The A-D-D-I-E Model, Born Again with the Anointments of Learning Analytics and Learning Design

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LEARNING ANALYTICS FOR PREDICTION & ACTION

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01. Pending issue of Educational Technology and Development of Learning Analytic

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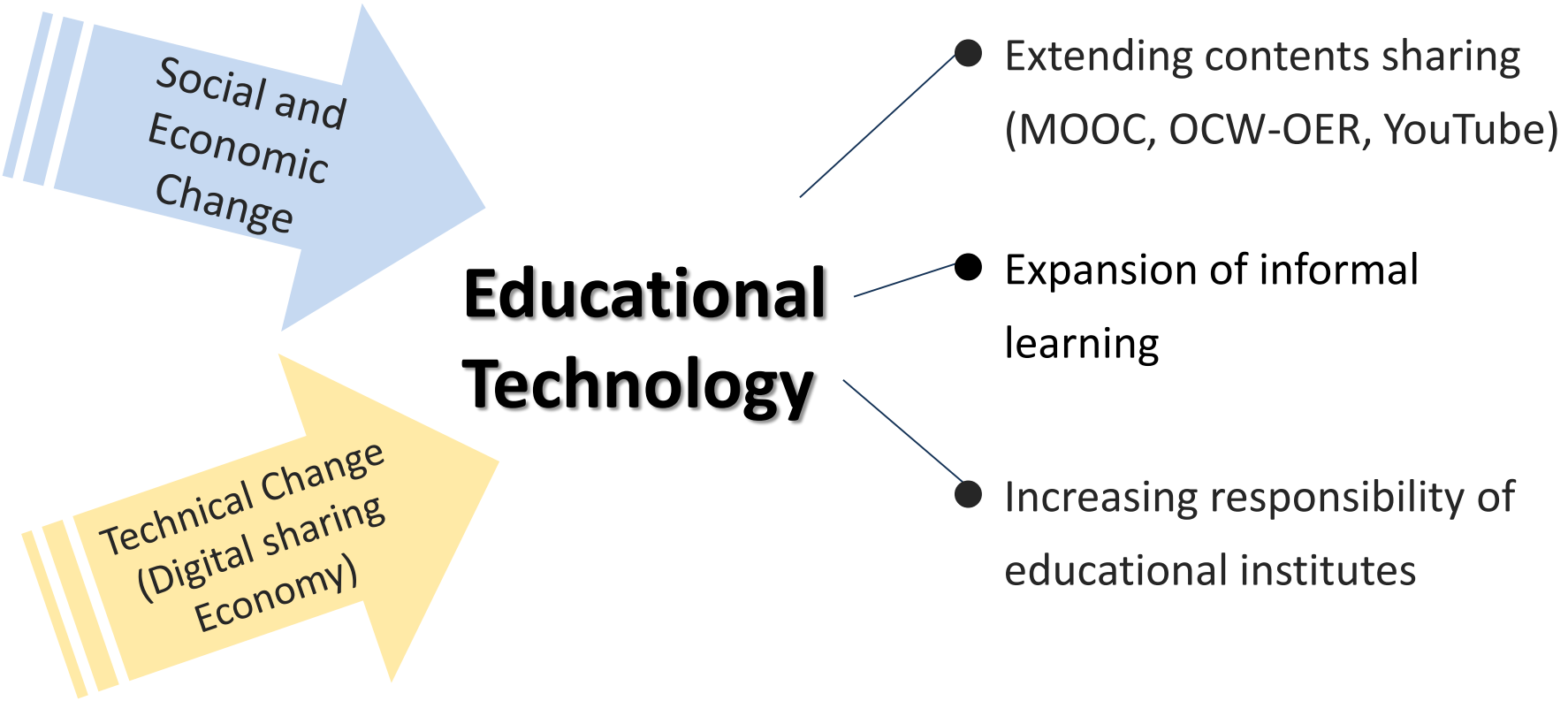
01 Pending issue of Educational Technology and Development of Learning Analytics

✔ **Challenge for Educational Technology**



01 Pending issue of Educational Technology and Development of Learning Analytics

✔ Development of Data Analytics

- Digital sharing economy brings development of Data Analytics as useful tool
- **Learning Analytics** is the research area which to utilize technical potentiality to design and manage learning as practice tool

Big data

Internet

Deep learning

Wearable device

01 Pending issue of Educational Technology and Development of Learning Analytics

✔ In this paper

- Specify definition and characteristics of Learning analytics
- Analyze Learning analytic activity procedure
- Highlight ‘design potentiality’ of learning analytics
- Focus on the need of blending learning analytics and learning design

Blending of learning analytics and learning design

can open a new prospect in the field of Educational technology

with **ad-hoc learning design** beyond conventional **a-priori instructional design**

02. Definition and Types of Learning Analytics

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02 Definition and Types of Learning Analytics

1) Definition and Characteristics

✔ Definition of Learning Analytics

- General: “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, Gasevic, Haythornthwaite, Dawson, Shum, Ferguson, & Baker, 2011)

- Affective characteristics of Learning Analytics

  ① Utilize big data as records between learners and learning context

  ② Optimization of learning environment

  ③ Practical base of Learning analytics ;Learners’ activity and learning context

02 Definition and Types of Learning Analytics

A. Definition and Characteristics

1) 'Big data' as analytic subject

Type	big data	Large data
Common	• The size is big	
Difference	• Unobtrusiveness and automaticity in data collection stage • Non-constitutivity management stag • Immediacy and machine dependency in analytic stage	• Obtrusiveness and passivity in data collection stage • Constitutivity in management stage • Labor intensiveness in analytic stage
Example	• Behavior log data • Spatio-temporal data • Psychophysiological data	• Labor pannel data

Definition and Types of Learning Analytics

A. Definition and Characteristics

2) Data mining as analytic method

- Learning analytics combine application of statistical methods and data-mining techniques to improve instructional decision making quality

Analytic method type	**Statistical analysis**	**Data-mining techniques**
Common	• Common in purpose: to get useful information from quantitative data analysis	
Difference	• Deductive • hypothesis-driven • Deterministic	• Inductive • Data-driven • Undeterministic
Example	• ANOVA • Regression analysis • Structural equation modeling	• Explorative chacteristics

02 Definition and Types of Learning Analytics

A. Definition and Characteristics

3) Learning analytics as treatment for learning

- Identity of learning analytics: teleological sufficient condition which is ‘to design treatment for learning’
- Data analysis techniques: methodological necessary condition

➡ It is hard to perform learning analysis without big data and data-mining, but only with them the essential purpose of Learning analytics can not achieve

  - i.e) ADDIE model

The key actors of Learning analytics are Educational technology experts

02 Definition and Types of Learning Analytics

B. Types of Learning analytics

1) Types for different treatment target

Target	For learners	For instructors	For institute managers
Function	• To predict achievement of learning objective • To produce multidimensional information for learners	• To summarize group's learning behaviors and to predict achievement • To cluster and explore high-risk student • To provide decision making info for instructors	• To decide openness or closeness of individual courses and contents • To predict optimized and shortest path for completion • To provide info for distributing educational resource • Academic analytics

Definition and Types of Learning Analytics

B. Types of Learning analytics

2) Types for different social relationship

Type	Individual learning analytics	Social learning analytics
Characteristics	• Research area: to analyze interaction between individuals and contents and to track the changing process of learners' internal conditions • To analyze behavioral data externalized human-computer interaction process and Psychophysiological sign	• To understand and stimulate social interaction process which blended Individual unique and various knowledge and experience • Big growth with CSCL, Activity Theory, expansion of SNS users, and provision of network analytic tools

03. Learning Analytics Performance Procedure

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03 Learning Analytics Performance Procedure

03 Learning Analytics Performance Procedure

A. Data collection and processing

- **Static data**
  - Traits of learners, demographic information, etc.
  - To manage in Student Information System(SIS)
- **Dynamic data**
  - Learners' interaction log data, learning achievement data, contextual data, etc.
  - Unprocessed natural resource
- **Input half of overall research time in this pre-processing stage**

Learning Analytics Performance Procedure

B. Analysis and prediction

- **The process which is to produce visualized data such as intuitive graph**
  - Information visualization stage
  - Learning analytics dashboard(LAD)
  - i.e. Signals dashboard in Purdue University
- **Association analysis**
  - To utilize clustering analysis for customized treatment by group characteristics
  - i.e. Regression analysis (X: login frequency, Y: learning achievement)

03 Learning Analytics Performance Procedure

C. Development and provision of intervention

- **To differentiate contents and target by learning management environment**
  - Formal class environment: to provide learning analytics results for instructors
  - Informal learning environment: to provide learners directly with visualized information
  - Flipped learning environment: to provide behavior pattern for instructors
- **To provide intervention for instructors as information for modification and supplementation of contents**

04. Integration of Learning Analytics and Instructional model

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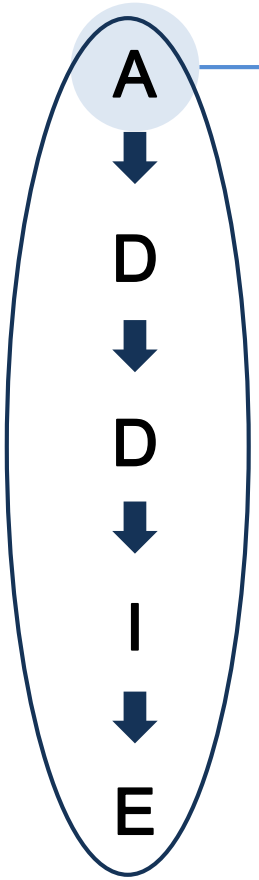
04 Integration of Learning Analytics and Instructional model

A. Conventional ADDIE model and Learning analytics

- Intra-course learning analytics
- Conventional ADDIE model



Starting point of instructional design (Analysis stage)

- Analysis(A^1)-Design(D^1)-Development(D^1)-Implementation(I^1)-Evaluation(E^1)
- Non-circumfluence due to lack of analytic skills and operational rigidity
- **A-priori** design model

04 Integration of Learning Analytics and Instructional model

A. Conventional ADDIE model and Learning analytics

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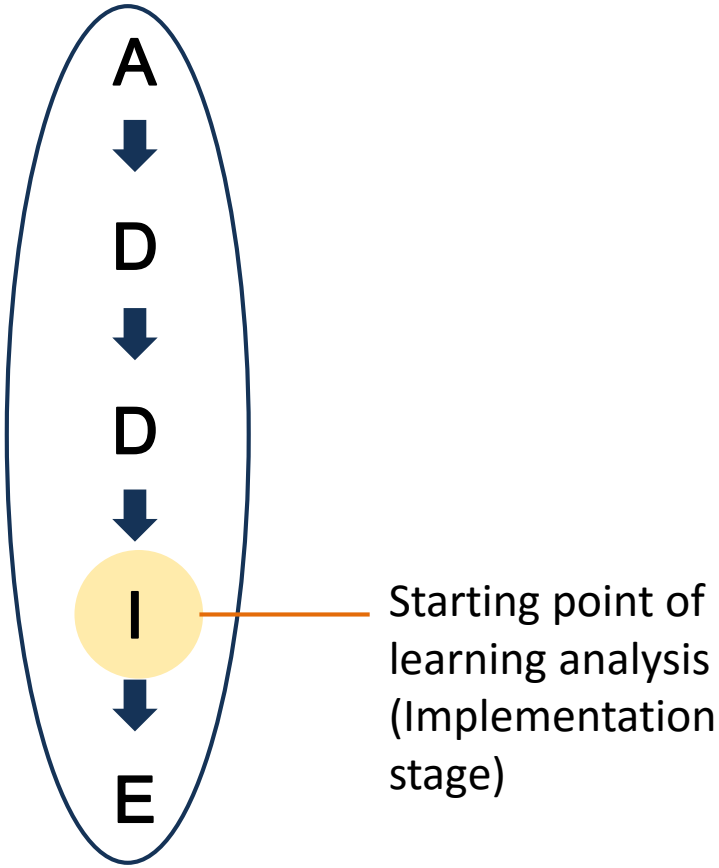
- Conventional ADDIE model



- Implementation(I^1)-Evaluation(E^1) -Analysis(A^1)-Design(D^1)-Development(D^1)-Implementation(I^2)-Evaluation(E^2) -Analysis(A^2)-Design(D^2)-…
- To collect big data from implementation stage in real learning situation
- To actualize circumfluence and systematic approach
- Occurring all stages of A-D-D-I-E simultaneously
- **Ad-hoc** design model

04 Integration of Learning Analytics and Instructional model

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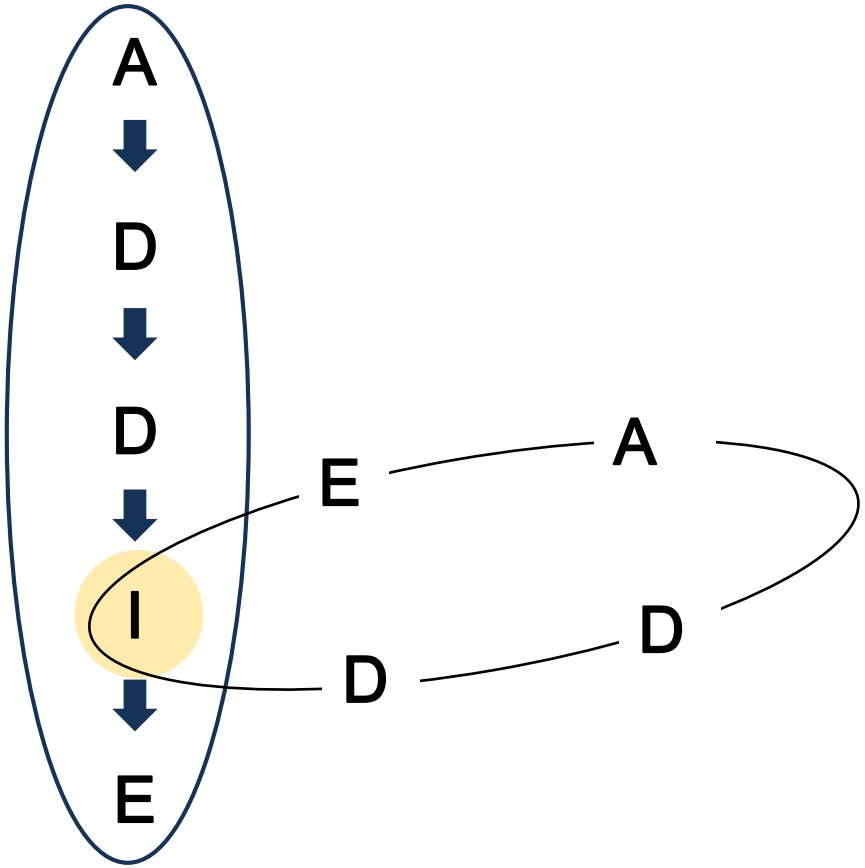
- Conventional ADDIE model



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04 Integration of Learning Analytics and Instructional model

B. Intervention strategy and Learning analytics

- **Operational intervention**
  - Purpose: To simulate desirable behavior by providing feedback to learners and instructors
  - Comparably ad-hoc intervention

- **Structural intervention**
  - Purpose: Course restructure such as contents deletion and addition, change of learning procedure, contents modification, etc
  - Deeply related with operation of circular ADDIE (I1-E1-A1-D1-D1-I2-E2-A2-D2-...)

04 Integration of Learning Analytics and Instructional model

C. Design of learning path and Learning analytics

- Expansion of Learning analytics research area

The learning method which is necessary for knowledge laborer is

Time distribution optimization strategy

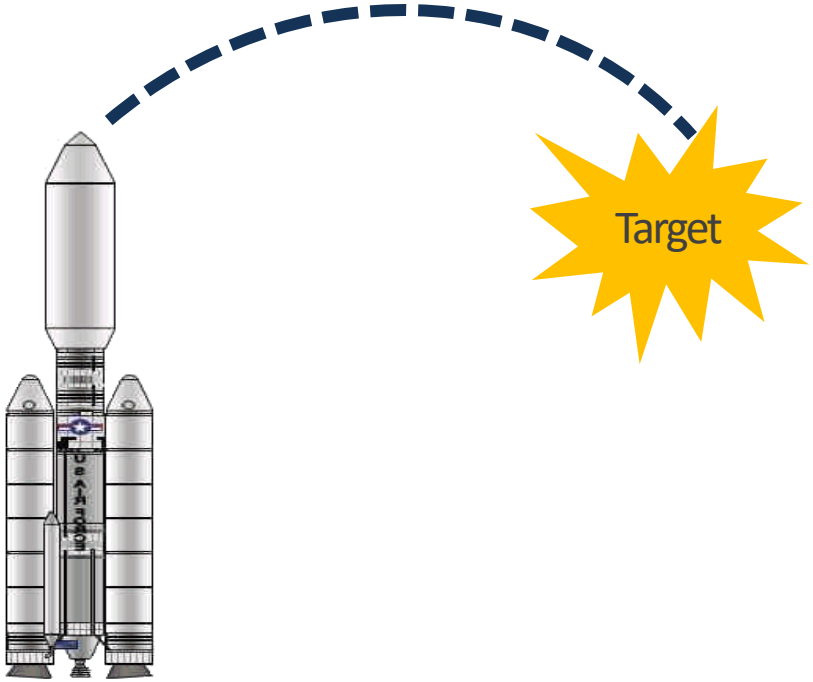
Inter course

Intra-courses

04 Integration of Learning Analytics and Instructional model

D. Combine Learning analytics and learning design

- a-priori instructional design approach in formal learning environment
  → Ballistic missile metaphor



Conventional a priori instructional design

- Have difficulty to change core design parameter after designing and predicting the trajectory before learning
- Hard to reflect unpredictable condition because of the rigidity of formal education
- easily face collateral damage around the target because of its size

04 Integration of Learning Analytics and Instructional model

D. Combine Learning analytics and learning design

- ad-hoc learning design approach in informal learning environment
  → Cruise missile metaphor

Ad-hoc learning design

Cruise missile

- **capable of developing self-navigated, learning experiences with operational flexibility**
- **this pre-analysis will be a small waste of learning process time and energy**
- **perfectly fitted to the specific interests of the targeted small group**

In order to realize ideal concept, **learning analytics** approach is needed

05. Research Issue for Educational Technology 2.0

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05 Research Issue for Educational Technology 2.0

Development of learning analytics model which is perfectly fitted for formal and informal learning

Interdisciplinary blending research approach

Adherence to research ethical standards

06. Vision of Learning Analytics and Educational Technology 2.0

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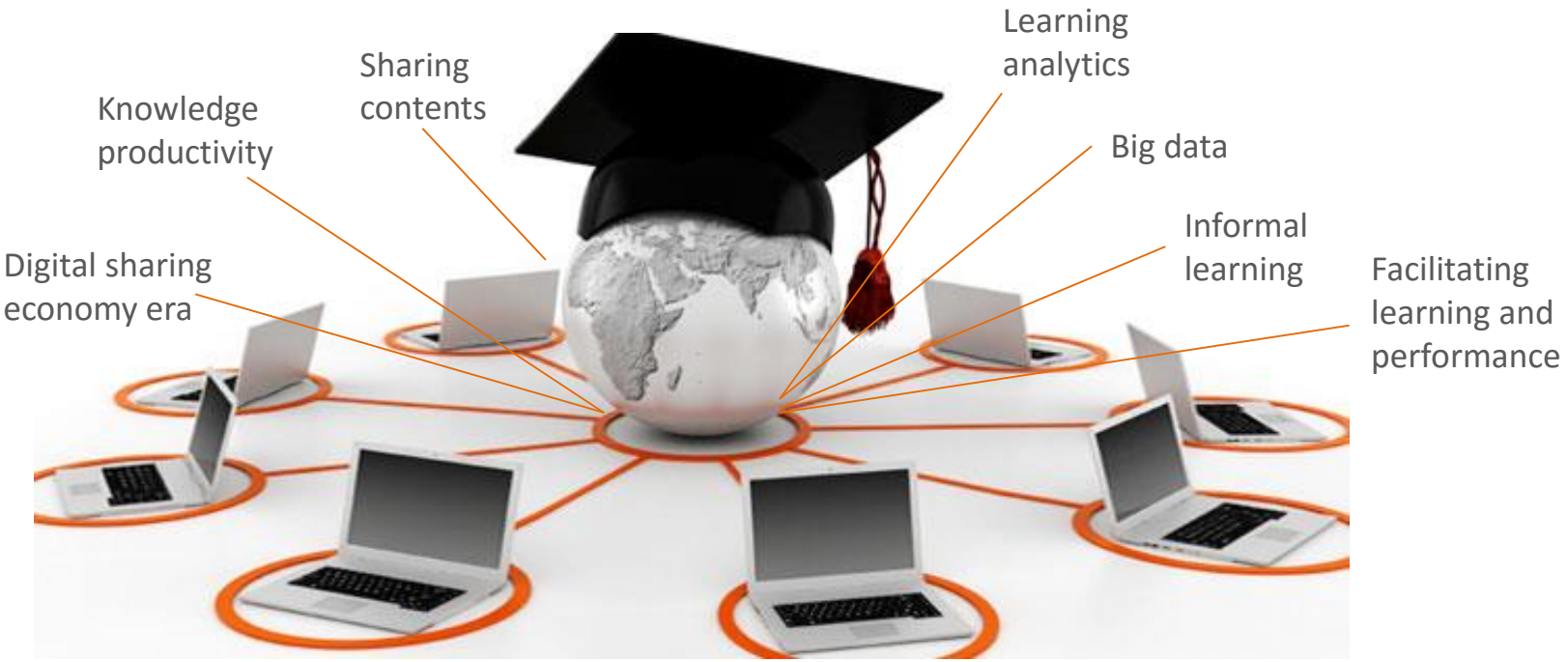
Vision of Learning Analytics and Educational Technology 2.0

Educational Technology 2.0

Evolved Educational technology through process of taking challenges in digital sharing economy era



Q & A

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Thank you !

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