Using the EP3 Guide to influence department action: Retention of Undergraduate Physics Majors

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Without a strong education system,
We don't have a thriving physics enterprise
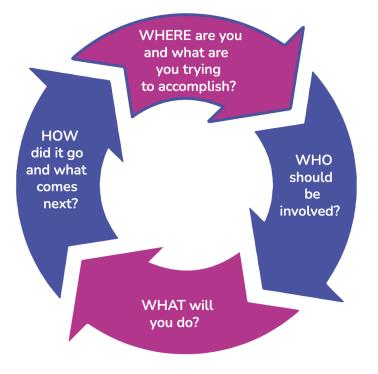
Part 1: What is the EP3 Initiative?

- Audience: department chairs, program leaders, etc.
- A response to issues facing the discipline
  (e.g., enrollments; inclusion)
- Based on research and effective practices
- Peer reviewed
- Responsive to local context

EP3 Guiding Principles

WHERE are you and what are you trying to accomplish?

HOW did it go and what comes next?

WHO should be involved?

WHAT will you do?

Development and Use

Be Intentional:
- Cyclic self-reflection
- Commit to shared action and ownership
- Create and enable clear steps / actions using data
- Reflect on actions to guide next steps

- Choose a few critical topics to focus on
- Use assessment to evaluate progress and assist with institutional accreditation efforts
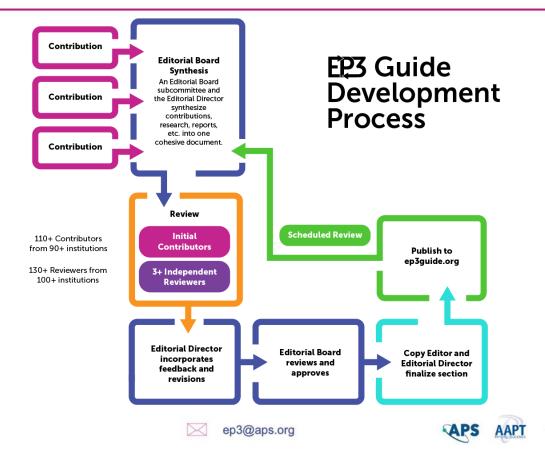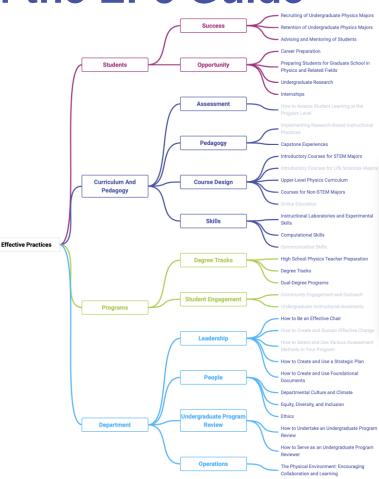
Not Disciplinary Specific!

Community Developed

EP3 Guide Development Process

Contribution → Editorial Board Synthesis
An Editorial Board subcommittee and the Editorial Director synthesize contributions, research, reports, etc. into one cohesive document.

Contribution

Contribution

Review
Initial Contributors
3+ Independent Reviewers

Scheduled Review

Publish to ep3guide.org

110+ Contributors from 90+ institutions

130+ Reviewers from 100+ institutions

Editorial Director incorporates feedback and revisions → Editorial Board reviews and approves → Copy Editor and Editorial Director finalize section

Tour of the EP3 Guide

A resource for physics departments to address challenges and make changes & improvements
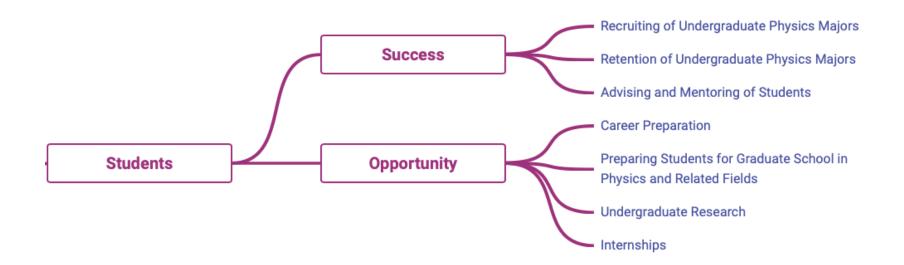
Being intentional about change:
- Effective practices addressing all aspects of undergraduate physics programs
- Departmental Survival Toolkit
- Tools to help use the Guide:
  - How to use the Guide
  - Goal maps
  - Cycle of reflection & action
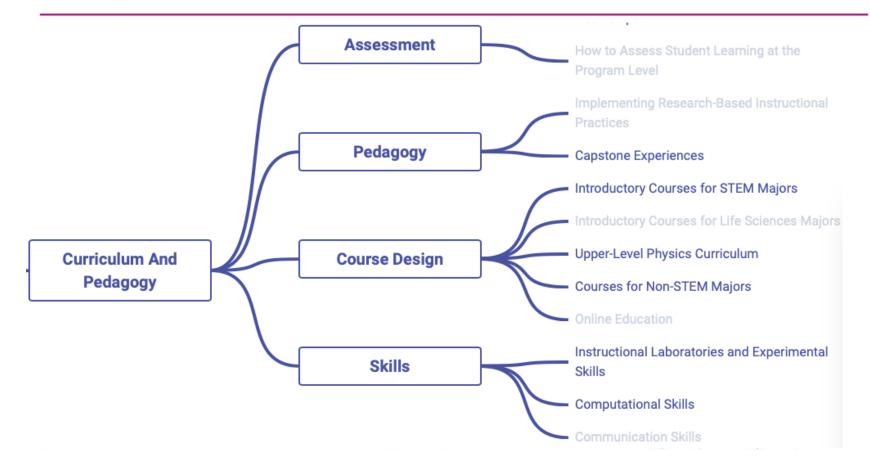 - Chapter on creating & sustaining change

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Curriculum & Pedagogy

EP3 — Effective Practices for Physics Programs

Curriculum And Pedagogy

- **Assessment**
  - How to Assess Student Learning at the Program Level
- **Pedagogy**
  - Implementing Research-Based Instructional Practices
  - Capstone Experiences
- **Course Design**
  - Introductory Courses for STEM Majors
  - Introductory Courses for Life Sciences Majors
  - Upper-Level Physics Curriculum
  - Courses for Non-STEM Majors
  - Online Education
- **Skills**
  - Instructional Laboratories and Experimental Skills
  - Computational Skills
  - Communication Skills

Programs

- **Degree Tracks**
  - High School Physics Teacher Preparation
  - Degree Tracks
  - Dual-Degree Programs
- **Student Engagement**
  - Community Engagement and Outreach
  - Undergraduate Instructional Assistants

Goal Maps

EP3 — Effective Practices for Physics Programs

Increase the Number of Majors

Improve Student Satisfaction or Engagement

Better Meet the Needs of Diverse Students

Improve Curriculum and Instruction

Lead a Strong Department

Build Community

Attract More Students

- Offer Diverse Degree Programs
  - Degree Tracks
  - Dual-Degree Programs
  - High School Physics Teacher Preparation
- Provide Compelling Courses
  - Introductory Courses for STEM Majors
  - Upper-Level Physics Curriculum
- Offer Opportunities for Experiential Learning
  - Undergraduate Research
  - Internships
  - Capstone Experiences
- Recruiting of Undergraduate Physics Majors

Keep the Students You Have

- Retention of Undergraduate Physics Majors
- Provide Outstanding Instruction
  - Research-Based Instructional Practices
  - Undergraduate Instructional Assistants
  - How to Assess Student Learning
- Create an Inclusive Department Culture
  - Equity, Diversity, and Inclusion
  - Departmental Culture and Climate
- Support Student Success
  - Advising and Mentoring of Students
  - Career Preparation
  - Preparing Students for Graduate School

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APS AAPT NSF if

Project Support
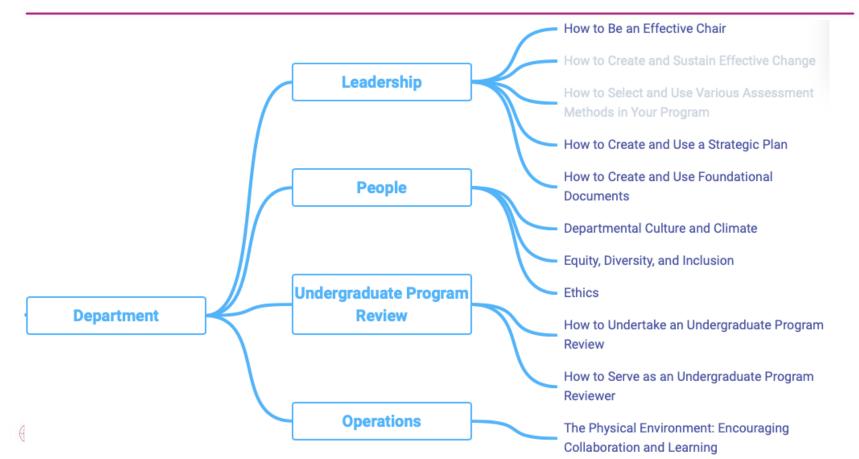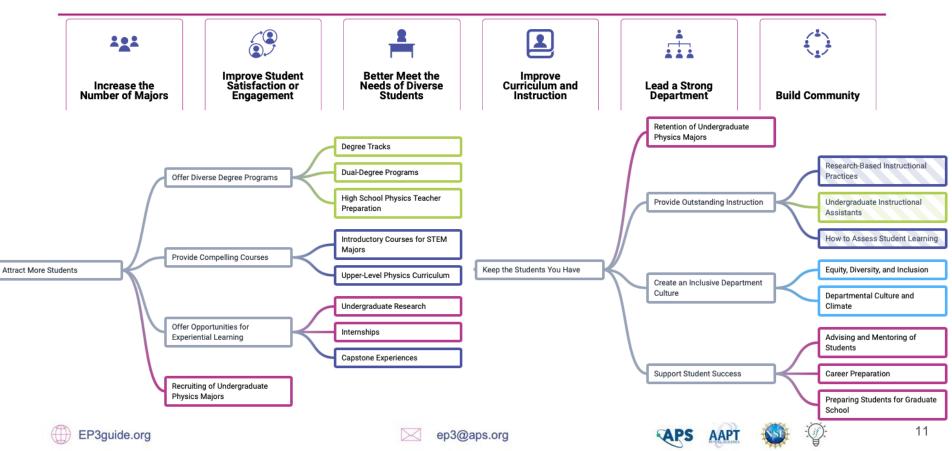
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Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation, AAPT, or APS.

	Students who started as a physics major at the institution and …				Averages are for students in the STEM College or University	
	Within University	**Within STEM College**	**Within Physics**		**STEM College Avg.**	**University Avg.**
Retention (1st to 3rd semester)	73%	62%	**50%**		65%	75%

Let's be sure we know what these columns mean!

Spend 2-3 minutes looking at the data

- What do you notice?

- How is the institution doing? How about physics?

In small groups:

- What might be a reason for trends that we noticed?

Your existing efforts

- In general, what kinds of things are you doing that have a positive effect on student retention?
- What effect are they having? How do you know?
- Do you think of these activities as retention-oriented activities? Or is retention part of other work?

Count your successes, don't just pay attention to things you're not yet doing!

- What do you wish you could be doing more of?

- Who do you need to work with to make it happen?

EP3 Terminology

Theme ➡ 1. **Make retention an explicit goal that your entire program supports through a comprehensive plan**

Actionable Practice ➡ A. **Engage all faculty in collaboratively creating and implementing a retention plan** ⌄

Implementation Strategies

i. Create a group or committee charged with developing and implementing a comprehensive retention plan. Ensure this group is given adequate resources and time on department meeting agendas.

ii. Encourage faculty members, collectively and individually, to think creatively and ambitiously about your department's future and about potential strategies to attain your retention goals. For example, sponsor periodic brainstorming sessions at faculty meetings, and dedicate time to generating ideas for retention during departmental retreats.

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Getting to know the Guide

- Spend 2 – 4 minutes looking at the Guide on your own.

- Which of the themes, practices, and strategies
  have we discussed today?

- What is in the Guide that you weren't expecting to be there?

- Which implementation strategies seem most aligned
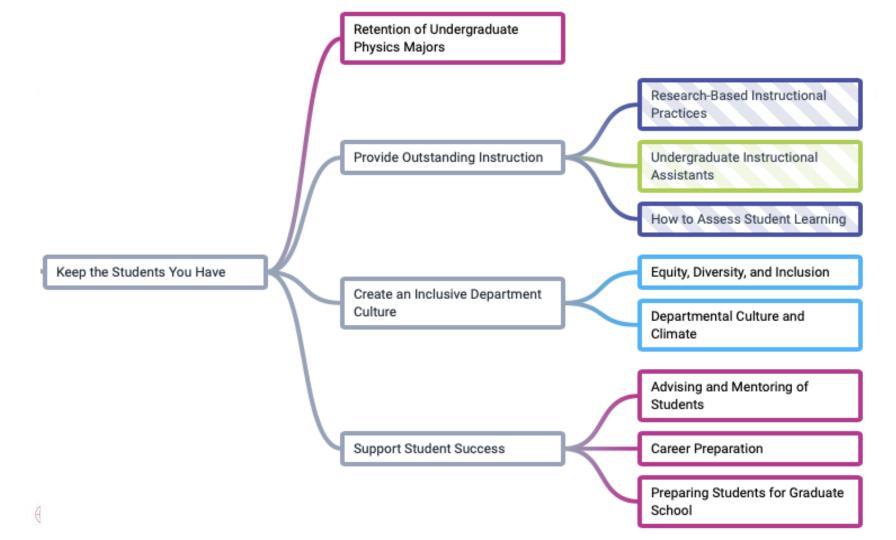 with your department goals?

- Are there any strategies you believe you can improve on?

- Are there any strategies you would like to know more about?

- Are there any themes that may be worth exploring further?

- Based on your discussion, what actionable practices and/or implementation strategies would be worth exploring more after the workshop?

Keep the Students You Have

- Retention of Undergraduate Physics Majors
- Provide Outstanding Instruction
  - Research-Based Instructional Practices
  - Undergraduate Instructional Assistants
  - How to Assess Student Learning
- Create an Inclusive Department Culture
  - Equity, Diversity, and Inclusion
  - Departmental Culture and Climate
- Support Student Success
  - Advising and Mentoring of Students
  - Career Preparation
  - Preparing Students for Graduate School

Other Sections of Interest?

Guide to How to be an Effective Chair

Guide to How to Undertake an Undergraduate Program Review

Guide to Equity, Diversity, and Inclusion

Guide to How to Create and Use a Strategic Plan

Guide to How to Assess Student Learning at the Program Level – Coming Soon!
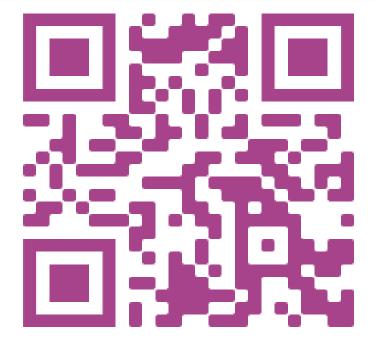
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