LAK'19 EdViz Workshop

Implications of Instructor Analytics Use Patterns for the Design of Actionable Educational Data Visualizations

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NYU | LEARN

Design | LA Dashboards| Instructors

Identification of instructors' needs & current problems

Instructors' **excitement** & **high perceived value** around the analytics release/use

<->

Common struggles in connections of **the data** with **their teaching**

The process of using analytics data to inform pedagogical decisions is complex

Tool-provided information

into

subsequent use of it to guide their **sense-making** & **pedagogical actions**

*LA designers need to **examine** **the process of instructor analytics use** and design LA tools based on **this evidence***

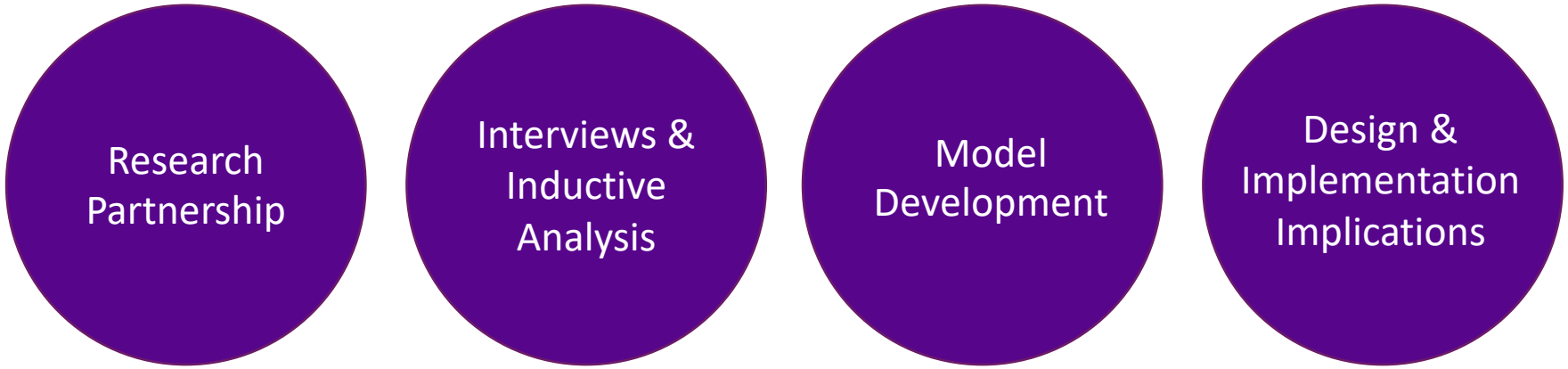
Research Purpose

To fill a gap in the information available to LA designers to make evidence-based design decisions

In what ways do instructors make **pedagogical decision** based on **analytic data**?

What implications for **LA design and implementation** can be drawn based on the empirical findings?

Research Process



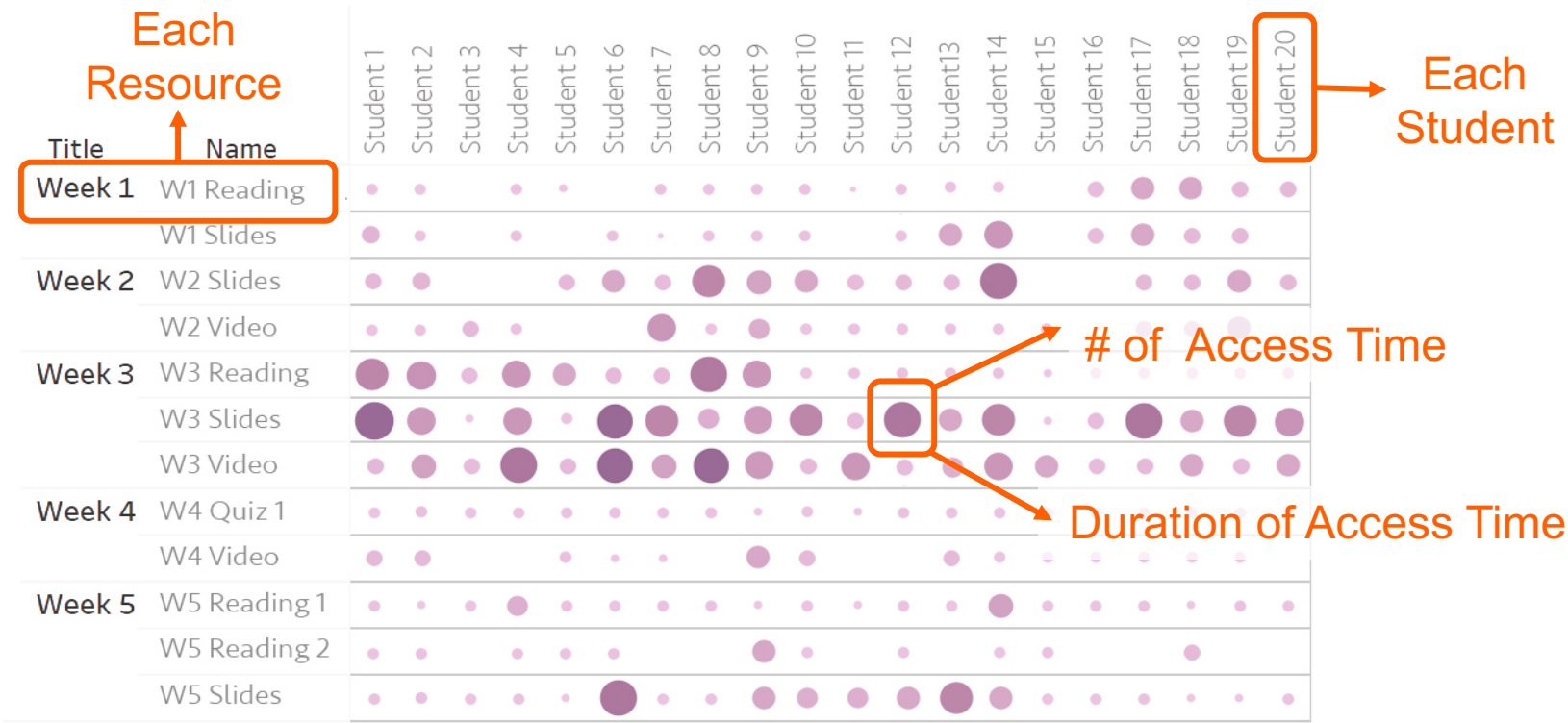
Case Studies

Cases **All 5 instructors** who used the LA dashboard in their teaching during the course of a semester in the university

Learning Analytics Dashboard

Resource Activity View

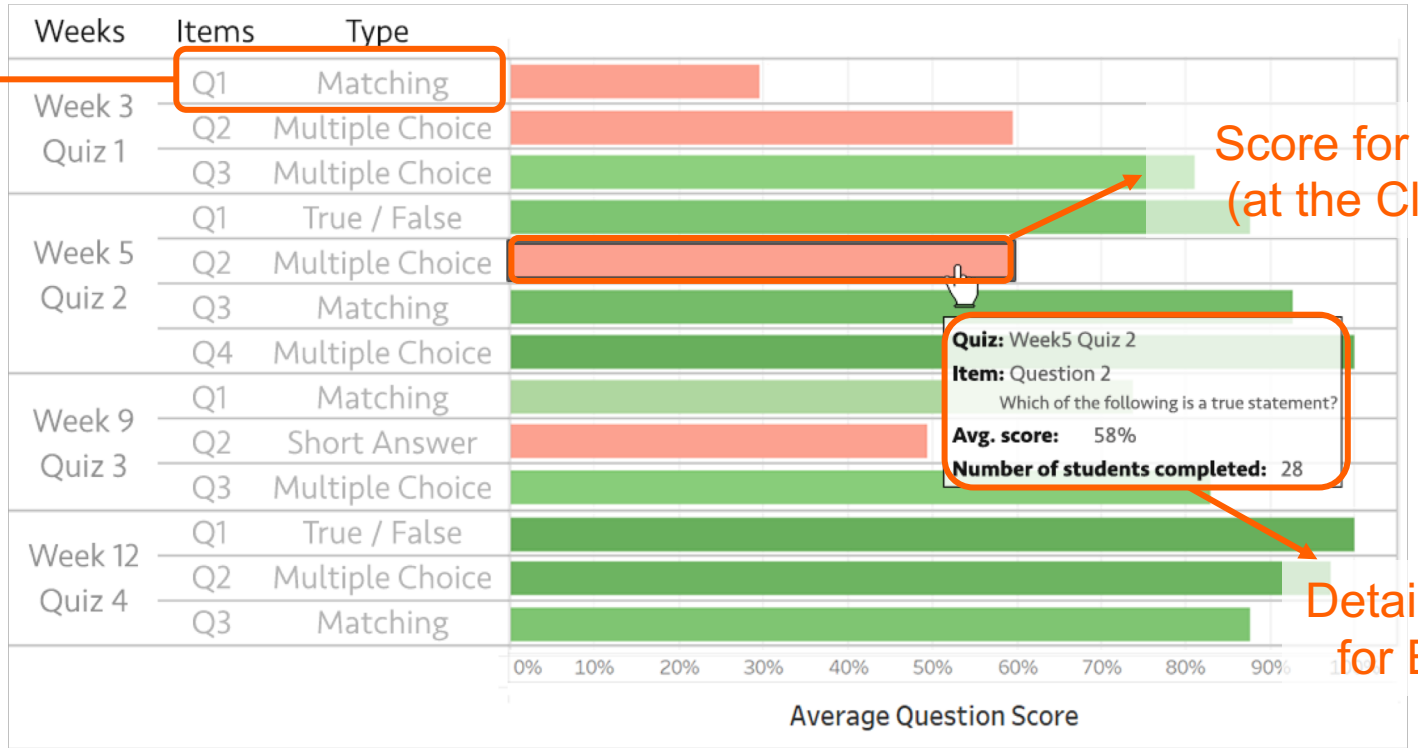
Purpose To identify **students** (who were not engaging with the resources) & **course resources** (which were not frequently accessed)



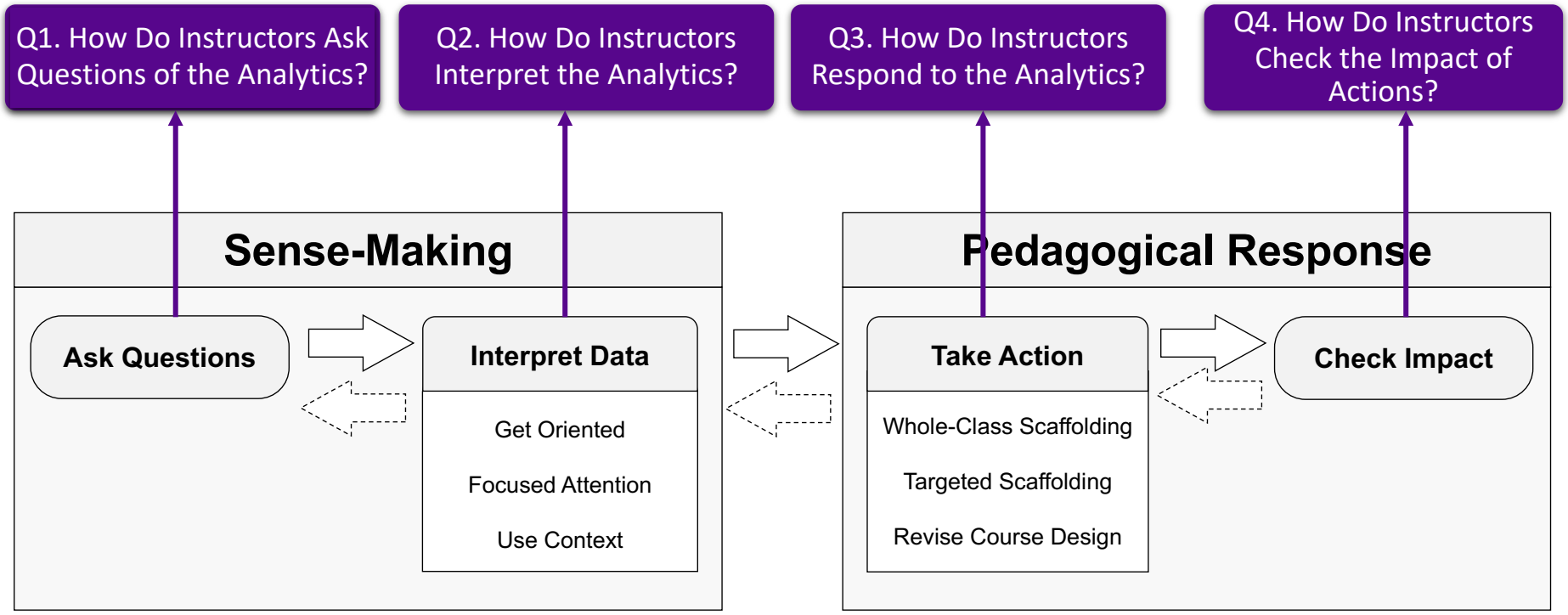
Learning Analytics Dashboard

Quiz Results View

Purpose To identify **parts of the materials** which were difficult for students



A Hypothetical Model with RQs



RQs & Emerging Themes

Q1. How Do Instructors Ask Questions of the Analytics?

- Approaching the Analytics Based on Existing Areas of Curiosity
- Developing Questions through Interacting with the Analytics

Q2. How Do Instructors Interpret the Analytics?

- Getting Oriented through Focused Attention to the Analytics
- Examining Changes of Student Engagement over Time
- The Need for a Reference Point
- Triangulating the Analytics with Additional Information abut Student
- Using the Course Context to Explain/Question the Analytics
- Inconsistent Attribution of Analytic Results

Q3. How Do Instructors Respond to the Analytics?

- Taking Action via Whole Class Scaffolding
- Taking Actions via Targeted Scaffolding
- Taking Actions via Revising Course Design
- Wait-and-See
- Reflecting on Pedagogical Strategies and Knowledge

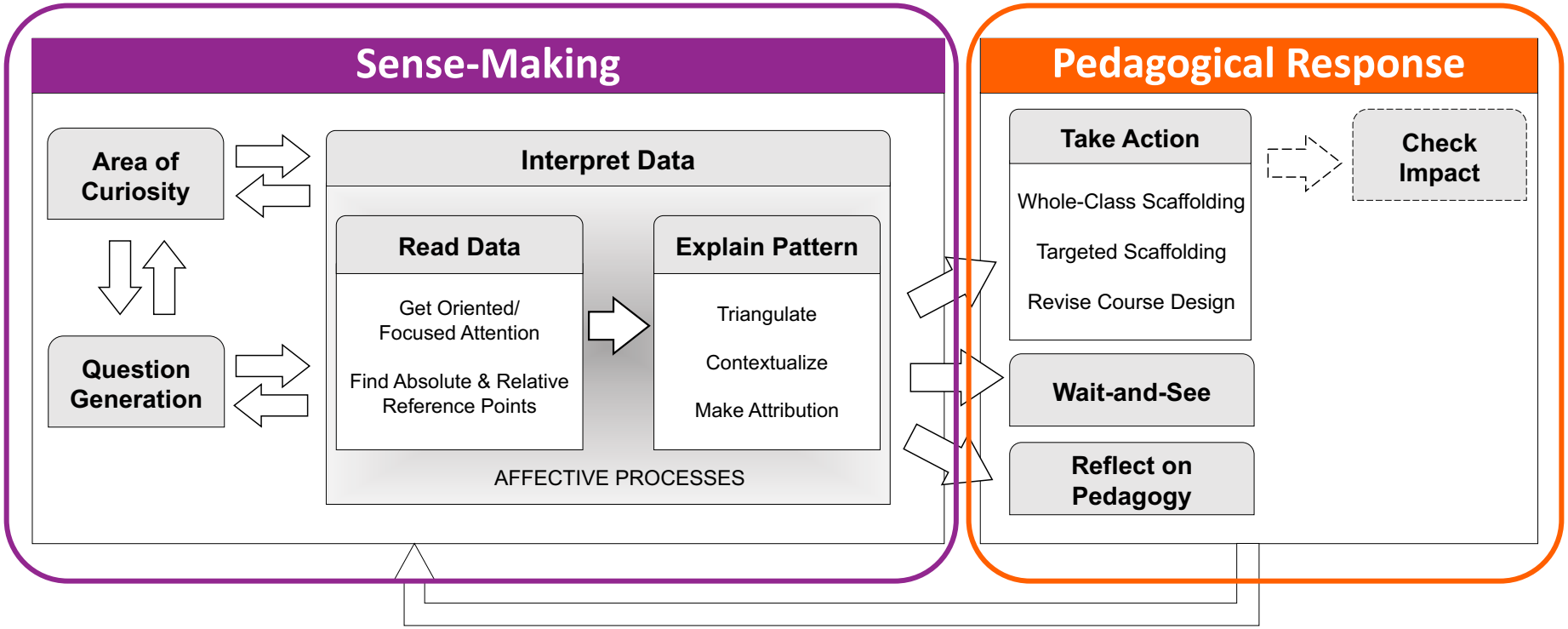
Q4. How Do Instructors Check the Impact of Actions?

Q5. What are Other Important Aspects of Instructor Analytics Use?

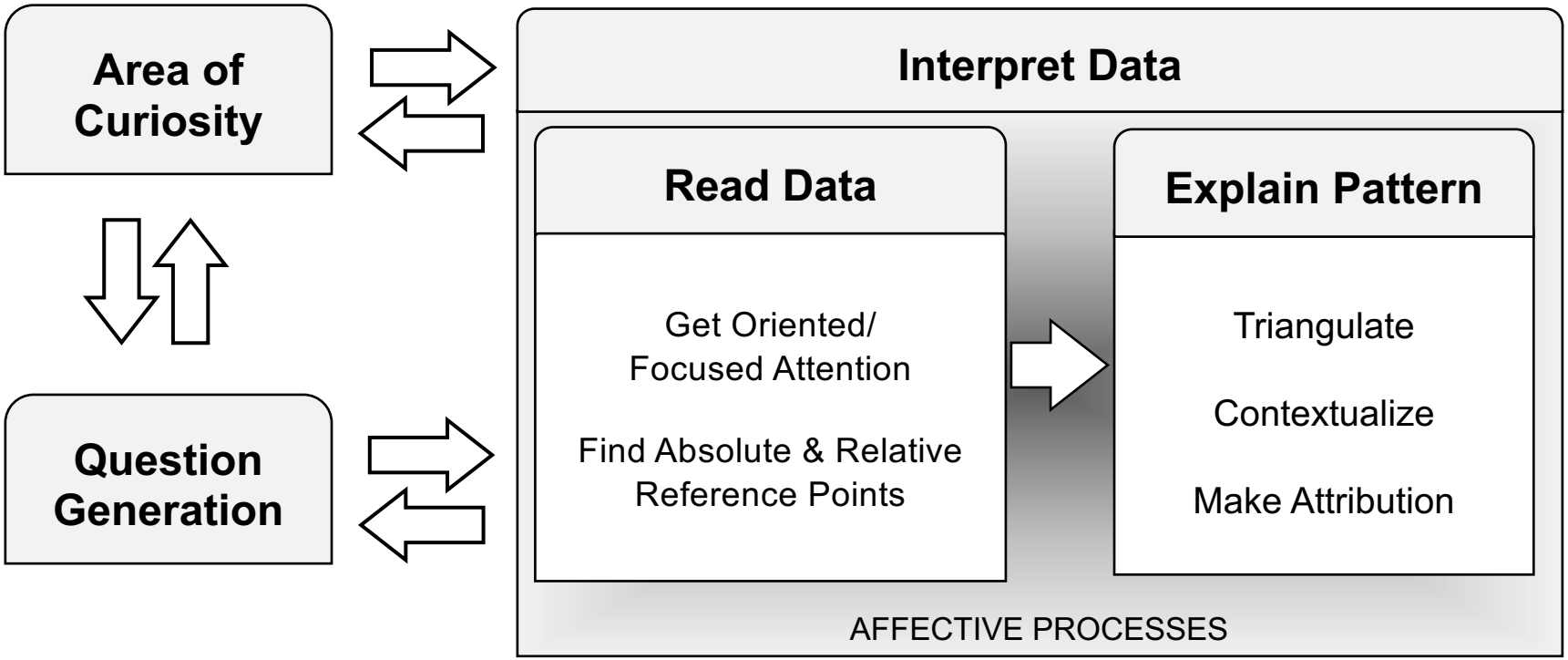
- Data Interpretation Is Affective as Well as Cognitive
- Wrestling with Questions of Transparency around Analytics
- Experiencing a Learning Curve in Analytics Use
- Potential Value of Collaborative Interpretation
- Disconnection between Pedagogical Approaches and Data Presented
- Misalignment between Instructor and System Timing
- Analytics Seen as Useful but not Essential

A Model of Instructor Analytics Use

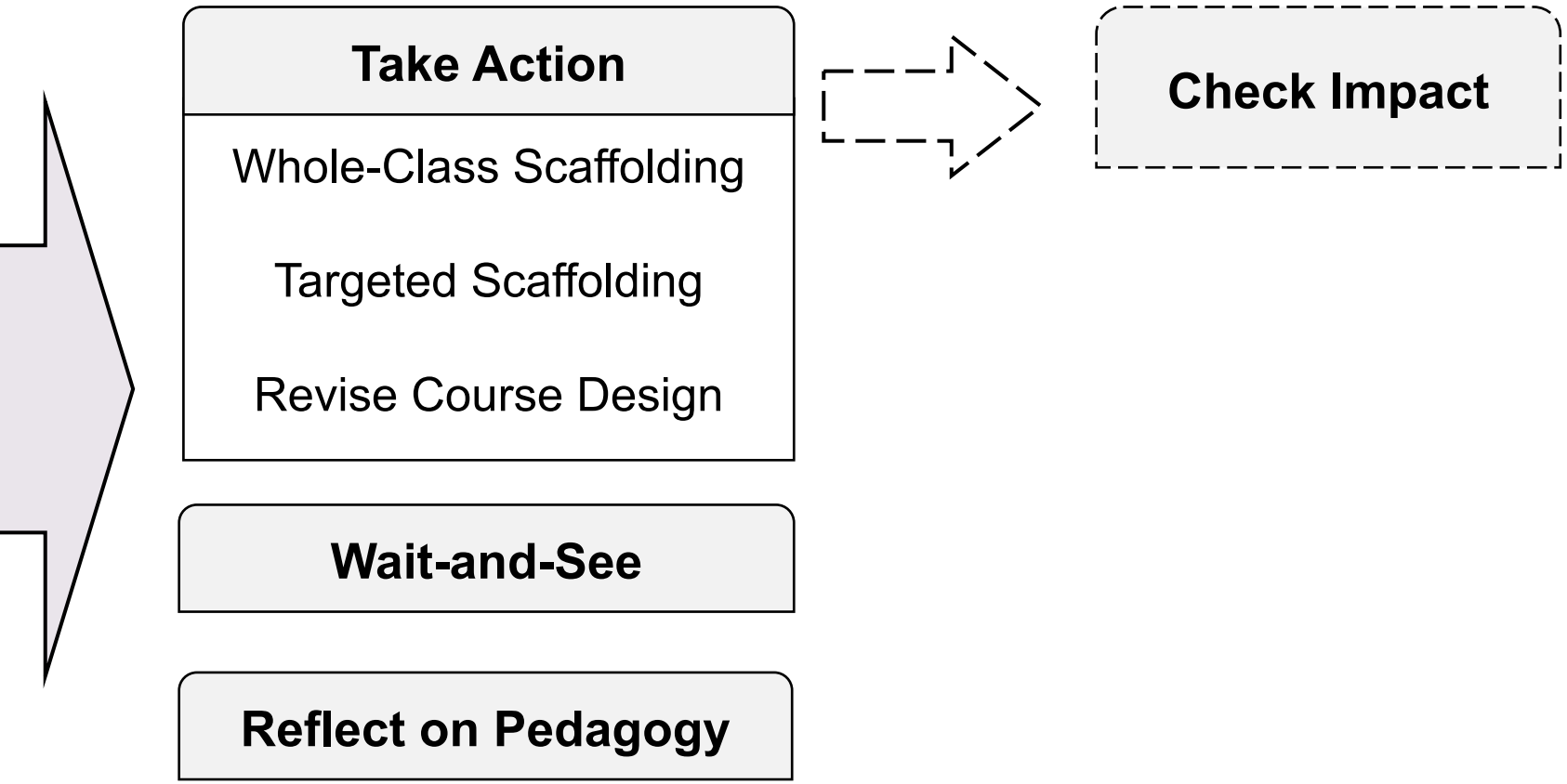
- Two-Part Structure with Multiple Phases



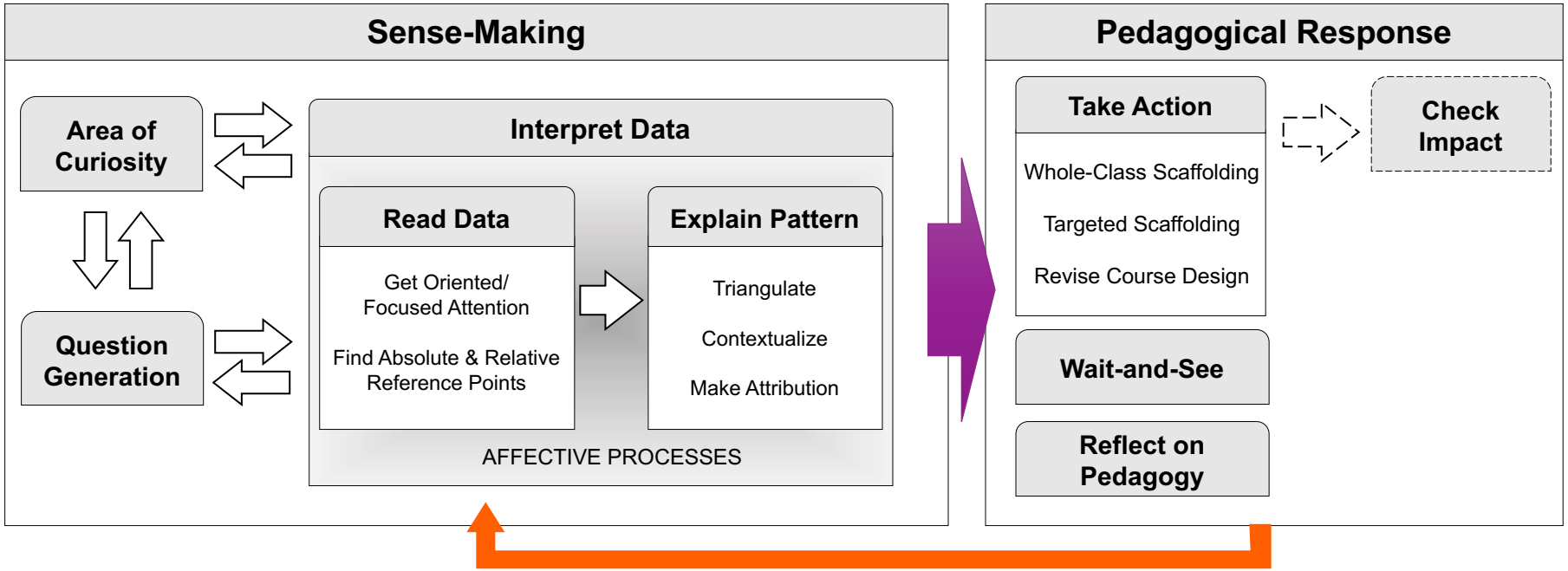
Part 1: Sense-Making



Part 2: Pedagogical Response



A Model of Instructor Analytics Use



*This model offers a **clear starting place** to **design LA** to **support instructors' pedagogical decision-making** by guiding designers in **thinking ahead** to instructor use during the design process*

Implications for LA Design

I. Align Information with Pedagogical Concerns

- Information Organization from Instructor's Views
- Alignment of System Timing and Practices

II. Support Processes of Instructors' Analytics Use

- Features for Question Generation & Maintenance
- Visual Aids for Finding Entry Points
- Support for Working with Reference Points
- Flags for Later Decisions to Take Action

III. Support Instructors' Sharing & Conversations

- Switch for De-identified Views for Sharing

Implications for LA Design

I. Align Information Structures with Pedagogical Concerns

(a) *Organize information from the view of instructors, not from data structures*

- **Weeks/units** of a class
- **Sets** of course activities

vs

- **Alphabetically**
- By **system-time**

(b) *Align the timing of system and instructors' practices*

Daily update of data refresh → **Limited usefulness** of the analytics → Embed features for **data refresh on demand**

Implications for LA Design

II. Support Processes of Instructors' Analytics Use

(a) Embed support for question generation and maintenance

Qs may emerge/ be revised through further look at the data

→

Embed features for **Qs**
Editable Functions
Annotation/tags with Qs

(b) Incorporate visual aids to find entry points to the analytics

Start with **an overview or** a specific part to focus

→

Embed aids for **entry**
Highlight info by rows/ columns or sequences

Implications for LA Design

II. Support Processes of Instructors' Analytics Use

(c) Support to find & work with reference points for interpretation

Relative Reference Points
Overarching **trends data** from prior terms/similar courses

Absolute Reference Points
Explicit metrics based on instructors' expectations for class

(d) Embed flags for later decisions to take action & check impact

Delay actions till further data is available → Would they **remember** it & **return** to it? → Embed features for **return** **Marking/annotation** for further follow-up

Implications for LA Design

III. Support Sharing & Conversations for Instructors

Offer instructors with de-identified views for sharing

*Along with design efforts, it is also important to consider **implementation supports** to facilitate instructors' **translation** of info into actionable insights.*

Implications for LA Implementation

Facilitate Pedagogical Support for the Process of Analytics Use

(a) Link Pedagogical Questions, Answers, & Actions together

Sending weekly email with support materials

(b) Support Collaborative Interpretation & Instant Feedback

Workshops & One-on-one coaching sessions

(c) Cultivate Contextualized & On-Going Networks

Local instructor communities of practice around analytics use

Conclusions

Evidence-based LA design can be informed through examining **instructors' situated analytics use**

LA *design* should be aligned with instructors' **views/concerns** & **situated practices**

LA *implementation* should offer **pedagogical support** for instructors' interpretable and actionable translation

Current + Future Works

NYU LEARN is currently working on

Instructor-Facing Dashboards

LA Dashboard Iterative Revision

Revising the tool based on the feedback
Extending the scale of participants
Rolling out the updated tools

LA Pedagogical Support

Creation of **a portal for user guidance**
Regular workshops & meetings with faculty
Weekly email with support materials

Current + Future Works

NYU LEARN is currently working on

Student-Facing Dashboards

LA Dashboard Design

Identification of student needs/problems
Co-design with associated stakeholders
(Students, faculty, academic advisors)

*Such efforts can help us move as a field towards **human-centered LA design** as a practice to meaningfully impact teaching and learning.*

Thank You

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