

Educational R, D & I: Using Logic Models to Design, Implement & Evaluate Programs

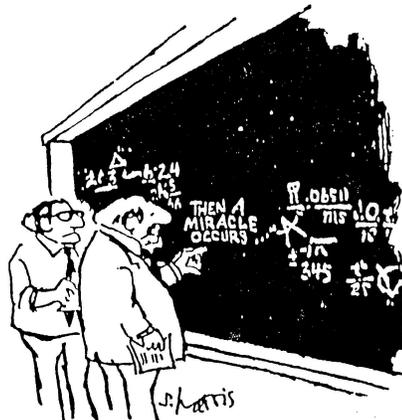
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A common problem is that the program designs, instructional activities, and assessment strategies we use in higher education often do not lead to the desired student outcomes.

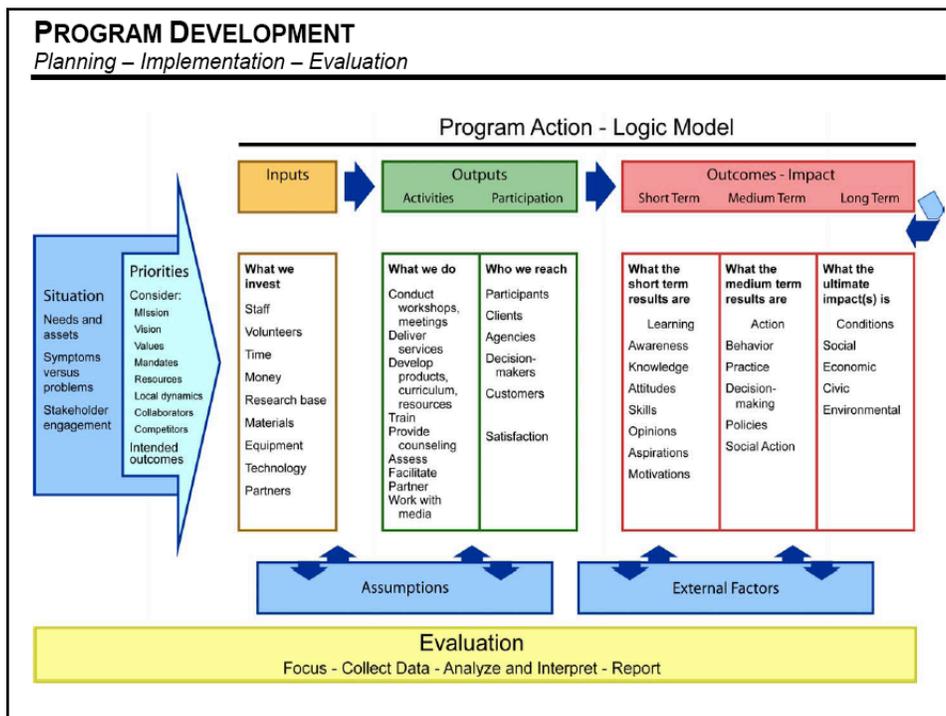
*We need to make our assumptions about Teaching, Learning & Assessment more **EXPLICIT** -- rather than believe in miracles.*

"I think you should be more explicit here in Step Two."



System Logic Models

- In educational R, D, & I we need to lay out a “Logic Model” for system or program design, implementation and evaluation
 - Logic Model forces attention to: (a) existing conditions, (b) resources, (c) inputs, (d) outputs, and (e) proximal and distal outcomes
 - Not only is there a focus on the elements of the system but most especially the assumed logical and causal relationships among them
 - Model enables monitoring the building of the system and its enactment
 - **Model also enables strategies for evaluation of the system along the way and for adjustment and correction as needed**



System Logic Model & Theory of Action

- ❑ A “Logic Model” forces one to specify the presumed “Theory of Action”
 - Helps make explicit assumptions about how particular components are supposed to work, who is to be impacted, what the expected consequences should be, and WHY.
 - In a complex system, it is critical that the theory of action be articulated, especially with regard to how assessment information is to be used to improve outcomes over time - who will use what information and how
 - Competing theories of action can be made explicit in the system design phase -- choices can be made based on the quality of the evidence and/or argument in favor of adopting one theory in lieu of alternatives

Topics for Today’s Discussion

- What’s a Logic Model & Why Do This?
- Components & Examples of Logic Models
- Connecting Logic Models to Evaluation and Continuous Quality Improvement
- Application to UIC’s Inclusive Excellence Project

A logic model is...

- A depiction of a program showing what the program will do and what it is to accomplish.
- A series of “if-then” relationships that, if implemented as intended, lead to the desired outcomes
- The core of program planning and evaluation

Logic model may also be called...

- Theory of change
- Program action
- Model of change
- Conceptual map
- Outcome map
- Program logic

What logic model is not...

- A theory
- Reality
- An evaluation model or method

It is a framework for describing the relationships between investments, activities, and results.

It provides a common approach for integrating planning, implementation, evaluation and reporting.

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Assumptions

Assumptions underlie much of what we do. It is often these underlying assumptions that hinder success or produce less-than-expected results. One benefit of logic modeling is that it helps us make our assumptions explicit.

Assumptions

The beliefs we have about the program, the participants, and how the program will work. Includes ideas about:

- the problem or existing situation
- program operations
- expected outcomes and benefits
- the participants and how they learn, behave, their motivations
- resources
- staff
- external environment: influences
- the knowledge base
- etc.

If-then relationships

Underlying a logic model is a series of ‘if-then’ relationships that express the program’s **theory of change**

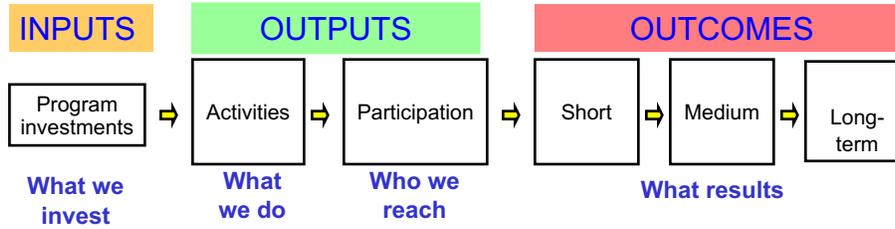


Theory of change

“A theory of change is a description of how and why a set of activities – be they part of a highly focused program or a comprehensive initiative – are expected to lead to early, intermediate, and long-term outcomes over a specified period.”

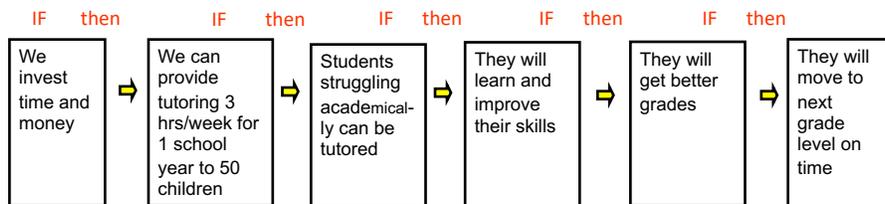
(Anderson, 2000)

Logical **chain of connections** showing what the program is to accomplish



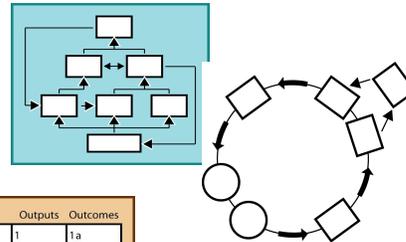
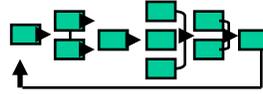
How will activities lead to desired outcomes?
A series of **if-then relationships**

Tutoring Program Example



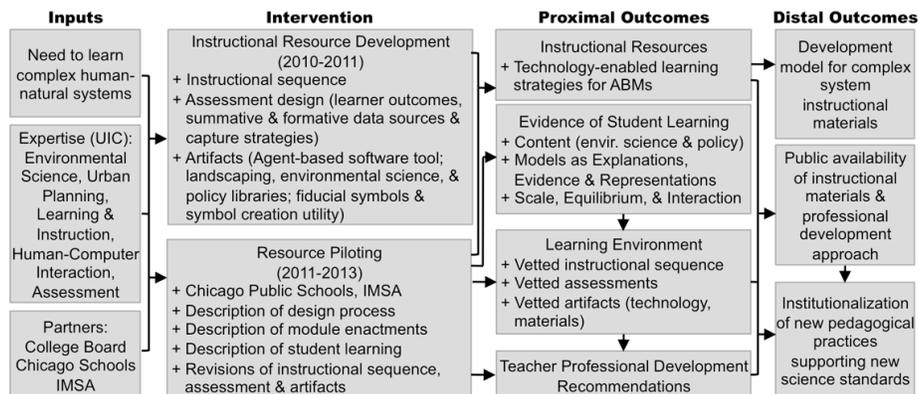
What does a logic model look like?

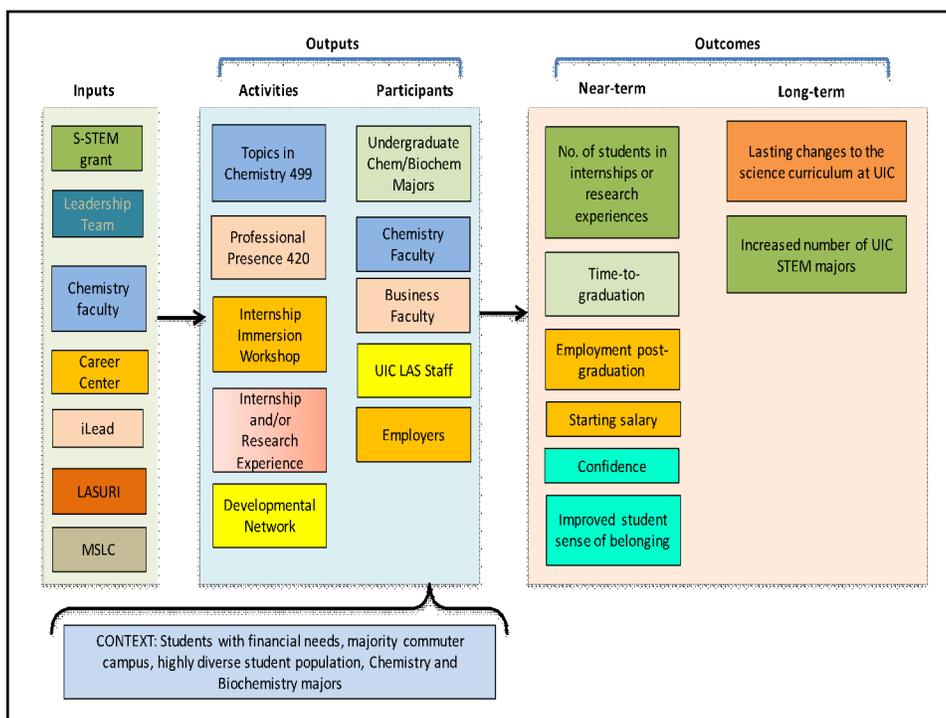
- Graphic display of boxes and arrows; vertical or horizontal
 - Relationships, linkages
- Any shape possible
 - Circular, dynamic
 - Cultural adaptations; storyboards
- Level of detail
 - Simple
 - Complex
- Multiple models
 - Multi-level programs
 - Multi-component programs



| Inputs | Outputs | Outcomes |
|--------|---------|--------------|
| 1 | | 1a b |
| 2 | | 2a b c |
| 3 | | |
| 4 | | 3a b |

Examples from NSF Research Proposals





Limitations

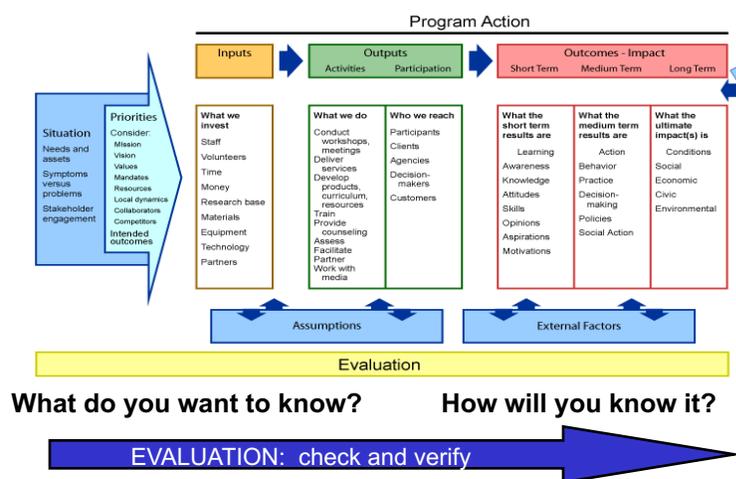
Logic Model...

- Represents intention, is not reality
- Focuses on expected outcomes
- Challenge of causal attribution
 - ✓ Many factors influence process and outcomes
- Doesn't address:
Are we doing the right thing?

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Logic model in evaluation

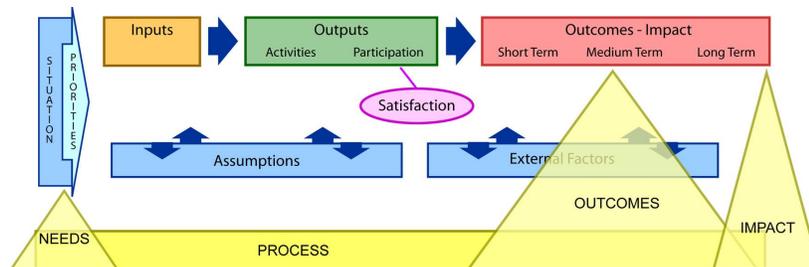


Logic Model helps with Evaluation

Provides the program description that guides an evaluation process

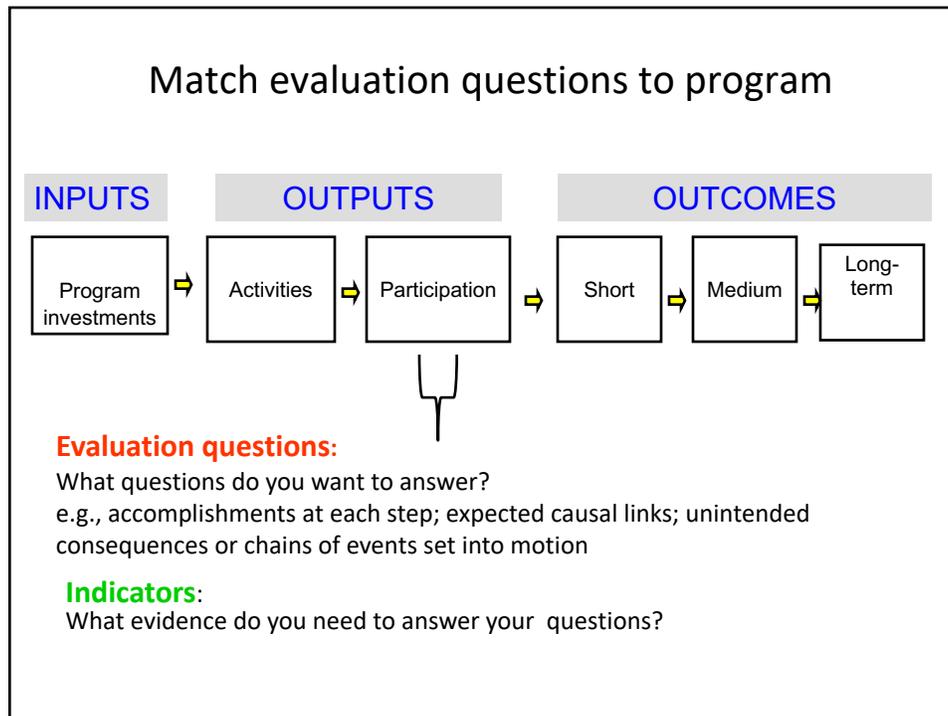
- Helps you match evaluation to the program
- Helps you know what and when to measure
 - Are you interested in process and/or outcomes?
- Helps you focus on key, important information
 - Prioritize: where will you spend your limited evaluation resources?
 - What do you really need to know??

Logic model and common types of evaluation



Types of evaluation

| | | | |
|---|---|---|---|
| <p>Needs/asset assessment: What are the characteristics, needs, priorities of target population? What are potential barriers/facilitators? What is most appropriate to do?</p> | <p>Process evaluation: How is program implemented? Are activities delivered as intended? Fidelity of implementation? Are participants being reached as intended? What are participant reactions?</p> | <p>Outcome evaluation: To what extent are desired changes occurring? Goals met? Who is benefiting/not benefiting? How? What seems to work? Not work? What are unintended outcomes?</p> | <p>Impact evaluation: To what extent can changes be attributed to the program? What are the net effects? What are final consequences? Is program worth resources it costs?</p> |
|---|---|---|---|



Identify indicators

How will you know it when you see it?
What will be the evidence?
What are the specific indicators that will be measured?
Can have qualitative indicators as well as quantitative indicators

Methods of data collection

SOURCES OF INFORMATION

- Existing data
 - Program records, attendance logs, etc
 - Pictures, charts, maps, pictorial records
- Program participants
- Others: key informants, nonparticipants, proponents, critics, staff, collaborators, funders, etc.

DATA COLLECTION METHODS

- Survey
- Interview
- Test
- Observation
- Group techniques
- Case study
- Photography
- Document review
- Expert or peer review

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HHMI Inclusive Excellence Initiative

“This initiative is about encouraging colleges and universities to change the way they do business.”

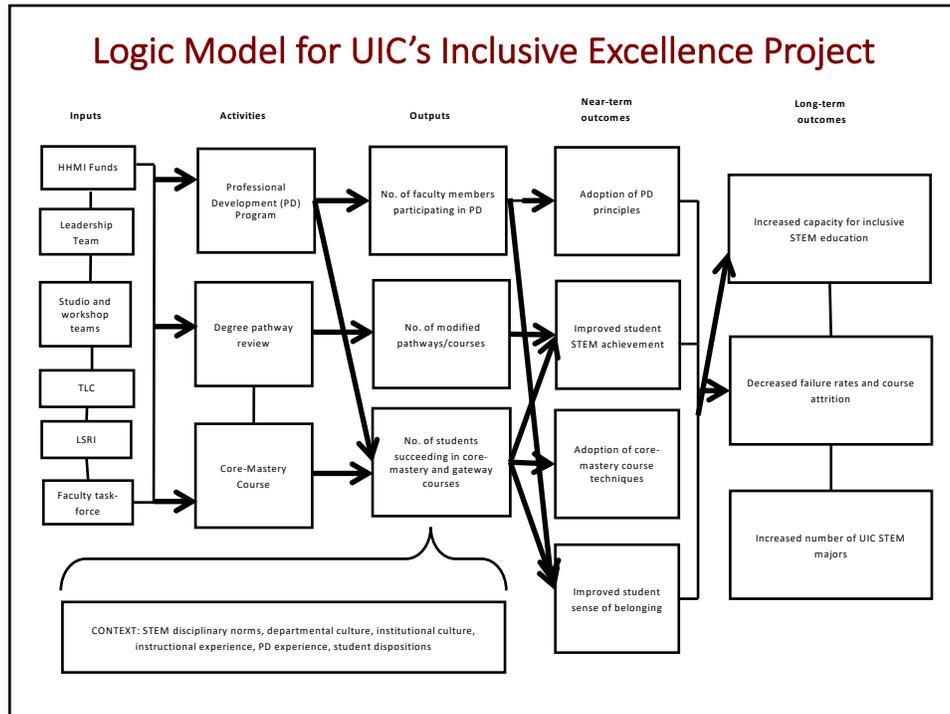
Erin O'Shea, president of HHMI

“The Inclusive Excellence initiative insists that schools recognize that the different perspectives that students of diverse backgrounds bring to science are assets.”

David Asai, HHMI's senior director for science education

UIC's Inclusive Excellence Project

- Our five-year project features 2 major components:
 - Faculty Professional Development Program
 - Designed to build a Professional Learning Community of UIC STEM faculty who engage asset-based strategies to support student learning
 - Focuses on faculty who teach introductory undergraduate courses in biological sciences, chemistry, and physics within LAS
 - Institutional policy and practice support for STEM undergraduate education
 - improved coordination of course scheduling, reformation of prerequisites, and introduction of corresponding mastery focused courses.



HHMI @ UIC: Motivation and Problem Identification

- Among our 19,000 undergraduate students, a third are the first in their families to attend college, a third are transfers from 2-year institutions, and more than half are Pell grant eligible.
- UIC has been designated as an Asian American and Native American Pacific Islander- and Hispanic-Serving institution.
- The number of Hispanic students in last year's freshman class jumped by 27 percent with 1,622 students making up nearly 40 percent of the freshman class.
- Over the last 10 years, our campus has seen the number of STEM undergraduate majors increase by 50%, growing from 4,200 in 2005 to over 6,300 graduates in 2015.

HHMI @ UIC: Motivation and Problem Identification

- Nearly 40% of students who intend to major in STEM degrees at UIC fail to do so and this failure disproportionately affects transfer, first-generation, and under-represented minority students.
- In the 2015/16 academic year, a third of all UIC undergraduates intended to major in a STEM discipline:
 - 1 in 3 are underrepresented minorities
 - 2 in 5 are transfer students,
 - 1 in 4 are first generation college students.
- In that same school year, 40% of STEM under-represented minority undergraduates who intended to major in a STEM discipline failed to achieve a passing grade (C or above) in a 100-level natural science course.

HHMI Inclusive Excellence proposes to move UIC away from the student deficit model

- In fact, UIC has placement tests, provides extensive tutoring (content and study methods), remedial courses, etc.
- With these approaches students should have sufficient background knowledge to understand the course material in our intro classes.
- **However the gap between interest and success in STEM remains!**
- These factors point to the need for a paradigm shift to focus on this achievement gap problem, from one localized in the student to one localized in the learning environment.
- HHMI then seeks a change in the institutional framework for student engagement and support.
- This project recognizes that students from these diverse groups are eager to participate in STEM, but our approaches to supporting them have been insufficient.

Why are we doing this at UIC?

- UIC STEM learning environments, particularly within gateway courses, are often not inclusive for URM students.
- UIC faculty, generally, do not utilize culturally-relevant, evidenced-based pedagogies in the STEM disciplines.

Catalyzing & Sustaining Change at UIC

- Our HHMI Project is intended to function as a Catalyst for change
 - It, along with other campus efforts in teaching, learning, and assessment, can catalyze and promote a change process – But change will be hard and often discomfoting – ***Disequilibrium***
- Sustaining the change will require an overall campus investment
 - New Center for Teaching Excellence starting next year and for the remainder of the project
 - This university-wide Center will be essential for sustaining and further developing a professional learning community and campus culture that embraces and promotes Inclusive Excellence
- This is ultimately about ***Changing People and Cultures, not about just Changing Courses and Prerequisites***

Primary Goals of the UIC HHMI Project

Goal 1

To develop and implement a professional development (PD) program **and** to develop professional learning communities (PLC) to inform and engage STEM faculty in culturally-relevant teaching and evidence-based pedagogies, with particular attention to Black, Latinx, and Native American students and their multiple identities, that support faculty members' undergraduate curriculum development initiatives.

Primary Goals of the UIC HHMI Project

Goal 2

To support the STEM departments in identifying and ameliorating programmatic or other departmental or institutional barriers that impact inclusiveness in classrooms.

Primary Goals of the UIC HHMI Project

Goal 3

To impact the institutional culture regarding the value of teaching through engagement of relevant administrative and programmatic entities positioned to support the change process and promote faculty engagement (e.g., Center for Teaching Excellence, Office of Diversity/Inclusive Classroom Workshops, Faculty Affairs/P & T Process; Orientation/"refresher" workshops).

The Road Map for Catalysts

• Activities:

- Studios at the beginning of the semester with specific narrow focus (goal 1)
- Design and implementation of activities with 1-3 semester check points within departments (serves Goals 1 and 2).
- All catalysts meeting at the end of the semester to share experiences, failures and successes and to further develop the professional learning communities in STEM (goal 2)

• Topics

- Studio I – general awareness and introduction to inclusive instruction
- Studio II – UIC students and their classroom experience in UIC STEM gateway courses
- Examples of future studio topics: developing culturally relevant lessons; Social context of science education; student identity and success; self assessment tools for eliminating classroom barriers (stereotype threat, conflicts, microaggression ...); inclusion in large enrollment courses

Some of What We Have Learned from Interviews with the Catalysts

- Types of Learning that Catalysts work to Support
- Teaching & Assessment Strategies
- Knowledge of the Diversity of Student Background Experiences
- Institutional Affordances & Constraints
- Reactions to Initial HHMI Programming
- Desires for Future HHMI Programming
- Support for Catalysts' Role in Change Process

Teaching & Assessment Strategies

- A broad variety of teaching and assessment strategies are used
- Lecture
 - Concepts, definitions
 - Visualize abstract concepts
 - Examples relevant to students or connect to own research
 - Worksheets and problems to provide support
- Use of Questions (iClicker, Echo 360, no tech)
 - Ask questions to gauge student engagement
 - Review/assess conceptual reasoning
 - Lead students through problem solving conceptual reasoning
 - Practice exam-like questions
 - Students ask on areas where they struggle/are interested

Teaching & Assessment Strategies

- Assessment
 - Online Homework, problems sets, projects
 - Quizzes (pop and regularly scheduled)
 - Conceptual, mathematical, applying to novel situations
 - Reflections on quiz errors, study skills, learning strategies
- Student-specific supports
 - Encourage to come to office hours to provide individual support & advice
 - Encourage study/working groups
 - Encourage students to share struggles with learning topics
 - Provide study guides, worksheets, in and out of class scaffolds
 - Teachers make themselves more approachable

Teaching & Assessment Strategies

- Faculty are aware of many teaching strategies
 - Unsure what works
 - Don't have time to develop new strategies
- Topics and syllabi identified through:
 - Disciplinary standards
 - Past syllabi
 - Professional school exams
 - Conversations with colleagues
- No principled feedback mechanisms to use student responses to support changes in teaching

Evaluation Activities for Year 2

- Observation of PLCs
- Review of Course Syllabi (new compared to old)
- Survey or interview with Catalysts to understand
 - the extent to which PLCs and PD are effective,
 - changes in core mastery, curricula, pathways,
 - how program leaders can more effectively support faculty in providing a more inclusive classroom.

*In Higher Education we need to make our assumptions about **Teaching, Learning, & Assessment** and our **Theories of Action** more **EXPLICIT**.*

"I think you should be more explicit here in Step Two."

