Bracket 1

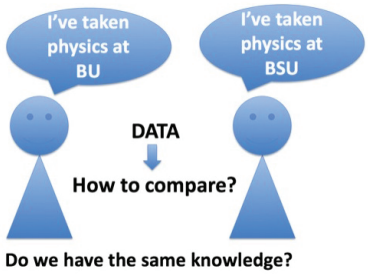
Entrant Information

I am submitting this entry as:
an individual entrant

Big Idea Information

Title of your Big Idea
Uniform content knowledge standard

Upload an image to represent your Big Idea or your team.



https://skild-prod.s3.amazonaws.com/nsfideamachine/uploads/5106455958351-team141056-entry126205-section63687-compare.jpg

What are your scientific or engineering research interests or areas of expertise?
teaching physics; teacher professional development; research in EDU

What is the compelling question or challenge?
Students taking the same course (by the type: e.g. Elementary Physics) in different institutions have incomparable (!) knowledge. There is no uniform measure their content knowldge (no "units").

What do we know now about this Big Idea and what are the key research questions we need to address?
This is a novel method very different from all current ones, NSF does not know about it. Existing tools like FCI and others cannot be used to accuratly measure content knowledge of students.

Why does it matter? What scientific discoveries, innovations, and desired societal outcomes might result from investment in this area?
Because education and the science of education cannot be advanced and effectively managed without measures of content knowledge which can be uniformly applied across all institutions. Development of a such an instrument can be achieved only as the result of a consensus building efforts under the leading guidance of the NSF (similar to the consensus building process which has led to the International System of Units).

If we invest in this area, what would success look like?
1. Developing uniformly applied measures for content knowledge; i.e. measurbale standards (etalons, units) of content knowldge.
2. Public, goverment, institusions will have a uniform scale to measure content knowldge of students taking science courses.
3. Advances in the development of science of education.
4. Advances in educational practices across all schools and institutions of K12 and higher education.

Why is this the right time to invest in this area?
Because for entering the next stage of its development, education and the science of education needs instruments for measuring the content knowledge of students uniformly across all the institutions. This transformation would be following the transformation which happened within natural sciences, most notably, in physics, which allowed to significantly advance practical and scientific outcomes of in those fields.

Please give us three key words describing the Big Idea.
content knowledge, uniform standard, comparability

Publication/Citation References (optional)

In the boxes below, you may list up to 3 publication/citation references, either by text or link.

Reference #1
Project I: The development of the uniform standard for measuring content knowledge in physics (and in other science subjects)

Reference #1 URL
http://gomars.xyz/1p.html
Reference #2
Learning aides for students taking physics.

Reference #2 URL
http://gomars.xyz/la.htm
Reference #3
Critical Reading of 'Making Sense of Confusion' by Jason E. Dowd, Ives Araujo, and Eric Mazur

Reference #3 URL
http://www.cognisity.how/2018/02/Mazur.html
Agreements and Validations

I consent to NSF's use and display of the submitted information and contestants' names and likenesses.
I agree

I confirm that all individual, teacher, and team entrants meet the age and citizenship/residence requirements, and agree to abide by all rules of the NSF 2026 Idea Machine as described in the
eligibility criteria and rules
.
I agree

Forms and Releases

All individual and team entrants must be at least 14 years of age as of September 1, 2018.

Individuals: If you are under 18 years of age, please upload a completed parental/guardian permission form (located in the Quick Links to your left) here.

Team leaders: Please collect the signed parental/guardian permission form for any team members younger than 18 years of age (including yourself) and combine them into one document to be uploaded here.

Teachers entering on behalf of high school classes are not required to submit parental/guardian forms on behalf of their classes.