Decades of science education research have demonstrated that students do not arrive in science classes as blank slates without any knowledge or beliefs about the subject under study. Instead, they often hold deeply rooted misconceptions, beliefs and ideas that may diverge widely from scientific consensus (Duit, 2003). These fundamental misconceptions are often a significant barrier to learning. The goal of this project is to develop concept questions for biology that address common student misconceptions in fundamental areas of biology, and are validated to help students focus their learning while helping instructors focus their teaching.

Concept Inventory (CI) is a tool designed to probe student understanding of fundamental concepts. This tool is valuable for assessing learning in a variety of settings, including classroom testing, and can help instructors diagnose and address misconceptions.

How is it different from student assessment?
- CIs probe students’ conceptual understanding.
- CIs are based on research into student misconceptions.
- CIs’ distracters are chosen to reflect common student misconceptions.
- CIs use language suggested by students and based on their feedback.

What is it?
“A CI is an outline of core knowledge and concepts for a given field and a collection of multiple choice questions designed to probe student understanding of these fundamental concepts.” (Redish, 2000)

How can it be used?
- Diagnosing misconceptions
- Assessing teaching techniques
- Measuring learning gains
- Checking student understanding
- Establishing a baseline for further instruction

Methodology

1. Identification of key concepts

2. Qualitative research into student misconceptions

3. Development of multiple choice questions in which student misconceptions are used as distracters

4. Validation of multiple choice questions through think aloud interviews with students, and expert validation

5. Administration as pre (before instruction) and post-test (after instruction), and statistical analyses of the data.