



National Science Foundation

Division of Engineering Education and Centers (EEC)



**NSF Engineering Education and Centers Division
Engineering Education**

Research Initiation in Engineering Formation (RIEF)

**Webinar for Prospective PIs
September 28, 2018**

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Research Initiation in Engineering Formation

Professional Formation of Engineers: Research Initiation in Engineering Formation (PFE: RIEF) solicitation is a funding opportunity in the Engineering Directorate's (ENG) multi-year initiative, the Professional Formation of Engineers, established to create and support an innovative and inclusive engineering profession for the 21st Century.

- Introductions to the profession at any age.
- Acquisition of deep technical and professional skills, knowledge, and abilities in both formal and informal settings/domains.
- Development of outlooks, perspectives, ways of thinking, knowing, and doing.
- Development of identity as an engineer and its intersection with other identities.
- Acculturation to the profession, its standards, and norms.



Research Initiation in Engineering Formation

The PFE: Research Initiation in Engineering Formation (PFE: RIEF) program has two goals:

- 1) Support research in the Professional Formation of Engineers (PFE).
 - 2) Increase the community of researchers conducting PFE research.
- PIs are expected to have little or no experience conducting social science research.
 - PFE: RIEF **is not** intended for established researchers in engineering education or other social science fields to initiate new projects



RIEF Additional Requirements

- RIEF is intended to increase capacity for engineering education research
- It supports researchers new to engineering education research
- Solicitation requirement is that PI must not have received engineering education funding in last three years
 - In practice PI should have little to no experience in engineering education research
- Co-PI acts as a mentor to the PI
- Research should not be an extension of the co-PI's research
- Professional development plan and plans for future research should have equal weight with the proposed research



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Research Initiation in Engineering Formation

Full Proposal Deadline Date

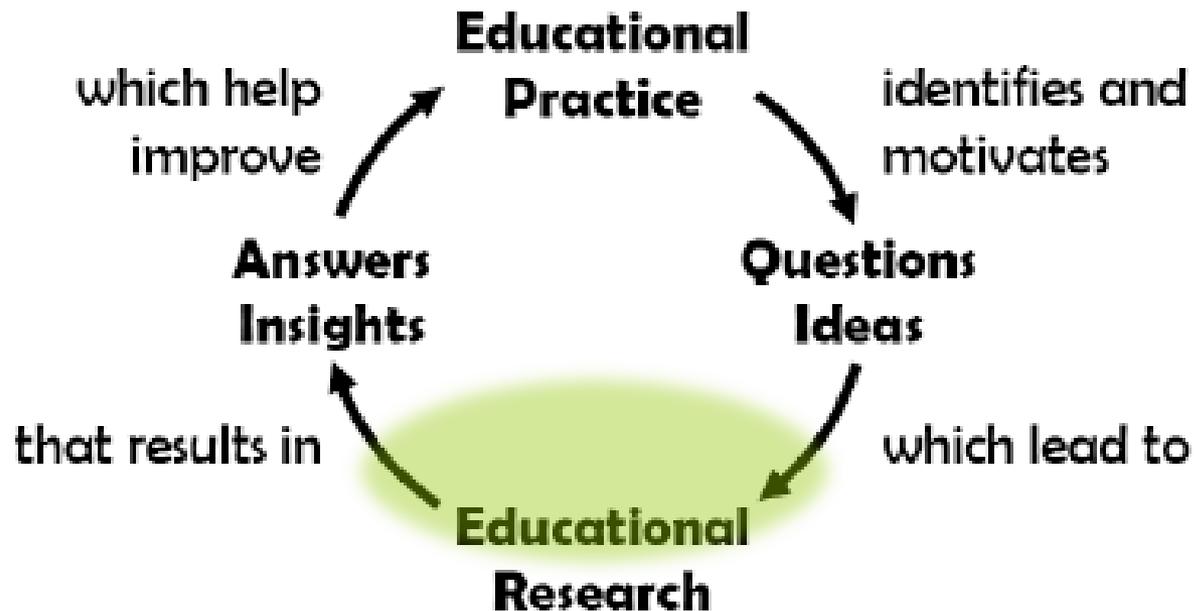
February 28, 2019

Maximum Award

\$200K for 2 Years



The Innovation Cycle of Educational Practice and Research



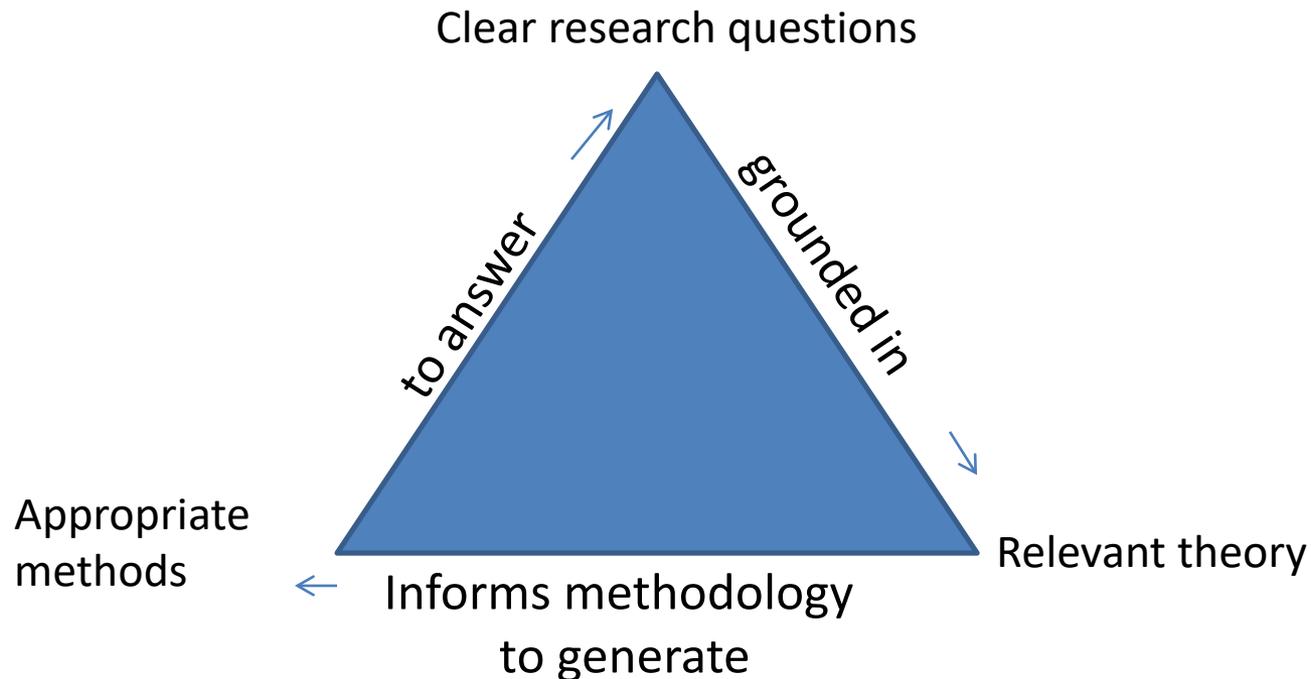
Adapted from Booth, Colomb, and Williams, 2008



Research v. Development

Engineering Education programs emphasize research.

Development activities must not be primary focus but can be part of a project where activities are germane to answering specific research questions.





Transformative Projects

Transformative activity involves ideas, discoveries, or tools that **radically change our understanding** of an important existing scientific or engineering concept or educational practice or leads to the **creation of a new paradigm or field** of science, engineering, or education. Such research challenges current understanding or provides pathways to new frontiers.

Transformative activity results often do not fit within established models or theories and may initially be unexpected or difficult to interpret; their transformative nature and utility **might not be recognized until years later**.

Transformative activity

- Challenges conventional wisdom,
- Leads to unexpected insights that enable new techniques or methodologies, or
- Redefines the boundaries of science, engineering, or education.



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Important Rules for Newcomers

- Read the Proposal & Award Policies & Procedures Guide (PAPPG) and follow it.
- Your proposal has to come through an eligible institution (typically a university or non-profit).
- Don't send the same proposal to multiple programs
- Consider resubmission with changes from feedback from earlier proposals, but note that all submissions are reviewed from scratch.
- Make sure that you're proposing research that advances understanding of engineering formation and not a course/lab/curriculum development.



NSF National Science Board Review Criteria

- Intellectual merit: What will we learn? How will it advance science?
- Broader impacts: What will the immediate or eventual impact be on society? How will it make the world a better place?

Educationally focused projects often have a hard time disentangling these, but you need to separate them out in your proposal



Elements of the NSB Criteria

The following elements should be considered in the review for **both criteria**:

1. What is the potential for the proposed activity to make a difference?
 - a. By **advancing knowledge** and understanding within its own field or across different fields (Intellectual Merit); and
 - b. By **benefitting society** or advancing desired societal outcomes (Broader Impacts)?
1. To what extent do the proposed activities suggest and explore **creative, original, or potentially transformative** concepts?
2. Is the **plan** for carrying out the proposed activities well-reasoned, well organized, and based on a sound rationale?
3. Does the plan incorporate a **mechanism to assess success**?
4. How **well qualified** is the individual, team, or institution to conduct the proposed activities?
5. Are there **adequate resources** available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?



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The Submitter's Three Jobs

- Identify the right funding opportunity
- Conceptualize a fantastic project
- Write a persuasive proposal in 15 pages



Conceptualize a Fantastic Project

- Avoid a focus on topics, ensure a focus on activities that people want to see occur
- Any part of the project that you can do before the funding arrives, you should do before submitting the proposal (locate partners, design studies, do preliminary design work, submit IRB, etc.)
- You will necessarily have thought through more detail than you may be able to express
- Your project must contribute to the knowledge base; typically evaluation is not enough
- You **MUST** align with the solicitation or program description



Conceptualizing Your Project: Common Issues

- **Fit with program**
Must match program goals
- **Clarity and specificity**
Should have important decisions made, plans laid out
- **Research and development**
Methods must match questions, build on literature, and contribute to knowledge
- **Expertise and collaboration**
You need to incorporate expertise appropriate to the contributions you want to make, both in project and in proposal
- **Innovation and impact**
You should be addressing an important problem, and not reinventing the wheel



Writing a Persuasive Proposal

- By the end of page 1, the reviewer needs to know what you will do (roughly)
- The activities alone are not persuasive; you need an argument for why those activities lead to desired outcomes in both intellectual merit and broader impacts
- Ensure the expertise of your team is adequate to do the work and their expertise is reflected in your proposal
- Build trust in the reviewers that what you can't fit in the page limit is within your grasp



Writing a Persuasive Proposal: Help the Reviewers

- Make what they are looking for easy to find, using the language of the review criteria and headings to highlight the elements of the project description
- Don't assume that all reviewers will know the jargon of your discourse community or commonly used acronyms
- Consider how your proposal will read both when reading start to finish and when a reviewer skims to look for certain elements
- Write to both an expert in your area, as well as an educated reviewer with different research emphasis



Writing a Persuasive Proposal: Help the Reviewers

- Be sure to address the “solicitation specific criteria” of expanding the community of engineering education researchers and the mentoring plan
 - Use space in the 15 pages to explicitly address this; you might discuss your motivation, interest, plans for future work.
 - Provide a road map for what your future contributions might be to the field of engineering education research and how the proposed work helps you to get started
 - Describe the mentoring relationship and activities—be specific! Show the reviewers that the mentoring plan sets you up for success in the project and as future researcher



Writing a Persuasive Proposal

- Clearly state the value proposition both for the research and for investment in you as a new engineering education researcher
- Provide a roadmap for eventual impact
- Be sure to describe prior related work
- Place the work in the context of existing literature and/or to make a case for why the work will add coherently to this literature



Writing a Persuasive Proposal

- Have a clear research question that is focused enough for the resources provided (2 years and \$200,000)
- Include details about your theoretical framework, methodology, and research plan
- Identify an appropriate audience for the research results and dissemination plans, and be creative about how to reach these people—be specific
- Be creative about assembling the right team to achieve meaningful dissemination



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Make Sure That You:

- Follow all requirements stated in the solicitation or the PAPPG
- Provide citations or evidence for critical assertions made, and detailed plans that can be evaluated—don't ask reviewers to just “trust you”
- Make sure your proposal is concise and contains necessary details



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Proposal Components: See PAPPG

- Cover sheet 'signed' by sponsored programs office
- Summary and Narrative (1+15p)
- References cited
- Biosketches (2p ea.)
- Budget(s) (1p per year + 1p total budget) and Budget Narrative(s) (3p max)
- Current and Pending Support
- Facilities and Resources
- Data Management Plan (2p)
- Postdoc Mentoring Plan (1p)- if applicable
- Letters of collaboration as allowed by PAPPG: 1 sentence
- This is actually ~100 pages!



Human Subjects

- While a proposal can be reviewed without IRB approval, projects involving human subjects **cannot** be recommended for funding until this certification or its equivalent is filed in the proposal jacket.
 - Researchers should file their proposal with their local IRB **at the same time they submit it to NSF**, so that the approval procedure will not delay the award processing.
- For detailed information:
<https://www.nsf.gov/bfa/dias/policy/human.jsp>



Possible Timeline for Proposals

- 1 year-6 months ahead: identify opportunities from prior years, read award abstracts and outcome reports
- 6 months ahead: begin discussing with any partners
- 3 months ahead: read final solicitation carefully. Alert sponsored projects office
- 1.5 months ahead: share draft proposal for feedback with colleagues. First draft of budgets.
- 2 weeks ahead: upload everything except narrative, if possible; ensure subcontract paperwork done
- 1 week ahead: final edits by PI, partners, and sponsored projects; mop up any last supporting docs
- Day before due date: submit if possible



Timeline for Merit Review Process

- 4-6 weeks after deadline: Administrative review, compliance checking
- 2-3 months after deadline: Potential panelists contacted, panel finalized
- ~ 3 months after deadline: Panel meets
 - Panel provides guidance to PO, NOT a decision
- 3-6+ months after deadline: PO considers panel input and other factors, may contact PI for additional information, decides on recommendations
- 3-6+ months after deadline: PO makes recommendation, recommendation is reviewed at higher levels
- 3-6+ months after deadline: Notification received by PI and/or SPO



Merit Review and Award Process Considerations

- Panel provides guidance to PO. Even if a proposal was highly recommended by panel it may not be awarded
- Receiving a request for additional information does not guarantee an award will be made
- If a proposal is shown in Fastlane as recommended, be patient. The PO has made a recommendation and it is being processed at higher levels
- Overdue reports will delay awards, and in some cases can mean an intended award will not be made
 - Reports should be submitted by the due date. The 90 days between the due date and overdue date are for the PO to review and request changes
 - Overdue reports will prevent an award for **any** proposal you are associated with



Contacting Program Officers- General Advice

- Recognize that program officers are *busy*
- Better to email rather than call
- Don't mass email—multiple POs may work on a program, talking to many creates redundant work
- Be prepared to say what you're asking for: advice on where to submit an idea, feedback on a one-pager to a program, procedural advice or answers to specific questions
- Consider the Policy office for legal/policy
- Consider volunteering to review (send a CV right near a program deadline)



Contacting Program Officers- My Guidelines

- Available to answer quick questions by email (please be patient)
- If you'd like to discuss your idea:
 - Read the solicitation
 - Review this webinar
 - Discuss your ideas with colleagues, then
- Email me (julmarti@nsf.gov) to set up a 15 min call. Send:
 - 1 page summary that addresses Broader Impacts, Intellectual Merit, review specific criteria
 - 2-3 “burning questions” to be answered during the call
 - Several available times (keep in mind that I stay booked up a couple weeks ahead)
- Once we have talked, I'm happy to have follow-on calls with updated summaries and questions, or answer quick questions by email



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Thank you for joining me.
I'm excited to hear your project ideas!

Questions?