



SoLAR Webinar, Oct 16th, 2019

DESIGNING LEARNING ANALYTICS FOR HUMANS WITH HUMANS

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 @alywise



 @NYU_LEARN

 nyu.edu/learn-analytics



Meet Our Team



Alyssa Wise



Yoav Bergner



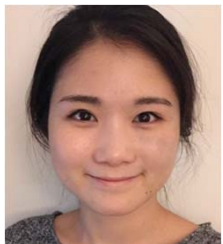
Xavier Ochoa



Qiuji Li



Susana Toro



Yeonji Jung



JP Saramiento



Fabio Campos



Sameen Reza



Ofer Chen



Yu Wang



Jing Zhang



Shiri Mund



Sophia Lu



Sophie Sommer



Trang Tran



Eunyoung Jeon



With thanks to our amazing partners at NYU-IT



Ben Maddox
Chief Instructional Technology Officer



Andrew Brackett
Learning Analytics Specialist



Jason Korenkiewicz
Director of Instructional Technology Tools & Services



Robert Egan
eLearning Specialist



Elizabeth McAlpin
Project Director of Research & Outcomes Assessment



And the many members of the larger LEARN community across NYU who participated in the projects described today

***Stern School of
Business***

Kristen Sosulski

Ben Bowman

Sean Diaz

Marian Tes

Daniel de Valk

***Faculty of Arts
& Sciences***

Selin Kalaycioglu

Lucy Appert

Tyrell Davis

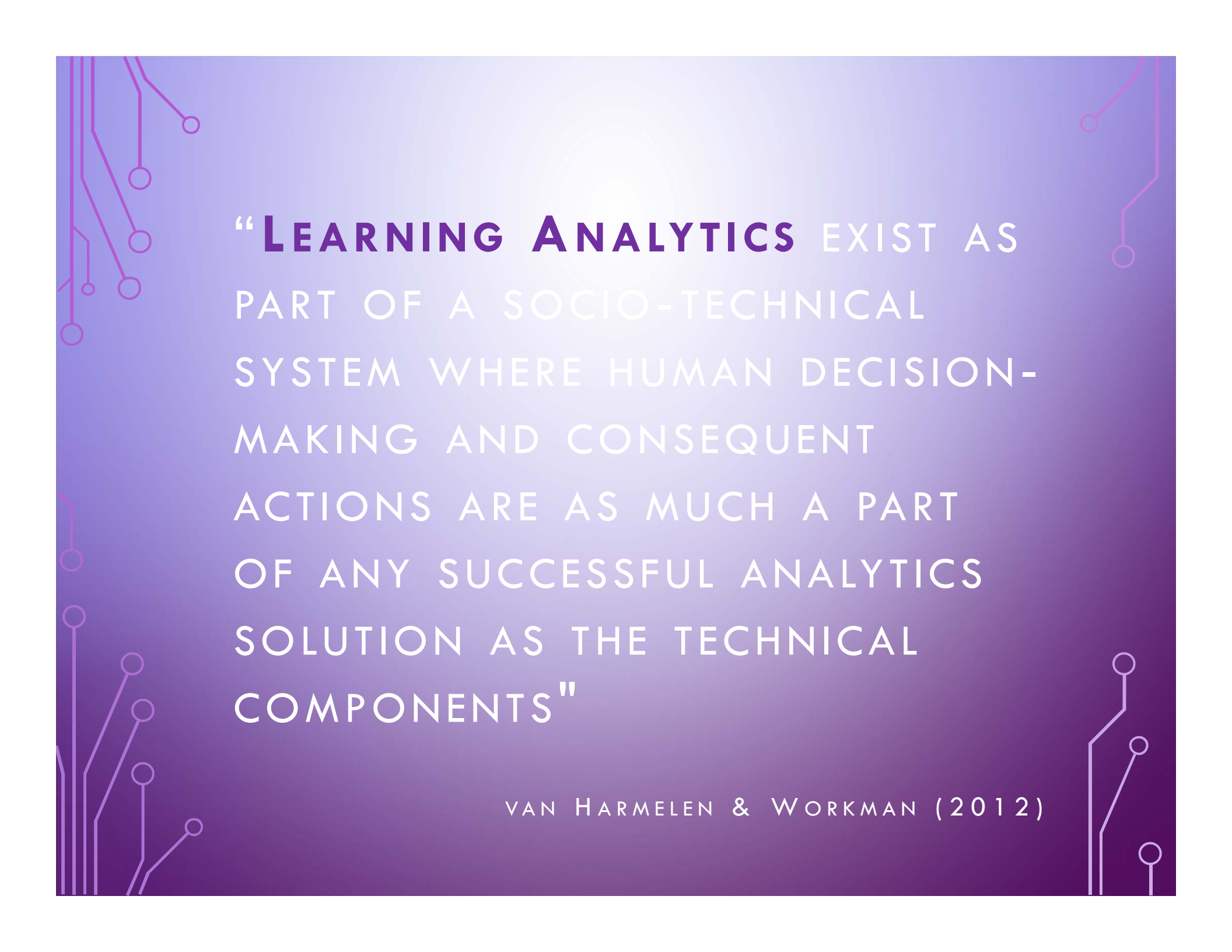
***NYU
Libraries***

Andrew Battista

Denis Rubin

School for Professional Studies

Victoria Axelrod



“LEARNING ANALYTICS EXIST AS
PART OF A SOCIO-TECHNICAL
SYSTEM WHERE HUMAN DECISION-
MAKING AND CONSEQUENT
ACTIONS ARE AS MUCH A PART
OF ANY SUCCESSFUL ANALYTICS
SOLUTION AS THE TECHNICAL
COMPONENTS”

VAN HARMELEN & WORKMAN (2012)



“LEARNING ANALYTICS EXIST AS
PART OF A SOCIO-TECHNICAL
SYSTEM WHERE HUMAN DECISION-
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OF ANY SUCCESSFUL ANALYTICS
SOLUTION AS THE TECHNICAL
COMPONENTS”

VAN HARMELEN & WORKMAN (2012)

AND YET . . .

ONLY 6% OF STUDENT-FACING
LEARNING ANALYTICS SYSTEMS DESCRIBED
IN THE LITERATURE 2004-2016 REPORTED A
CLEAR, EXPLICIT NEEDS ANALYSIS
AND ONLY 11% REPORTED ANY FORM OF
USABILITY TESTING

BODILY & VERBERT (2017)

AND YET . . .

ONLY 30% OF DASHBOARDS
DESCRIBED IN THE LITERATURE 2010-
2015 INCLUDED A REPORT OF
AUTHENTIC USER EVALUATION

SCHWENDIMANN ET AL. (2016)

WHY DOES THIS MATTER?

MISALIGNMENT BETWEEN
DESIGNERS' INTENTIONS AND
STUDENTS' PERCEPTIONS CAN
RESULT IN DISTRUST OF LA
TOOLS

DE QUINCEY ET AL. (2019)

WHY DOES THIS MATTER?

TOOLS THAT ARE DESIGNED WITHOUT
CONSIDERATION OF USER'S NEEDS
AND THE SITUATIONS IN WHICH THEY
WILL USE THEM ARE UNLIKELY TO
IMPACT REAL WORLD PRACTICES IN
ANY SIGNIFICANT WAY

CUBAN (2001)

IN SUMMARY

The first decade of Learning Analytics has focused more on technical systems than human ones

This represents a large gulf with what is known about best practices for Human-Computer Interaction Design

Consequently there is now great interest in involving the intended users of learning analytics in their design

Spotlight on these issues in recent JLA Special Section on Human-Centred Learning Analytics

Journal of Learning Analytics 6(2) – Summer 2019



learning-analytics.info

Special Section: Human-Centred Learning Analytics

Working Together in Learning Analytics: Towards the Co-Creation of Value

Co-Designing a Real-Time Classroom Orchestration Tool to Support Teacher-AI Complementarity

Teaching with Analytics: Towards a Situated Model of Instructional Decision-Making

Designing in Context: Reaching Beyond Usability in Learning Analytics Dashboard Design

Engaging Faculty in Learning Analytics: Agents of Institutional Culture Change

DESIGNING LEARNING ANALYTICS FOR HUMANS WITH HUMANS

BUT HOW?

GETTING
INFORMATION
ON

GATHERING
INPUTS
FROM

GENERATING
IDEAS
WITH





Learning Analytics @ NYU

a collaborative effort, focused on community change, that puts people, not data, first

We build *partnerships* between researchers, information technology staff, faculty, administrators and students to *jointly advance* data-informed teaching and learning

We *create* and *support* effective teaching and learning *tools* that *augment human capacity* to improve educational processes



Learning Analytics @ NYU

Instructional
Dashboard

Collaboration
Analytics

Intro STEM
Early Alerts

Student Facing
Analytics

Instrumented
Learning Spaces

Reflection
Analytics

Presentation
Feedback Tool

Discussion
Analytics



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NYU INSTRUCTIONAL DASHBOARD

INITIAL DESIGN PROCESS

Establish the scope and goals for the project

- University-wide service to operate at scale
- Support data-informed decision-making
- Instructor of record at the heart of service

Some starting strategies

- Draw on existing knowledge and relationships
- Get an early version in the hands of humans
- Iterate quickly, scale slowly

NYU INSTRUCTIONAL DASHBOARD

INITIAL DESIGN PROCESS

Use cases drive design with instructor questions as the starting point

Dr. Callahan taught a material assignment containing expanded differences between online and in-person

Professor Badino teaches an large in-person undergraduate physics course in which students prepare for class discussion and problem solving with online readings and videos.

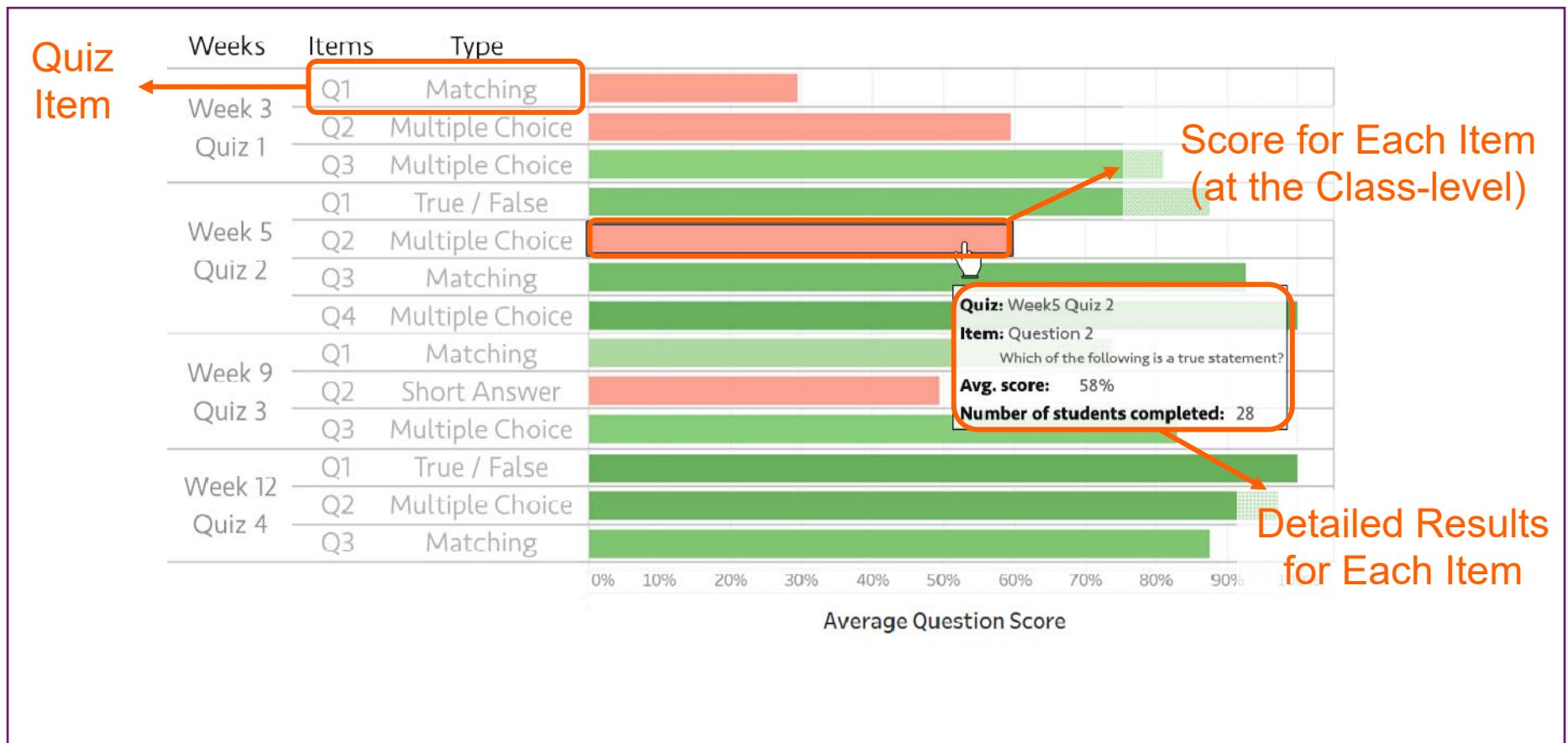
Prof. Badino wants to better understand relationships between student interaction with pre-class materials, in-class question scores, and their achievement on weekly quizzes

aims to compare

Learning Analytics Dashboard Design v1

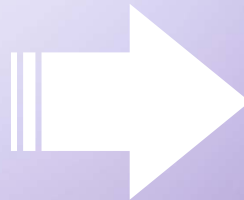
Quiz Results View

Purpose To identify aspects of the materials which were difficult for students



NYU INSTRUCTIONAL DASHBOARD

FIRST FORAYS TO THE FIELD



Quiz: Week 5 Quiz 2
Item: Question 2
 Which of the following is a true statement?
Avg. score: 58%
Number of students completed: 28

NYU INSTRUCTIONAL DASHBOARD

FIRST FORAYS TO THE FIELD

(Not surprisingly) the process of actually using analytics to inform pedagogical decisions is complex

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

<< >>
TENSION

Struggles in connecting the **data** with **their teaching** and **routines**

Tool-provided **data** about student activity

{ GAP }

Use of information to guide **sense-making & pedagogical action**

We need to examine the process of analytics use in situ



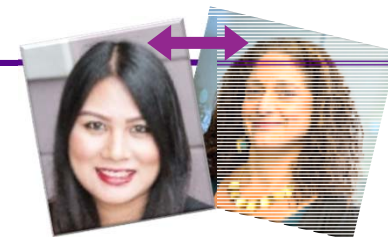
Key Questions

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

What implications for LA design and implementation can be drawn based on this?

Approach

Case studies with all 5 instructors who used the LA dashboard in their teaching during that first semester

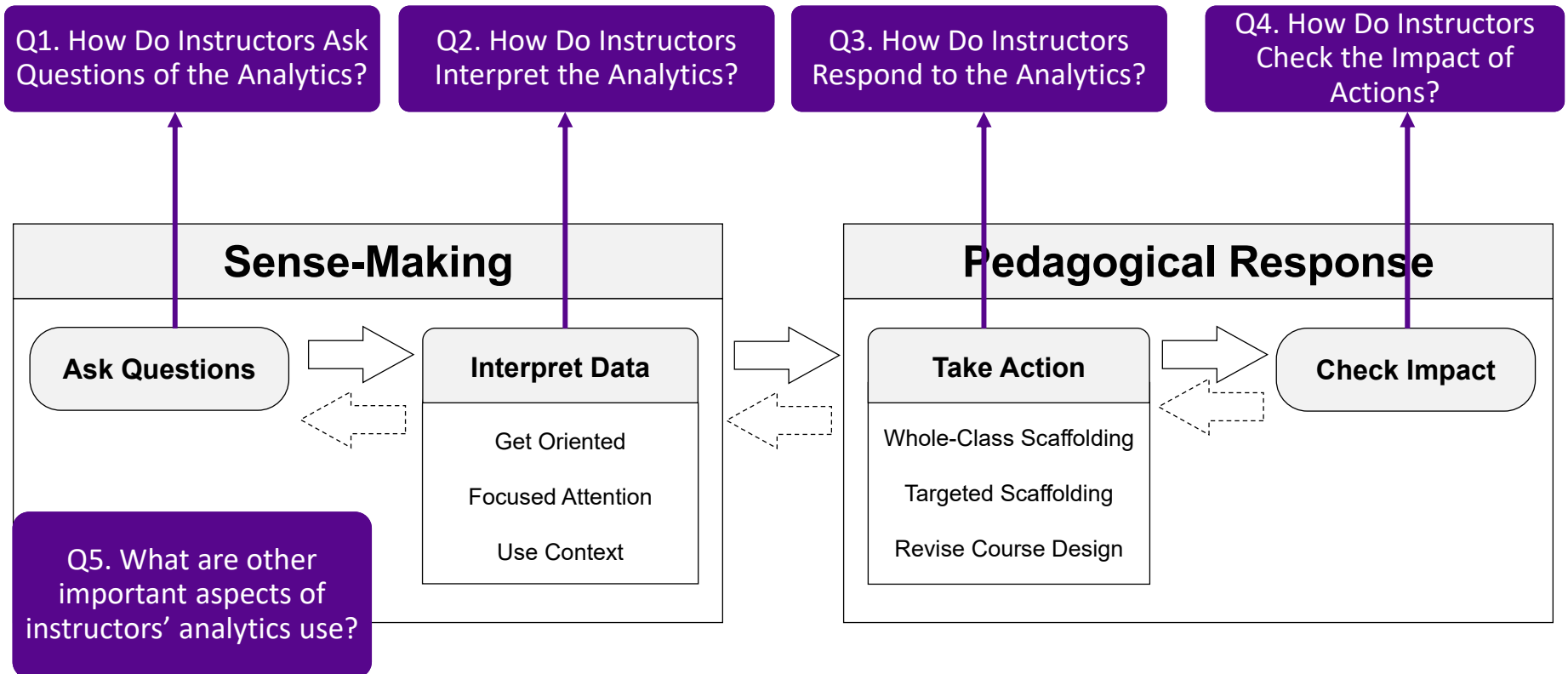


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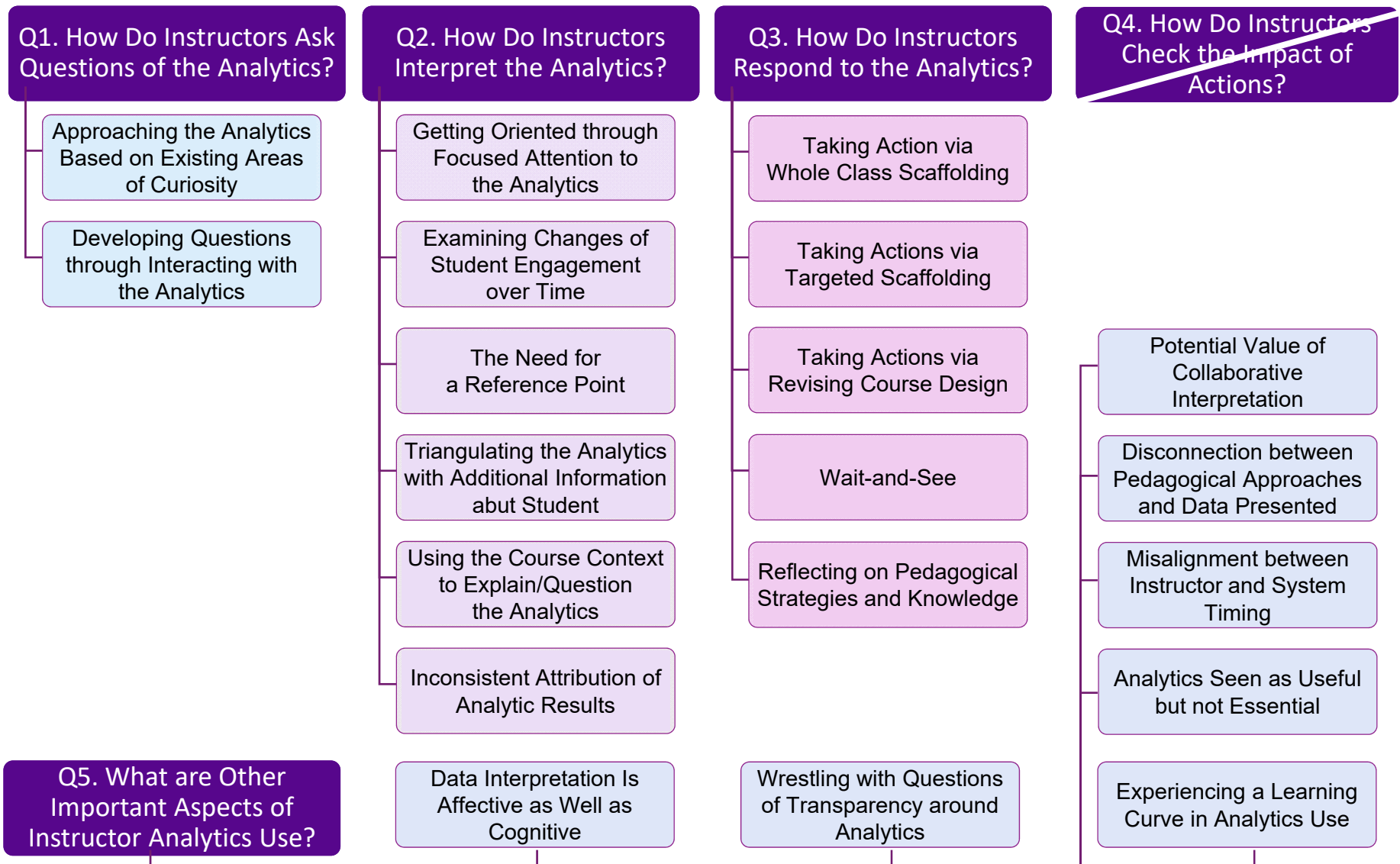


Template for Inquiry

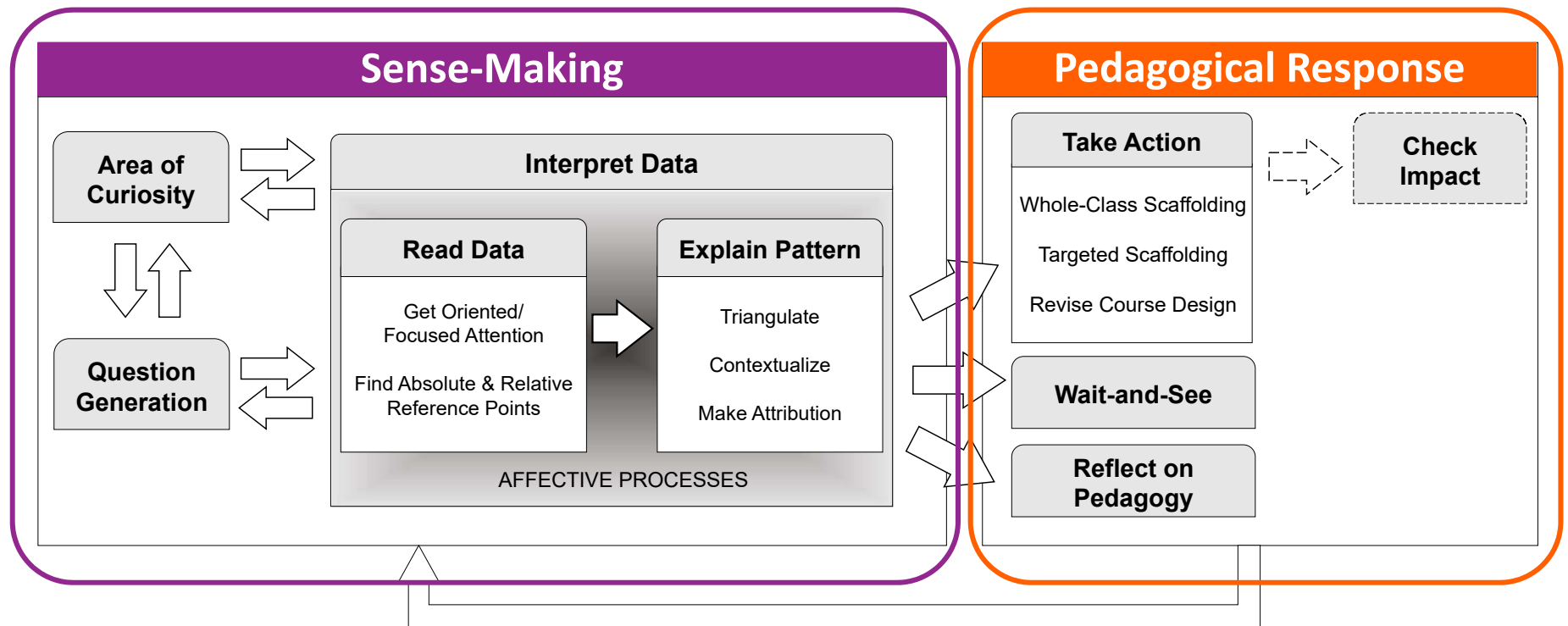
starting from the literature



Emergent Themes



A Model of Instructor Analytics Use



Wise, A. F., & Jung, Y. (2019). Teaching with Analytics: Towards a Situated Model of Instructional Decision-Making. *Journal of Learning Analytics*, 6(2), 53-69.



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

Implications for Dashboard Redesign

I. Design to Support Processes 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**

II. Align Information with Pedagogical Concerns

Organize Information from Teaching Perspective

Align System Timing with Teaching **Practices**

III. Support Sense-making Conversations

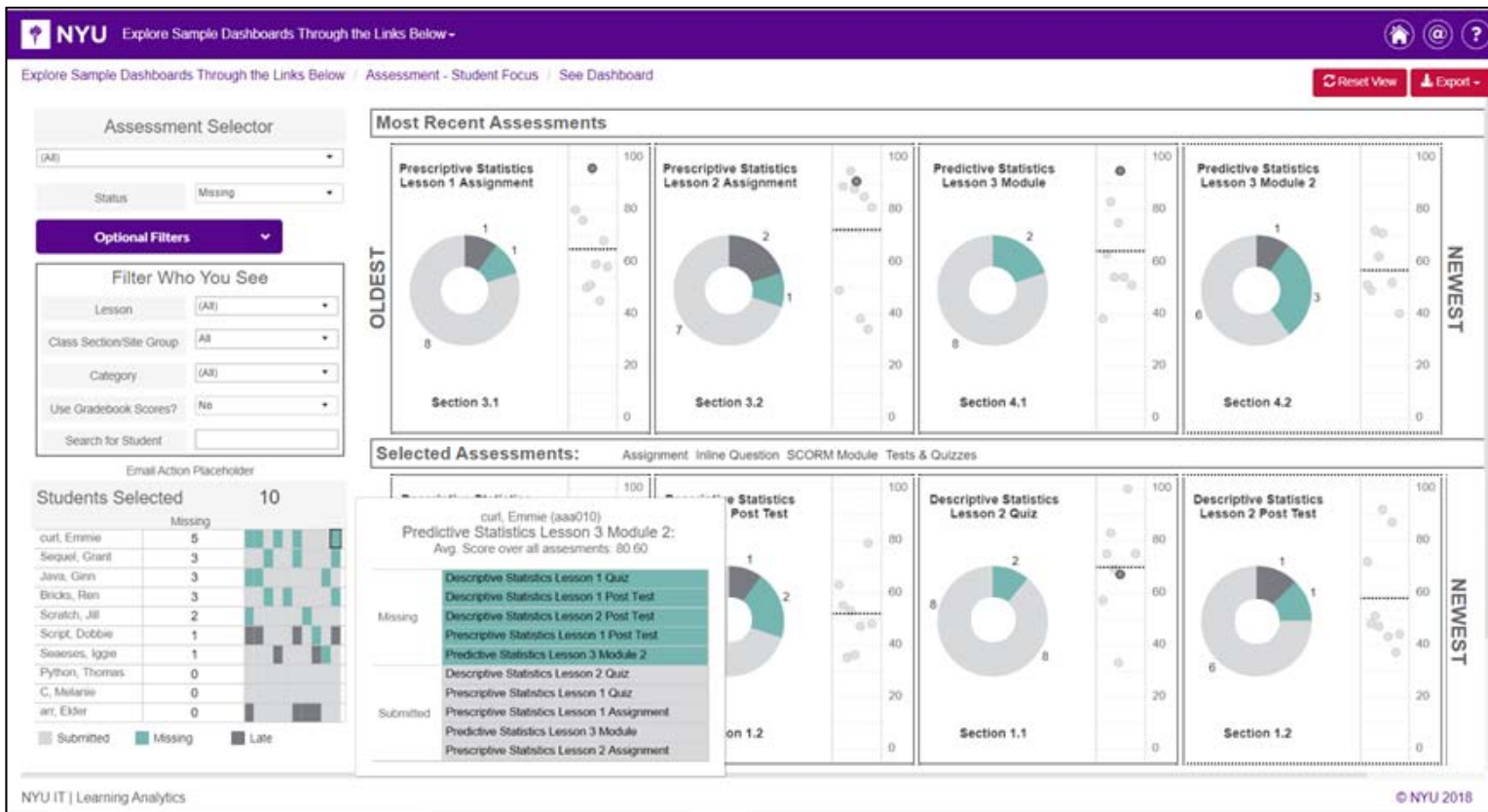
Switch to De-identified **Views for Sharing**



Our **partnership** with IT has led to **new models** of dashboard (re)design and **iterative improvement cycles**

Learning Analytics Dashboard Design v2

Assessment View





*Along with design efforts, it is also important to consider **implementation supports** to facilitate **translating** information into actionable insights.*

Implications for Implementation Supports

I. Link Pedagogical Questions, Answers, & Actions Together

Interpretive dashboard shell plus weekly emails

II. Support Collaborative Interpretation & Feedback

Workshops & One-on-one coaching sessions

III. Cultivate Contextualized & On-Going Networks

Local instructor communities of practice around analytics use

Learning Analytics Dashboard Portal Design

Struggling Students Article

The screenshot displays a web portal for Learning Analytics Faculty Service. The header includes the NYU logo, the service name, and a site selector for '2019 Fall: Learning Sciences - Wise'. A sidebar on the left contains navigation links under 'Questions to Explore:' with categories for 'Assessment' and 'Engagement'. The main content area features an article titled 'Article: How can I identify struggling students?' with a purple header bar. The article text discusses various methods for identifying struggling students, including classroom observations and dashboard analytics. A 'What next?' section follows, providing context and a video link. The video player shows a dashboard with the text 'CHECK THE SUCCESS OF THE INTERVENTIONS'. On the right, there are thumbnails for 'Lesson Interaction & Traffic' and another dashboard view.

NYU Learning Analytics Faculty Service Site: 2019 Fall: Learning Sciences - Wise

Questions to Explore:

Assessment

[+] Do some of my students need help? / Which of my students need help?

[Who is behind on submitting Assessments and Assignments?](#)

[How can I identify struggling students?](#)

Engagement

[+] What lesson materials are mv

Article: How can I identify struggling students?

Instructors have many ways to identify struggling students. Your time spent in the classroom can sometimes be the best place to observe student knowledge and grasp on important concepts. Beyond the classroom, you may have artifacts such as written assignments that reveal student thoughts and understanding on relevant topics. Beyond these experiences and other direct student contact, your dashboards provide additional information that can help you gain insight into student behavior and knowledge. Two examples of this include: (1) Identifying students who aren't accessing course material or are only doing so directly before the class, and (2) Stud

assessments that d

Identifying Students w

What next?

Things to consider

This article is a companion article for identifying students who struggle. We recommend checking out the companion article under the 'Engagement' section of questions in the learning analytics portal. The larger article discusses actions you can take at a student or class-level. We generally describe action in a general framework using three buckets. The video below discusses those ideas.

CHECK THE SUCCESS OF THE INTERVENTIONS

DESIGNING LEARNING ANALYTICS FOR HUMANS WITH HUMANS

BUT HOW?

GETTING
INFORMATION
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Learning Analytics @ NYU

Instructional
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Intro STEM
Early Alerts

Student Facing
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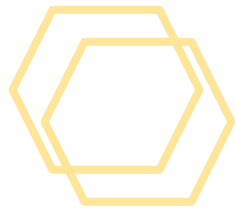
Reflection
Analytics

Presentation
Feedback Tool

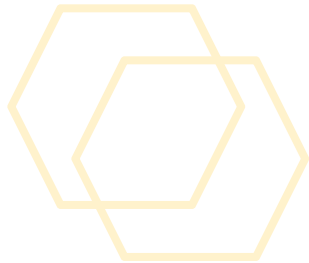
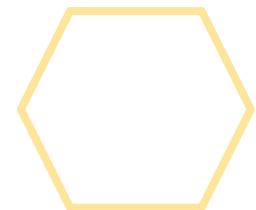
Discussion
Analytics



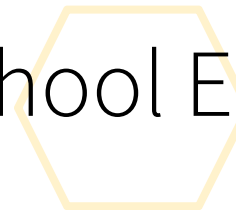
Co-Designing Student-Facing Learning Analytics



NYU LEARN



NYU IT + School EdTech



Student Advisors



Students

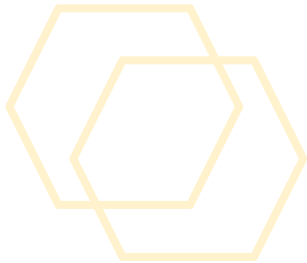
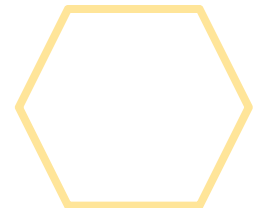




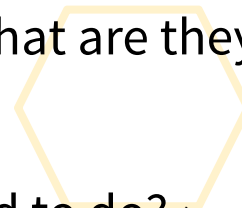
Key Questions for Participatory Design



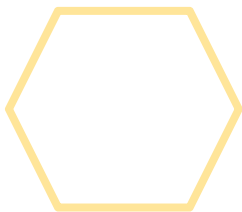
Who is in the room? (VON HIPPEL, 2005)



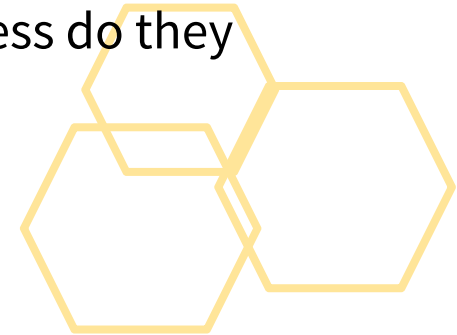
What do they see? What are they told?



What are they invited to do? (VERBERT, 2014)



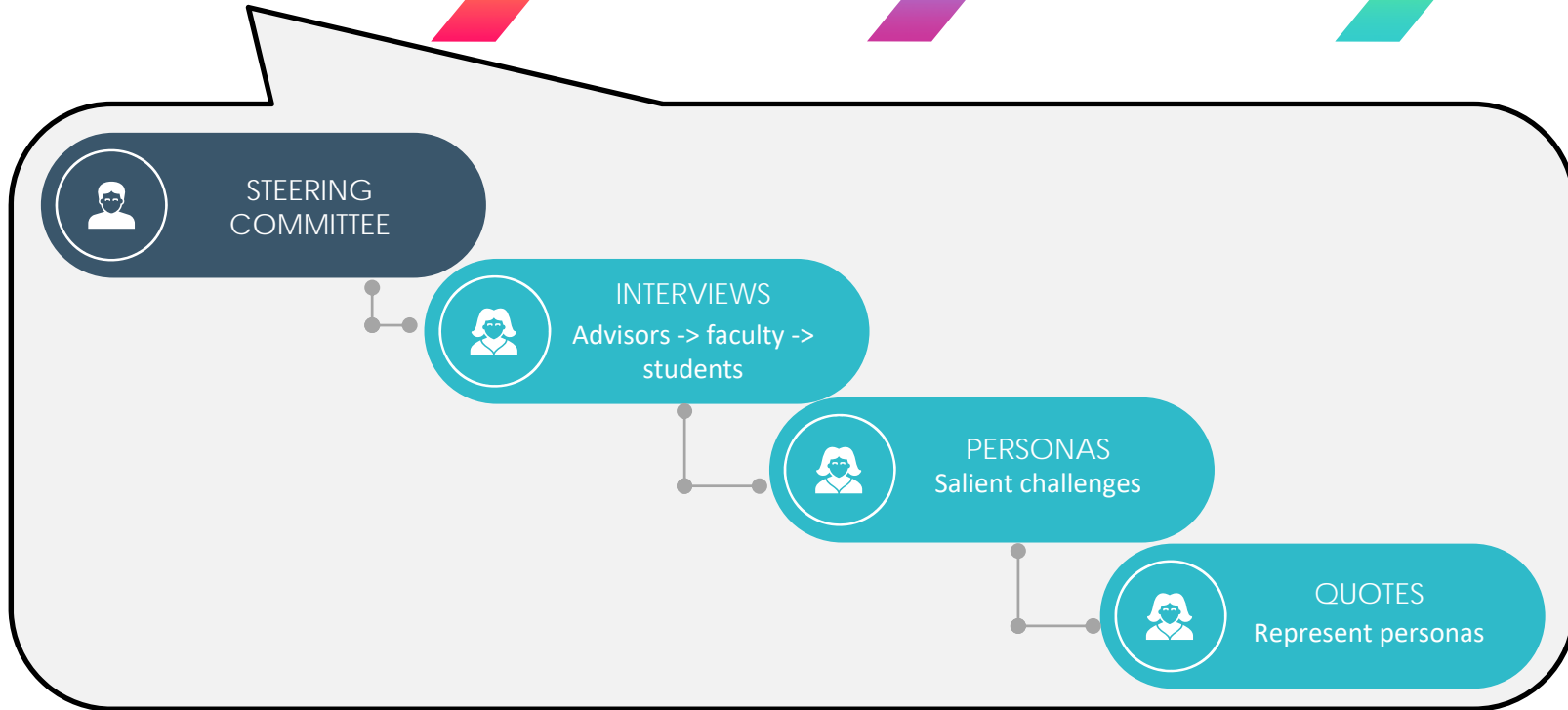
At what stages of the process do they participate?



Note that students are frequently excluded
(MARJANOVIC, 2014)



Student-Facing Learning Analytics Project Phases





WE NEED YOUR IDEAS FOR THE FUTURE OF STUDENT EXPERIENCE

Come participate in a workshop about how to unleash your creativity and help us design a new data tool to enhance how students learn at NYU.

Design Thinking Workshop

 NYU | LEARN



Three 5-hr Design Sessions

10 Student Participants

Human-Centered Design Methodology

THREE KEY DESIGN INGREDIENTS



WIDE PROBLEM SCOPE

The dashboard, data and academics are not the limit. Project objectives flexible from the beginning.



SAFE DESIGN SPACE



GENERATIVE TENSIONS

THREE KEY DESIGN INGREDIENTS

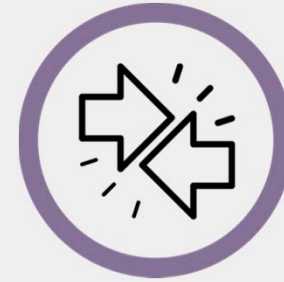


WIDE PROBLEM SCOPE



SAFE DESIGN SPACE

Doc students led workshops for undergrads: a learning experience for everyone involved.



GENERATIVE TENSIONS

THREE KEY DESIGN INGREDIENTS



**WIDE PROBLEM
SCOPE**



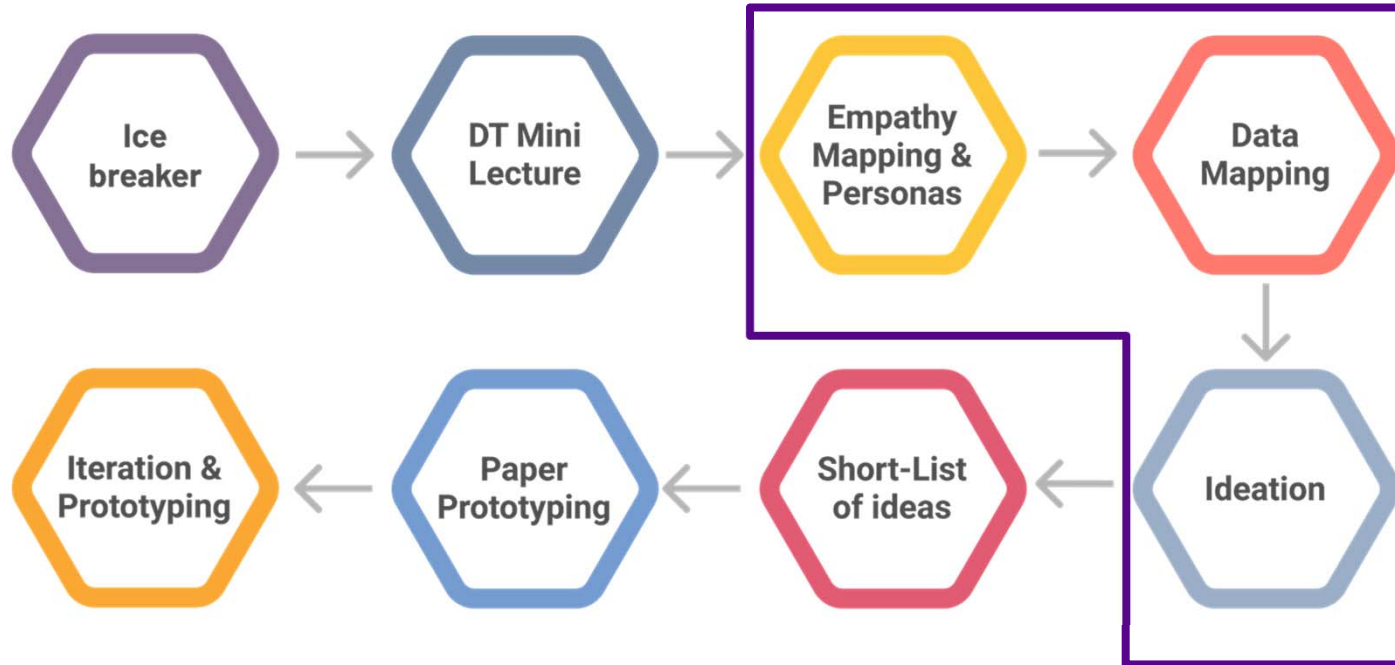
SAFE DESIGN SPACE



**GENERATIVE
TENSIONS**

Leveraging tensions as fuel for design; going beyond "tell me what you want".

Workshop Process



THREE FUNDAMENTAL TOOLS



EMPATHY MAPPING

The entire design process was centered what on what the defined *personas* would feel or think about our ideas.



DESIGN CARDS



LIVE PROTOTYPING



Student Persona Descriptions

OS (Overwhelmed Student)

- College feels a lot more challenging than high school
- Is reassessing who they are (not the best in class any more)
- May have some habits that could be improved around:
 - Writing
 - Time management
 - Advocating for themselves

FG (First Gen Transitioner)

- NYU perceived as great opportunity: stakes very high
- Generally very proficient and recognized in their environments but not recognized as much in new space
- May feel different to classmates
- High pressure from family and fear of failure
- May have trouble navigating additional opportunities



Student Personas Shared via Quotes

Olivia (Overwhelmed Student)

Says

- I used to do well in school. Really well. I was the Valedictorian, and I always knew that I wanted to come to NYC. Now I am not so sure.
- I am confused about my grades. I am good at studying. I did well in school.

Does

- Tends to open the readings one or two days before class, sometimes the morning before the class itself.

Frank (First Gen Transitioner)

Says

- I had a friend, one of these mentors, that told me how to navigate the statistics course.... there was all this stuff out there. I wish he would have told me earlier.
- I have learned to pace myself when studying, and do a little every day. I don't know where I got that from, maybe another student.

Does

- Studies a bit every day. Without much structure; just allots a number of hours to study and reads or writes whatever is most urgent.



EMPATHY MAPPING



THREE FUNDAMENTAL TOOLS



EMPATHY MAPPING



DESIGN CARDS

A deck of cards allowed students to ask new questions about the data and see new angles and possibilities.



LIVE PROTOTYPING



DESIGN CARDS



THREE FUNDAMENTAL TOOLS



EMPATHY MAPPING



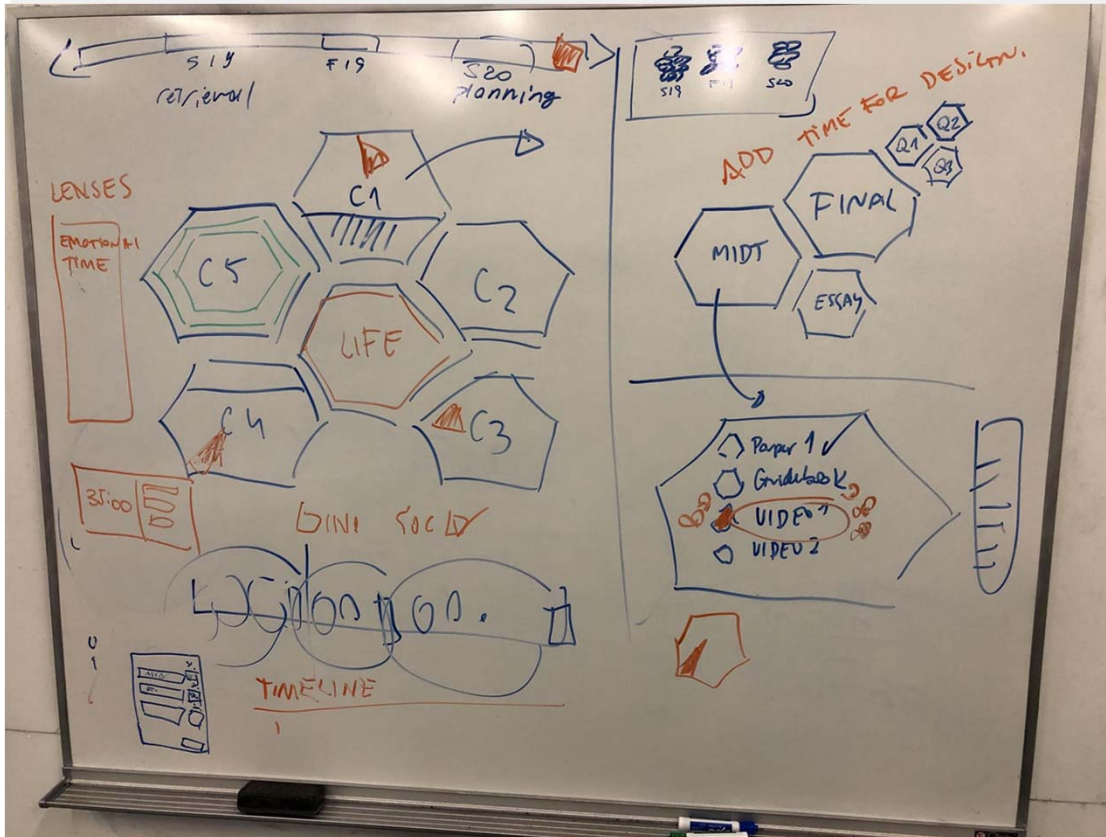
DESIGN CARDS



LIVE PROTOTYPING

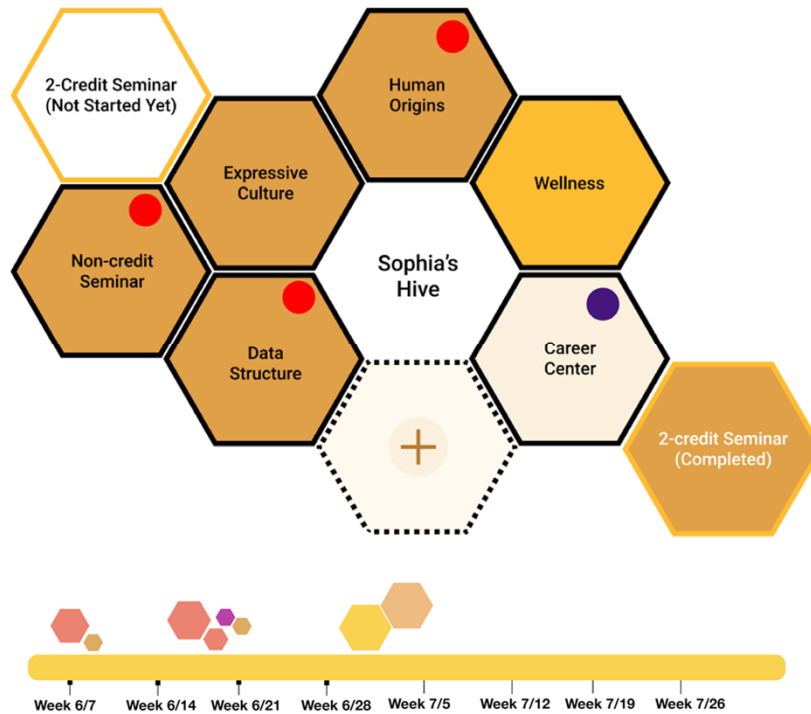
A UX designer materialized ideas into sketches with students in situ, during the workshops.

“HIVE” design – from Ideation to Prototype




Design expanded and reflected back by facilitators and live designer

“HIVE” design – from Ideation to Prototype



First digital prototype brought back to the students for feedback

“HIVE” design – from Ideation to Prototype

 Today I feel

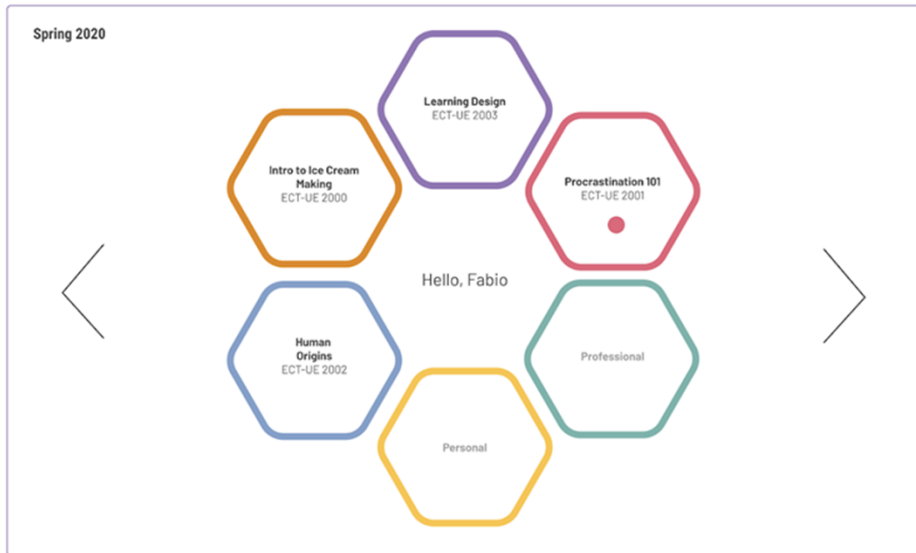
3
Deadlines
in the next 2 weeks






09
days
until next Deadline

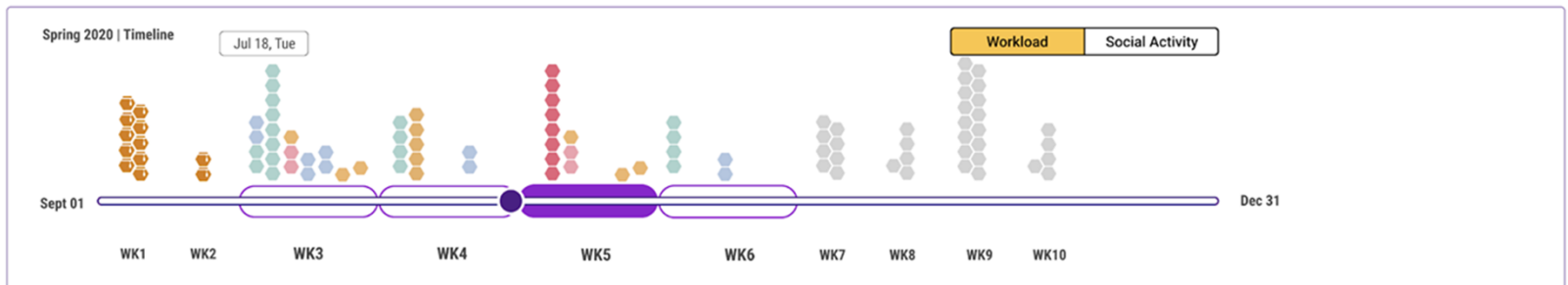
+
add a reminder

 Set a timer

 Something not working?
Report a Bug



-  Mar 20, 2019
Learning Design
 The professor has posted grades.
-  Mar 18, 2019
Procrastination 101
 New quiz posted. Check it out.
-  Mar 16, 2019
Human Origins
 Analysis available for Quiz #1.
-  **Career Center**
 50+ of your peers registered this event.
-  **Intro to Ice Cream**
 80% of students have submitted the assignment.
 Assignment is due in 24 hours.



cross course assignment weight that already gained - hopefully provide some motivation, aggregated by week. Each hex = 5% of weight

2-week detailed view, workload is shown by courses, and by day of the week. When hover over the hex column, specific date shows up

cross course again, for longer term

EMERGENT THEMES FROM STUDENTS

[Data]

Using data was as only *part* of the story. Thus, students came up with tools that are more than dashboards.

Holistic

Students underscored needs beyond academic help.

Social

Sharing of information through the system seen as one of the powerful possibilities of data.



Student-Facing Learning Analytics Project Phases



FINAL TAKEAWAYS FOR DESIGNING LA FOR HUMANS WITH HUMANS

Gathering (useful) input from humans to inform analytics is about much more than simply asking people what they would like

Both efforts described here led to a variety of things we never would have imagined otherwise

There was a concern with burdening already overstretched students and instructors, but they appreciated being involved in the processes



Special thanks to the LEARN PhD students who spearheaded work on the projects described today




Yeonji Jung



JP Saramiento



Fabio Campos



**Thank you and I'm
happy to answer any questions**



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 @alywise





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