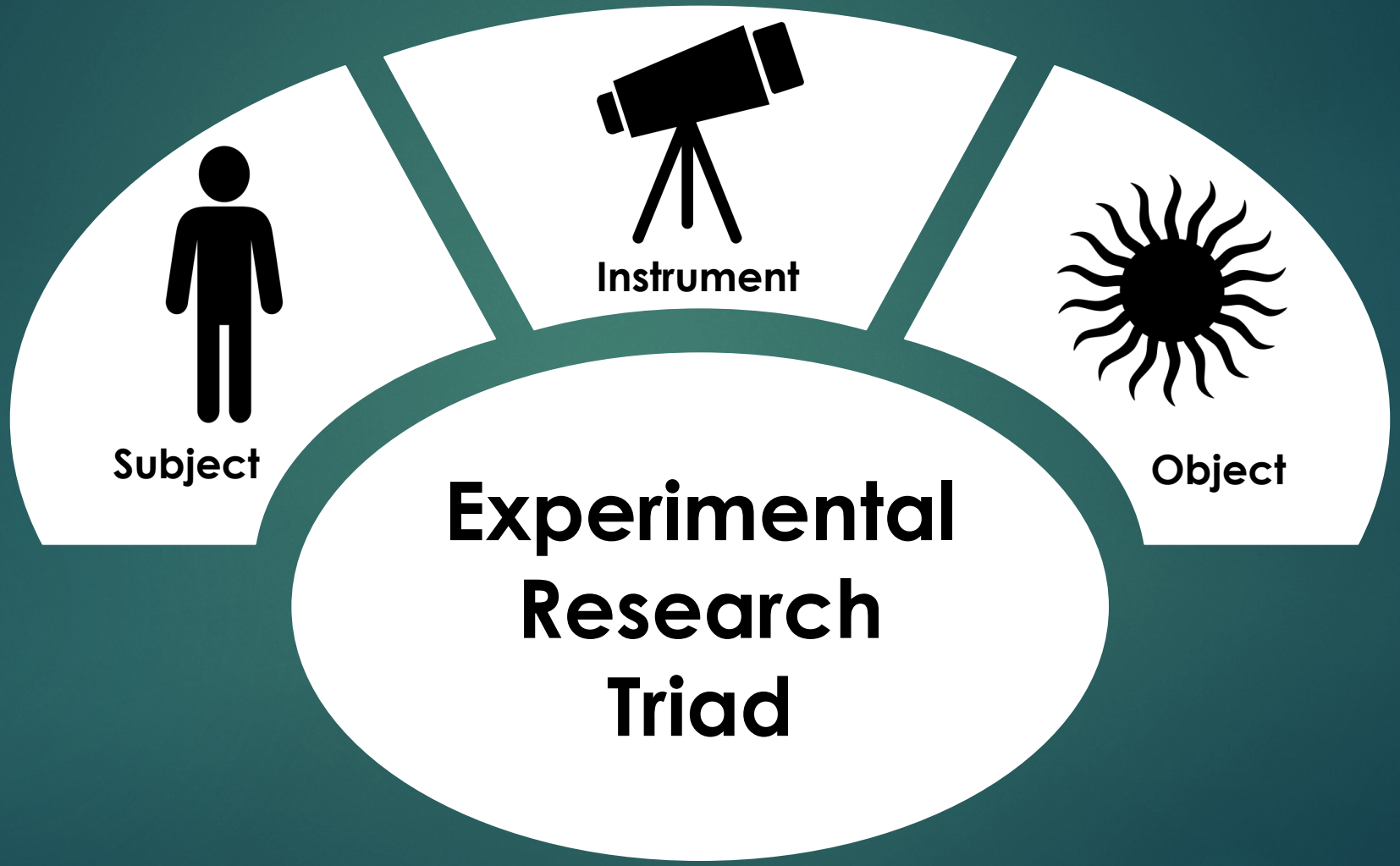
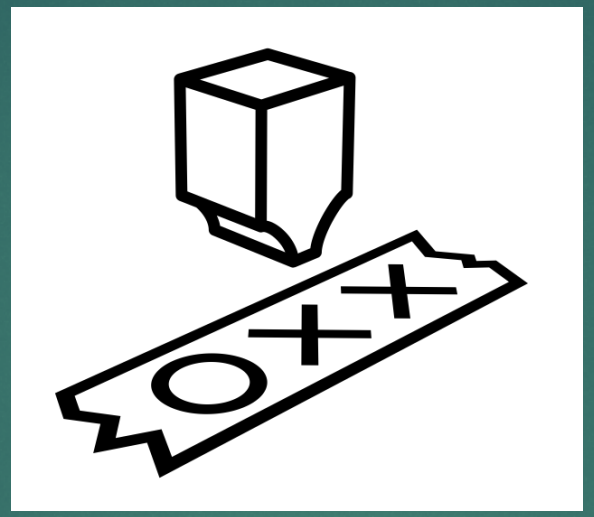
Experimental Research Triad



Ages of Experimental Research

Pre-digital age

Transition age



Digital age

End XVI century

Mid-End XX century

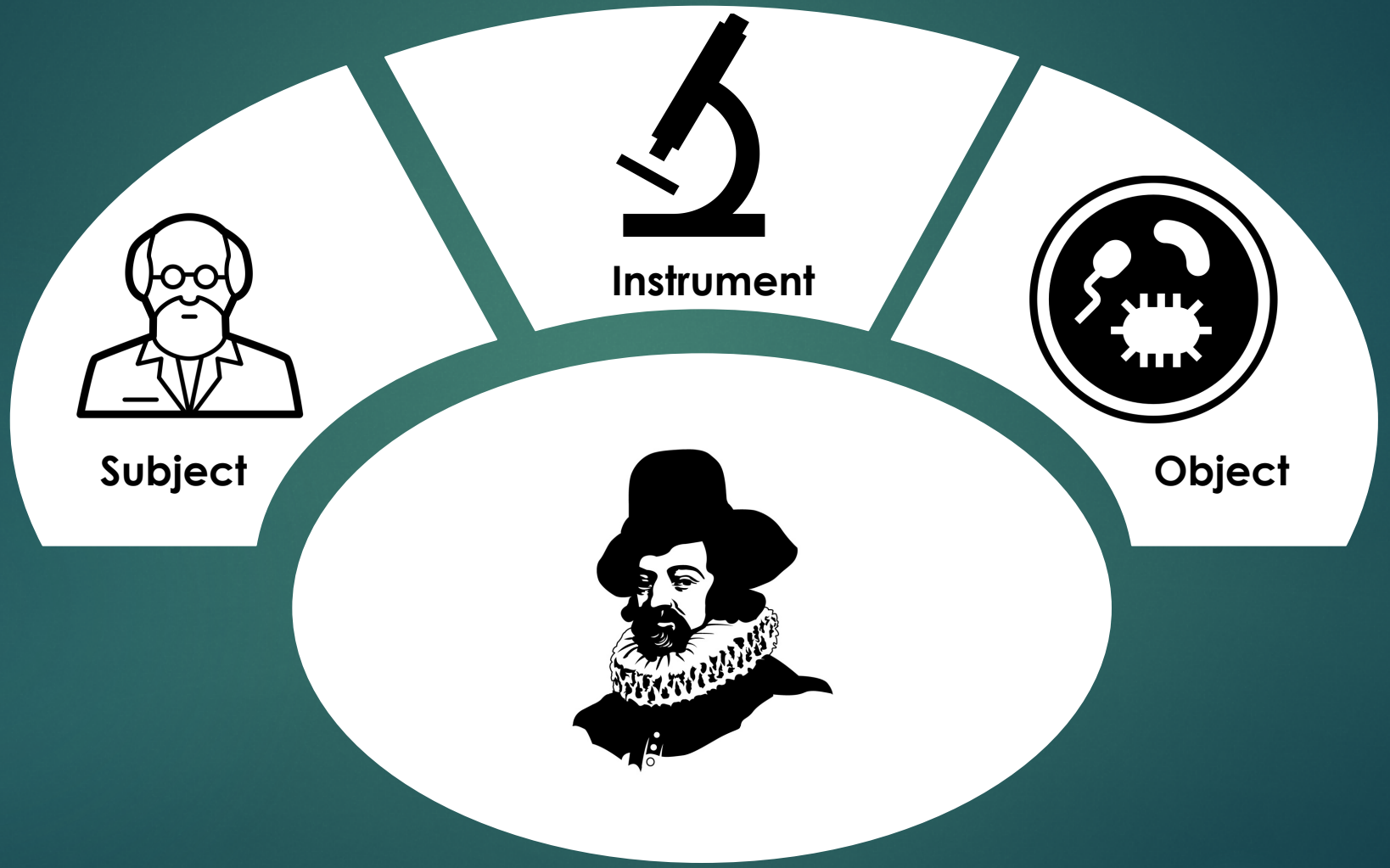
Beggining of XXI

No ICT experimental science

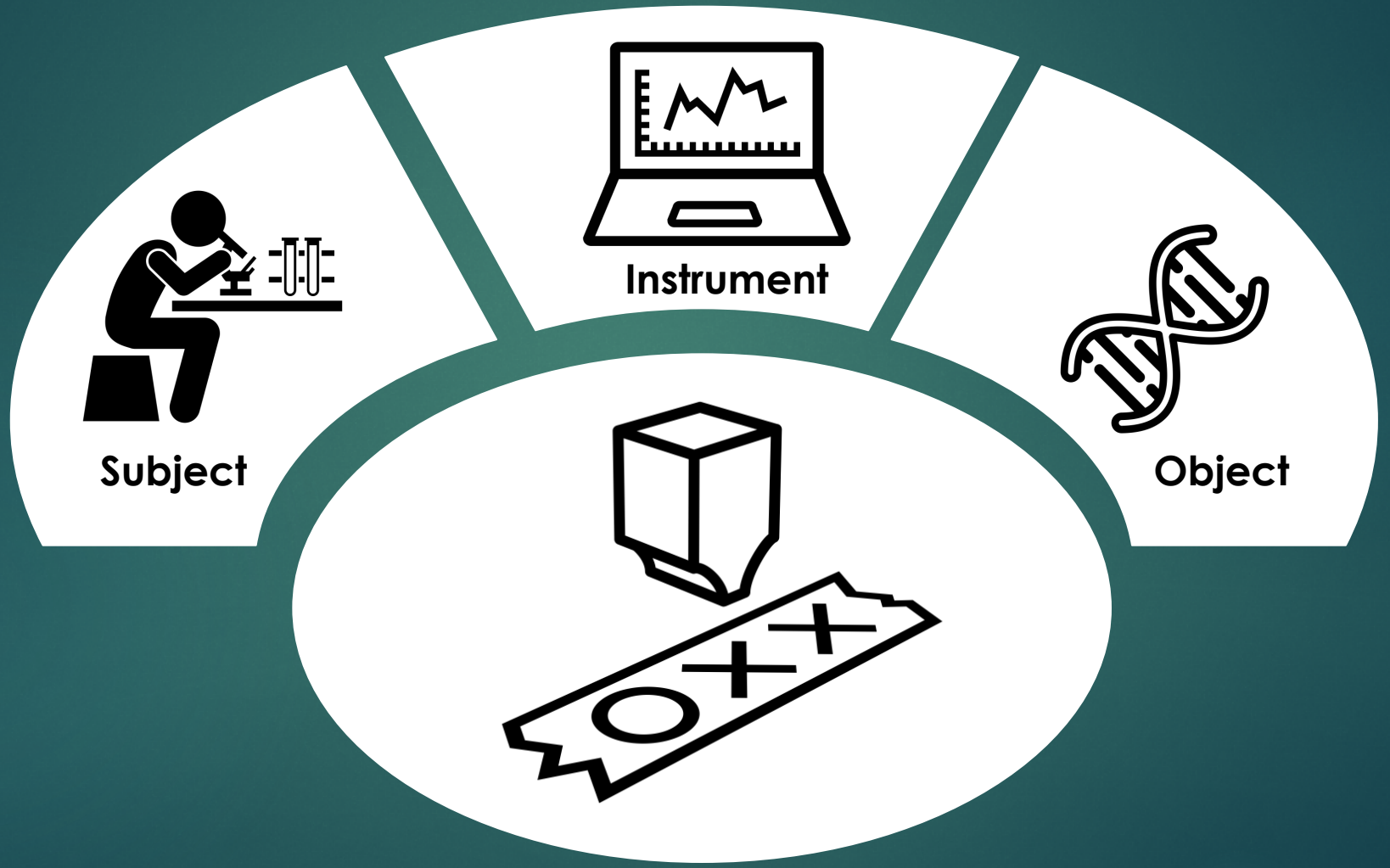
ICT enhanced experimental science

ICT dependent experimental science

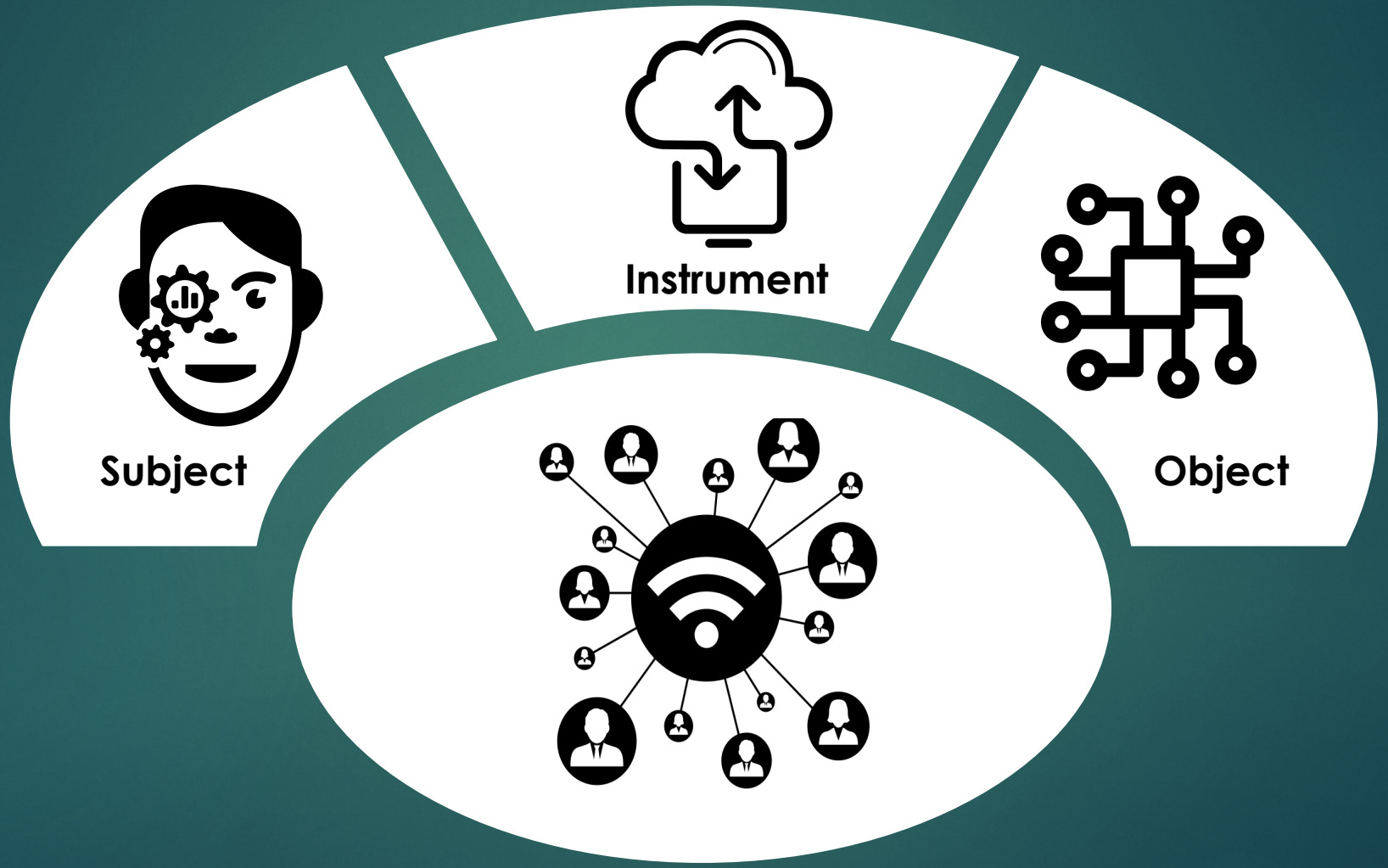
Experimental Triad in Pre-digital Age



Experimental Triad in Transitional Age



Experimental Triad in Digital Age



Symptoms and Phenomena of the Digital Age

Reality/Virtuality

Digital Personality

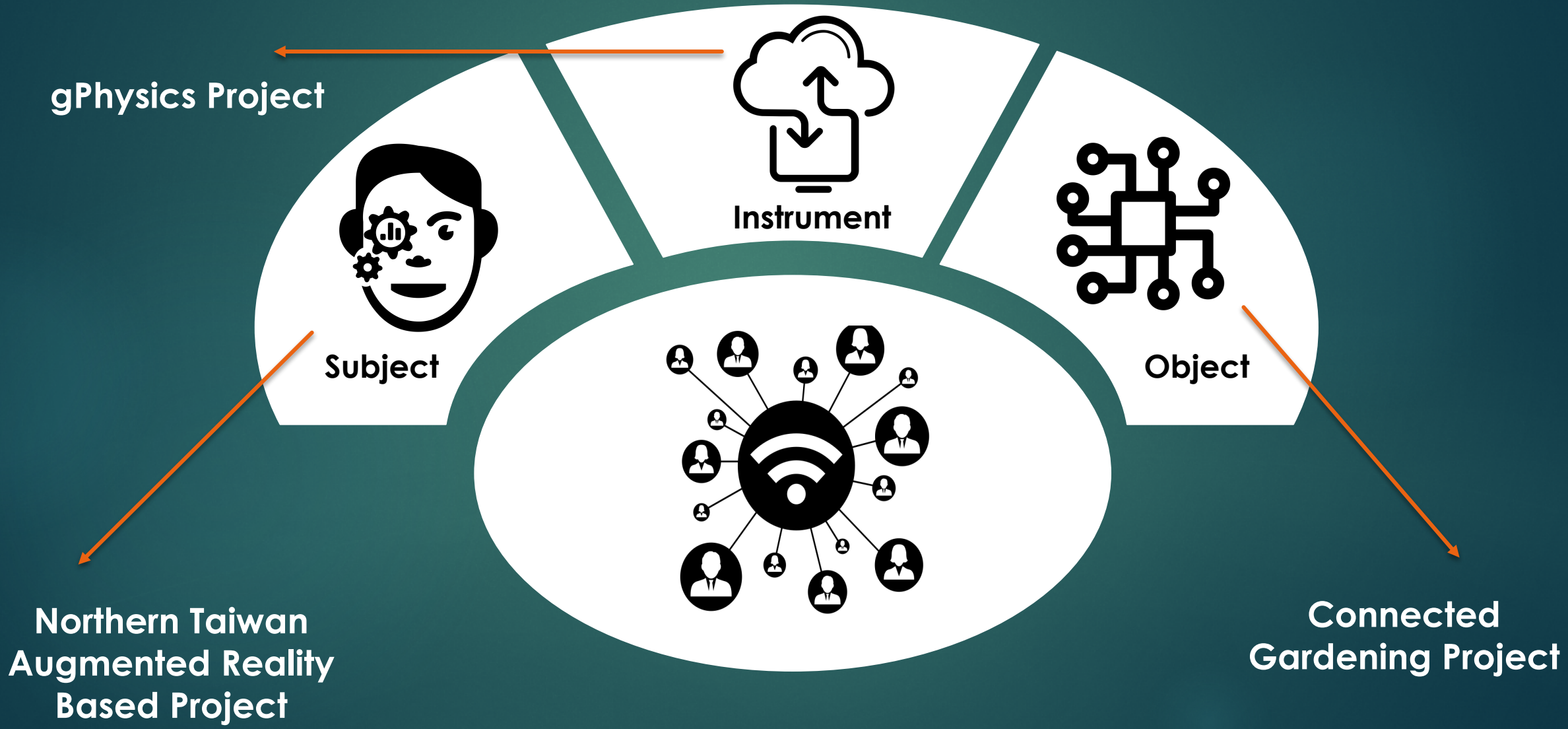
Scarcity/Abundance

Data Intensive Science

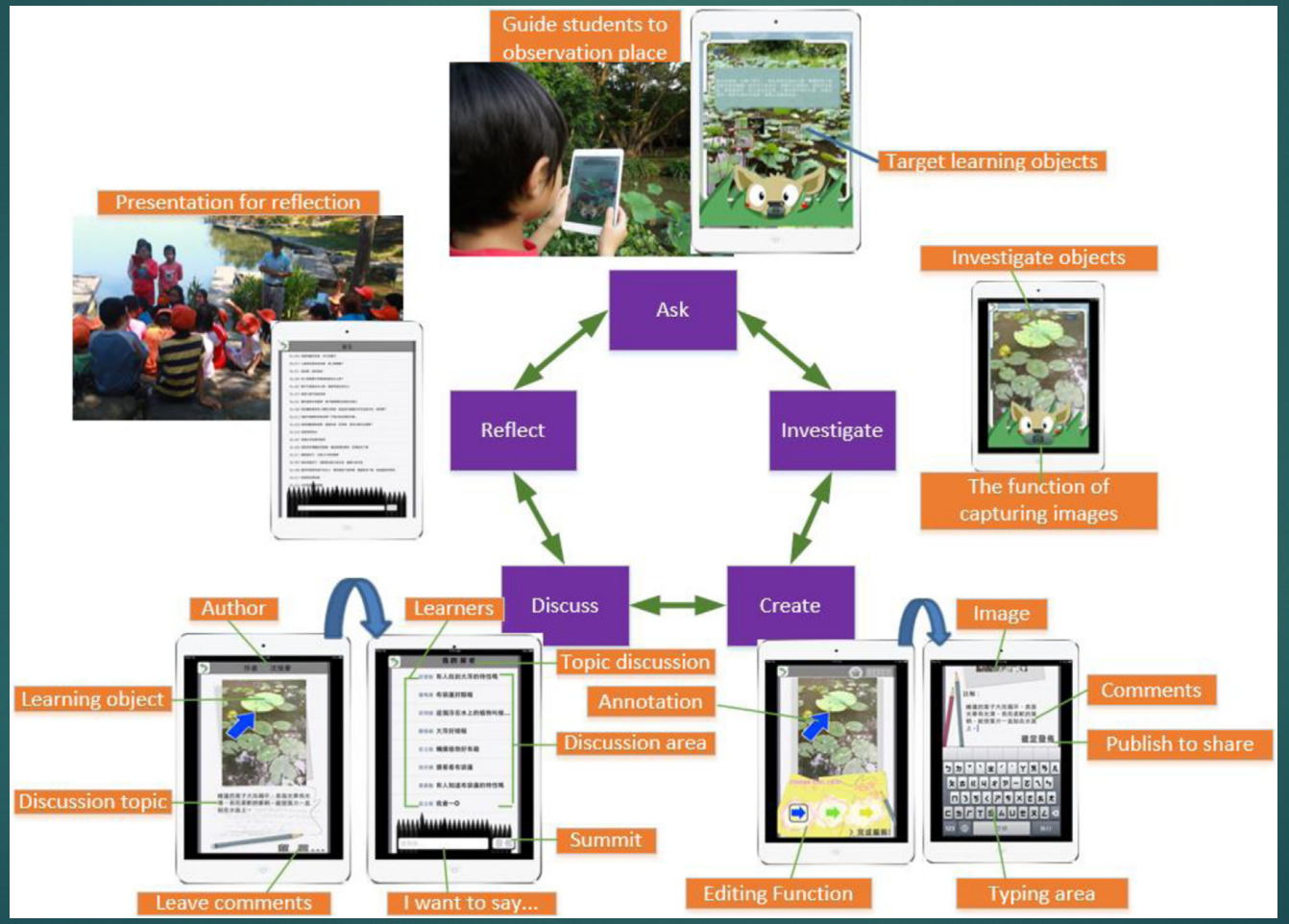
Human/Artefact/Nature

Cyber Physical Systems

Digital Triad in Science Education



Northern Taiwan Augmented Reality Based Learning Project



An example of a new research subject

Chiang, Yang, and Hwang, 2014

gPhysics – Google Glass for Wearable - Technology Enhanced Learning

An example of a new research instrument

Lukowicz et al., 2015

Connected Gardening Project

An example of a new research object

Zuiker and Wright, 2015

Conclusions

- Two books are just published:

1. Digital Tools and Solutions for Inquiry-Based STEM Learning
2. Optimizing STEM Education with Advanced ICTs and Simulations

- The books comprise 22 chapters, which deal with the diversity of topics connected with the inquiry based STEM education in Digital Age
- The topics are not limited by just using emerging technologies in STEM but include also a number of research subjects reflecting fundamental transformations of science in Digital Age
- The books may be used as a a comprehensive source of scholarly material on the transformation of science education class