

Proposal Writing Webinar for  
NSF's Improving Undergraduate STEM  
Education: Education and Human Resources  
(IUSE: EHR) Program

*Pre-service Teacher Preparation Focus*

[NSF 17-590](#)

December 4, 2017

**Kathleen Bergin & Sandra Richardson**

[kbergin@nsf.gov](mailto:kbergin@nsf.gov)

[srichard@nsf.gov](mailto:srichard@nsf.gov)

NSF Program Directors

Division of Undergraduate Education

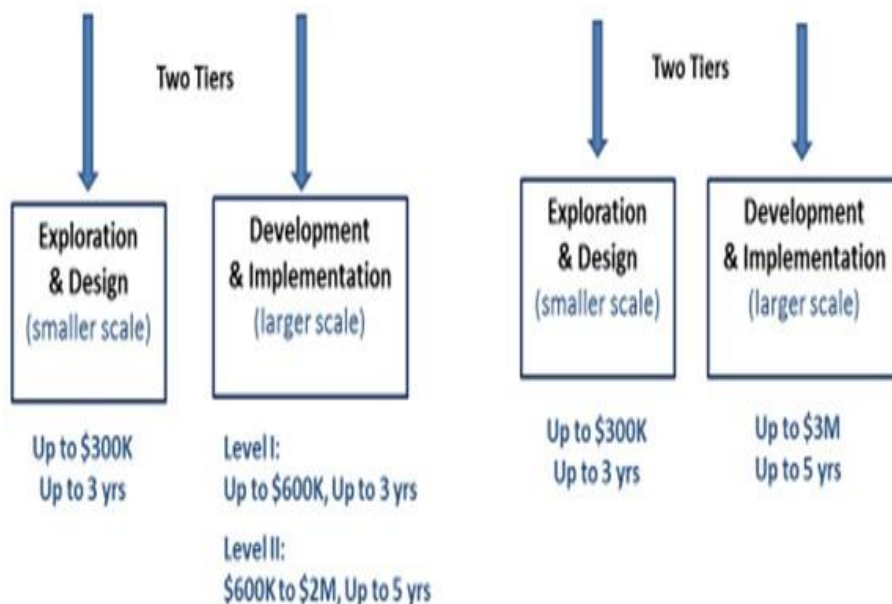


**Engaged Student Learning**

*Focus on designing, developing, and implementing research on STEM learning models, approaches, and tools*

**Institutional & Community Transformation**

*Focus on increasing the propagation of highly effective methods of STEM teaching and learning*



Proposal Writing Webinar for  
NSF's Improving Undergraduate STEM  
Education: Education and Human Resources  
(IUSE: EHR) Program

*Pre-service Teacher Preparation Focus*

[NSF 17-590](#)

December 4, 2017

**Kathleen Bergin      &      Sandra Richardson**

[kbergin@nsf.gov](mailto:kbergin@nsf.gov)

[srichard@nsf.gov](mailto:srichard@nsf.gov)

NSF Program Directors

Division of Undergraduate Education



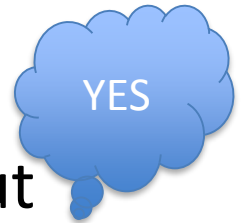
*This session is being recorded*

*In participating in the session, you are giving permission to record your question/comment(s).*



## Are You Interested In:

- Making changes at your institution to improve students' STEM learning and engagement?
- Using assessment to enhance what is known about effective STEM teaching and learning practices?
- Considering the implications of the aforementioned factors for preservice STEM teacher preparation?



**Stay tuned to learn more about the IUSE: EHR program ...**



# Webinar Topics

(Webinar Duration: 1.5 hours)

- Introduction to IUSE:EHR Program
- Description of E & D Tier
  - Engaged Student Learning and Institution & Community Transformation tracks
  - Research proposals
  - Workshop and conference proposals
- Additional Program Details
  - Important program expectations
  - NSF review criteria
- Resources

*Webinar will include two Q & A sessions. Participants will use the Q&A widget at bottom of the screen console to ask questions.*



# Introduction to IUSE:EHR Program



# Pre-Service STEM Teacher Education in IUSE

From Solicitation [NSF 17-590](#):

- “IUSE: EHR encourages projects that develop faculty expertise, **prepare K-12 teachers**, and provide all undergraduate students with STEM competencies and a basic understanding of STEM concepts and principles.”
- “... improving K-12 STEM education **through undergraduate pre-service** STEM teacher preparation courses and curricula; encouraging life-long learning; and building capacity in higher education.”



# IUSE: EHR Program

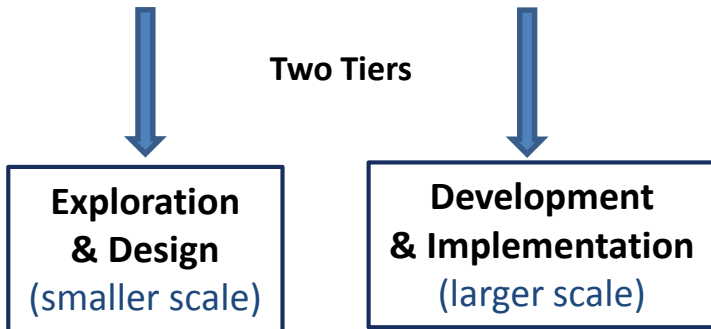
## Two Program Tracks



### Engaged Student Learning

*Focus on designing, developing, and implementing research on STEM learning models, approaches, and tools*

Two Tiers



Up to \$300K  
Up to 3 yrs

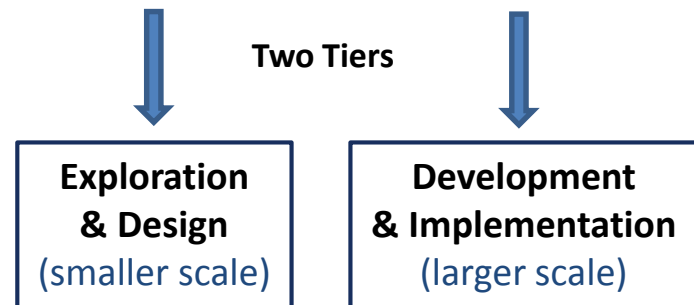
Level I:  
Up to \$600K, Up to 3 yrs

Level II:  
\$600K to \$2M, Up to 5 yrs

### Institutional & Community Transformation

*Focus on increasing the propagation of highly effective methods of STEM teaching and learning*

Two Tiers



Up to \$300K  
Up to 3 yrs

Up to \$3M  
Up to 5 yrs





# What's New?

- **No submission deadline** for E & D proposals in FY2018 and FY2019
- Click [here](#) for a link to the current [IUSE Solicitation](#), FAQs ([NSF 17-142](#)), and general [IUSE Q&A webinars](#).



# IUSE Fact Check

*(True or False)*

- Q1: All proposals must have a research component.
  - True. New knowledge should be generated through an educational research study that poses one or more significant questions and uses a research design to investigate the questions.
- Q2: Funds for STEM curriculum development, programmatic pathways, learning resources, assessment instruments, and faculty development may receive funding.
  - True
- Q3: Proposals may focus on both STEM and non-STEM majors.
  - True. Efforts to improve STEM undergraduate education for either or both are welcome.
- Q4: Proposals may focus solely on STEM teacher preparation.
  - True. Proposals may focus on any area of STEM undergraduate education
- Q4: Proposals should demonstrate a solid grounding in relevant literature on STEM teaching and learning.
  - True. All proposals should be evidence-based.
- Q5: Proposals must include an evaluation plan that provides formative and summarize assessment of the effectiveness of the project in achieving its goals.
  - True
- Q6: Only Universities and Colleges may submit a proposal.
  - False. All categories of proposers identified in the [NSF PAPPG](#) are eligible.



# IUSE Fact Check (*cont.*)

Which of the following may receive IUSE funding?

- a. **use and build evidence** about improved STEM instructional practices;
- b. **design and study innovative learning opportunities**;
- c. **create, implement, and test program, curricular, course, and technology-driven models**;
- d. **develop, implement, and test creative approaches for adoption of education research into disciplinary teachings**;
- e. **develop and validate assessments/metrics** for undergraduate STEM learning and instructional practice; and
- f. **conduct fundamental research** on issues of undergraduate STEM teaching and learning.

**Answer — ALL of the above**



# Description of Tracks in E & D Tier



# Engaged Student Learning (ESL) Projects

- Focus on design, development, and research studies.
- Involve the creation, exploration, or implementation of tools, resources, and models that show promise to:
  - increase engagement in STEM learning; and
  - lead to measurable and lasting learning gains.
- Reflect disciplinary differences in needs and priorities.



# ESL Track Specifics cont.

- Collaborations are encouraged among:
  - STEM disciplinary researchers
  - Education researchers
  - Cognitive scientists
- Such collaborations should:
  - Leverage what is known about how people learn
  - Contribute to the growth of that body of knowledge



# Target Populations for Projects in ESL Track

Target populations include:

- Students at two- and four-year institutions
- STEM majors (declared and undeclared)
- Students whose course of study require solid skills and knowledge of STEM principles
- Non STEM majors seeking to fulfill a general education requirement in STEM
- STEM faculty members
- **Pre-Service STEM teachers in *undergraduate* teacher preparation programs**



# Sample ESL Project Themes

- Assessment/metrics of learning and practice (in STEM or pedagogy courses for teachers)
- Educational Research (of best practices in STEM teacher preparation)
- Conducting undergraduate disciplinary research (for pre-service teachers)
- Developing the STEM and STEM-related workforce (including teachers)
- Educating a STEM-literate population
- Broadening participation in STEM (including STEM teachers)
- Exploring co-curricular activities to increase student motivation and persistence (in STEM teaching)
- STEM faculty professional development (including PD for STEM faculty teaching pre-service STEM teachers)
- Building capacity in higher education (including STEM teacher preparation programs)

*While these are some examples of ESL project themes, other themes are appropriate and many other applications to preservice STEM teacher preparation are possible.*





# Institutional & Community Transformation (ICT)

ICT projects may:

- Use **innovative approaches** to increase the **propagation** of highly effective teaching and learning methods, curricular and co-curricular practices across/within disciplinary communities.
- Be **proposed by an institution or set of institutions.**
- Be **proposed by professional communities.**
- Seek to **transform high enrollment, lower division courses.**
- **Implement their efforts in multiple courses** within a department or a college or in a particular disciplinary area.
- Focus on **leadership development** for pedagogical and curricular innovation.



# ICT Projects

- Describe **theory of change**.
- Include **research literature and theoretical perspectives** concerning change.
- Recognize STEM higher education as a **complex system**.
- Promote institutional change and include:
  - **Teams** of faculty members
  - **Support** from the department chairs, college deans, or others within the institution's academic leadership
  - **Support** from Provosts or Presidents



# Sample ICT Project Themes

- Technology and distance education methods (in STEM or pedagogy courses for teachers)
- Institutional STEM planning efforts and investigation of evidence-based practices in institutional strategic planning and faculty rewards
- STEM faculty professional development (including PD for STEM faculty teaching pre-service STEM teachers)
- Development of instruments and metrics to assess institutional shifts towards evidence-based teaching practices (in STEM or pedagogy courses for teachers)
- Research studies on approaches for advancing change in the STEM undergraduate community (including STEM teacher preparation programs)

*While these are some examples of ICT project themes, other themes are appropriate and many other applications to preservice STEM teacher preparation are possible.*



# Q & A — Session1



# IUSE:EHR Research Projects

- Projects that are predominantly research studies may be submitted to either track (ESL or ICT).
- Research studies may explore (among other possibilities):
  - Enhancement of student learning and attitudes through teaching strategies and effective curricula
  - Diffusion of widespread practices through the community
  - Effective professional development
  - Effective institutional change models



# Workshops and Conferences

- Proposals for workshops and conferences addressing critical challenges in undergraduate STEM education may be **submitted at any time.**
- Typically these proposals include **budgets** between \$50,000 and \$100,000.
- Proposers must consult an NSF Program Officer (in the IUSE: EHR program) before submission to determine appropriateness of proposed workshop or conference for IUSE: EHR.



# Additional Program Details



# Transportability and Propagation Expectation

Engaged Student Learning and Institutional & Community Transformation proposals must be transportable and propagatable.

- Describe plans for making project transportable.
- Describe plans for encouraging, enabling, and facilitating use of findings or developments by others.
- Provide an evidence-based justification for your approaches.





# Knowledge-Based Expectation

Engaged Student Learning and Institutional & Community Transformation proposals must be evidence-based.

- Proposals should provide an evidence-based justification of the importance of the proposed topic and selected approach.
- Justifications should be substantial discussions with references to the literature.



# Knowledge-Generating Expectation

Engaged Student Learning and Institutional & Community Transformation proposals must be knowledge-generating.

Proposals should:

- Describe plans for collecting, analyzing, and sharing data.
- Include goals and objectives (intended outcomes).
- Identify an evaluator.
- Include an evaluation plan to determine the effect of the intervention.
- Describe how the evaluation results will be a basis for publication.



# Elements of an Assessment and Evaluation Plan



Evaluator

Outcomes



Instruments

Data Analysis



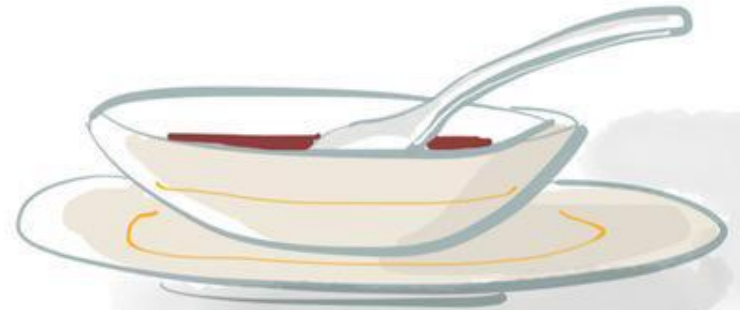
Controls



# FORMATIVE SUMMATIVE



WHEN THE **CHEF**  
TASTES THE SOUP



WHEN THE **GUESTS**  
TASTE THE SOUP



# Merit Review Considerations

*For both ESL and ICT projects, proposals must fully address both IM and BI.*

- What is the potential for the proposed activity to:
  - **Advance knowledge and understanding within its own field or across different fields** (Intellectual Merit)?
  - **Benefit society or advance desired societal outcomes** (Broader Impacts)?
- To what extent does the proposed activity suggest and explore **creative, original or potentially transformative concepts**?



# Merit Review Considerations (Cont.)

- Is the **plan** for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale?
- Does the plan incorporate a mechanism to **assess success**?
- How well **qualified** is the individual, team, or organization to conduct the proposed activities?
- Are there **adequate resources** available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?

*Please Note: Reviewers are also asked to review Facilities, Equipment and Other Resources, Data Management Plan, Postdoctoral Researcher Mentoring Plan, and required Supplementary Documents.*



# Q&A – Session# 2



# Program Resources





# IUSE: EHR Website

- For more information on IUSE: EHR Program visit <https://www.nsf.gov/pubs/2017/nsf17590/nsf17590.htm>
- Conduct an Awards Search of previously funded IUSE projects at [www.nsf.gov](http://www.nsf.gov).
- Follow up with an NSF IUSE (teacher prep) Program Officer.
  - Kathleen Bergin, [kbergin@nsf.gov](mailto:kbergin@nsf.gov)
  - Sandra Richardson, [srichard@nsf.gov](mailto:srichard@nsf.gov)



# Other Resources

- [2017 NSF Proposal & Award Policies & Procedures Guide \(PAPPG\)](#)
- [2018 NSF Proposal & Award Policies & Procedures Guide \(PAPPG\)](#)
  - Effective Date: January 29, 2018
- [Common Guidelines for Education R&D](#)



# Complementary EHR Programs

*with a teacher preparation focus*

- Robert Noyce Teacher Scholarship Program (Noyce) Track 4: Noyce Research  
<https://www.nsf.gov/pubs/2017/nsf17541/nsf17541.htm>
- EHR Core Research (ECR)  
<http://www.nsf.gov/pubs/2015/nsf15509/nsf15509.htm>
- Advanced Technological Education (ATE)  
<https://www.nsf.gov/pubs/2017/nsf17568/nsf17568.htm>



# We Want You!

- Consider serving as a reviewer!
- If you are interested in serving as a reviewer on an upcoming IUSE: EHR panel, contact an IUSE Program Officer via email with a copy of your 2-page vita attached.



Thank you for your participation and for  
your interest in improving undergraduate  
STEM education,  
*particularly related to*  
**pre-Service STEM teacher preparation!**

