EP3
Effective
Practices
for Physics
Programs

APS April Meeting
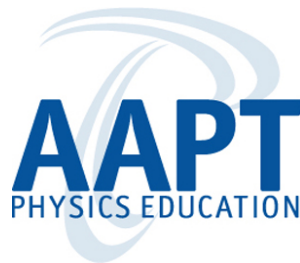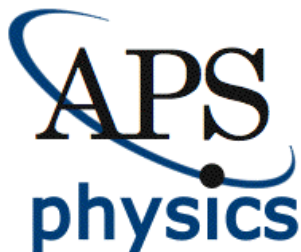20 April 2020

Abstract: R08.00001

Improving your undergraduate major: Introduction to the Effective Practices for Physics Programs (EP3)*

Michael Jackson, Millersville University of Pennsylvania

Gay Stewart, West Virginia University

David Craig, Oregon State University

Theodore Hodapp, American Physical Society

Effective Practices for Physics Programs

The EP3 Guide

An Introduction: Michael Jackson

Effective Practices for Physics Programs:
The EP3 Guide

APS, in collaboration with AAPT, is creating a guide to help physics departments improve, review and assess their programs …

and to help them meet challenges they may face

The EP3 Project is bringing together research and information about practices for building successful and effective physics programs from experts across the American physics community.

Effective Practices for Physics Programs

Co-Chair: David Craig, Oregon State University

Co-Chair: Michael Jackson, Millersville University of Pennsylvania

- Noah Finkelstein, University of Colorado Boulder
- Courtney Lannert, Smith College and UMass Amherst
- Ramon Lopez, University of Texas at Arlington
- Willie Rockward, Morgan State University
- Gay Stewart, West Virginia University
- Gubbi Sudhakaran, University of Wisconsin-La Crosse
- Kathryn Svinarich, Kettering University
- Carl Wieman, Stanford University
- Lawrence Woolf, General Atomics Aeronautical Systems, Inc.

Editorial Director: Sam McKagan   **Project Manager:** Kathryne Woodle

Staff Liaison: Ted Hodapp   **Project Coordinator:** Sean Costello

AAPT Liaison: Bob Hilborn   **External Evaluator:** Stephanie Chasteen

Research: C. Turpen, J. Corbo   **Community Engagement:** Joel Corbo

Who is it for?

- Physics department chairs
- Program leaders
- Programs undergoing a self-study and being reviewed
- Program reviewers
- Departments & faculty facing program challenges or interested in improving their programs
- Anyone in physics involved with student learning assessment
- Administrative leaders

Effective Practices for Physics Programs

Help department chairs (& other program leaders)

- Bring together known literature on topics
- Collect practices recognized by the community as effective when there is insufficient evidence-based literature
- Collect information for departments to use in advocating for resources to improve their program
- Encourage discussions in departments on continuous improvement of physics programs using evidence
- External program assessment / departmental review
- Improve usefulness of assessment
- Engage PER community on departmental needs

Chapters:

- **Introduction**: how to navigate and use the guide

- **How to be an Effective Chair**

- **How to create and sustain effective changes in your department or program**

- **Effective Practices** (~25 "sections")

- **Assessment of Student Learning**: developing a useful and efficient culture of assessment

- **Program Review** and a Departmental Culture of Continuous Self-Improvement: Preparing for a self-study and program review as well as a Guide to reviewers

- **Ancillary material**: Creating foundational documents; examples of student learning goals and program learning goals; assessment instruments; additional resources

EP3 Guide Section List

Students

- *Recruiting (in 1st release)*
- *Retention*
- *Advising and Mentoring of Students*
- Internships (to be included in 2nd release)
- *Undergraduate research*
- *Career preparation*

Curriculum

- *Implementing research-based instructional practices in your program (overarching)*
- *Introductory courses for physical science and engineering majors*
- Introductory courses for life sciences majors
- *Upper-level physics courses*
- Introductory courses for Non-STEM majors
- Communication skills
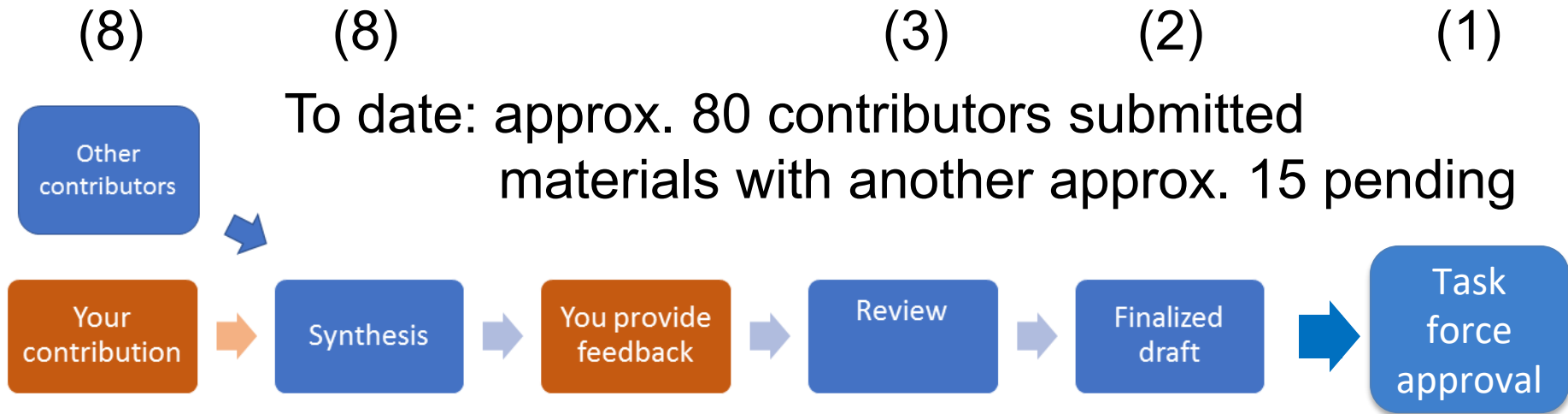- *Laboratory / experimental skills*

- *Computational skills*
- Capstone experiences
- Online education

Programs

- Individuated degree tracks: engineering / applied physics
- Institutional partnerships: dual-degree physics / engineering programs
- *High school physics teacher preparation*
- Undergraduate Instructional Assistants
- Community engagement / outreach

Departmental

- Physical environment: encouraging collaboration and learning
- *Departmental climate*
- *Equity, diversity, and inclusion*
- Ethics

EP3 — Effective Practices for Physics Programs

(8)   (8)   (3)   (2)   (1)

To date: approx. 80 contributors submitted materials with another approx. 15 pending

Other contributors → **Your contribution** → **Synthesis** → **You provide feedback** → **Review** → **Finalized draft** → **Task force approval**

Other contributors →

For each section there will be several individuals (including yourself) contributing content

The task force and editorial director will then synthesize into one cohesive document.

We may have some additional questions for you. After internal vetting you will have a chance to see and comment on the synthesized section.

Each section will be sent for expert review to at least 4 individuals.

To see an example of a final section the Teacher Preparation can be found here: http://apps3.aps.org/bpupp/

Is:

- Collection of community knowledge and evidence-based practices

- Authored, reviewed, approved by physics community **(>200!)**

- *Living* document (not static), with stewardship by an Editorial Board

- Primarily online

- Ethics and diversity included throughout

- Effort to encourage evidence-based pedagogy

- Transform mandatory assessment into useful exercise

- Suggestions on how to improve all aspects of a program

- Opportunity to extend reach of education research

Effective Practices for Physics Programs

Is:

- **Key:** flexible, not prescriptive; mindful of local contexts
- **Tool to help departments understand who they are and what they want to be, and then provide community-based knowledge and information to help them achieve this**

Is NOT:

- Accreditation or program certification
- Mandate to conform
- A checklist of required actions
- Every possible idea for what to do (e.g., the 'kitchen sink')
- At the smallest level of detail to assist with implementation
- **Finished (yet)… Join our mailing list at ep3guide.org**

Effective
Practices
for Physics
Programs

The EP3 Guide
Example Content: Gay Stewart

High School Physics Teacher Preparation

Description

Physics programs are encouraged to implement, document, publicize, and support pathways to recruit and educate future high school teachers. This includes creating an environment within the program that promotes high school teaching as a valid and desirable career option for students.

⊕ Benefits to the Program

Effective Practices

1. Implement a teacher preparation pathway

⊕ Establish a degree track for high school teacher education within the major

⊕ Understand alternate pathways to teacher certification

⊕ Support recent graduates during their transition into the classroom

Engaging in effective practices to support high school physics teacher preparation improves learning for undergraduate students within and outside the major. Additional benefits include improving recruitment and retention initiatives within the program, increasing program graduation rates, increasing the program's eligibility for funding opportunities, and increasing the number of careers for which students are prepared, particularly in the field of education where physics students have near-certain employment upon graduation.

Effective Practices for Physics Programs

2. Provide students opportunities to learn physics in ways teachers are expected to teach

⊕ Incorporate evidence-based, active-engagement pedagogies into courses

Provide opportunities for future (pre-service) teachers to participate in existing courses or workshops for practicing (in-service) teachers

3. Provide early teaching experiences for students interested in teaching as a career

⊕ Provide departmental and university opportunities for students to experience and practice teaching

⊕ Provide physics degree credit for students to take "introduction to teaching" courses

4. Understand and communicate paths to and requirements for teacher licensure

⊕ Identify and support appropriate individual(s) to advise students

⊕ Cultivate active relationships with School of Education faculty responsible for science teacher licensure (individually or in collaboration with other STEM departments)

5. Communicate the value of teaching as a career path

Faculty should use language that is supportive of teaching as a career in their courses, department activities, and when advising or mentoring students

⊕ Sponsor regular faculty discussions on promoting teacher education in the department

⊕ Share data on teacher salaries and employment opportunities with faculty and students

Include practicing teachers from your program when highlighting accomplishments of graduates/alumni

Effective Practices for Physics Programs

6. Promote the program and actively recruit students

⊕ Advertise the program through posters, flyers, and department website

⊕ Intentionally recruit promising students to teaching

⊕ Bring practicing high school teachers to campus to speak with students

⊕ Programmatic Assessments

⊕ Evidence & Resources

Click for implementation strategies

1. Implement a teacher preparation pathway

⊕ Establish a degree track for high school teacher education within the major

1. In programs with one track, modify the existing degree to allow certification requirements

2. In programs with multiple tracks, design a teaching track to allow students to smoothly transition among degree options (should be perceived as on par with other career options)

3. Collaborate with School of Education or its equivalent to accurately communicate required components for licensure (curriculum, field experiences, testing, etc.) to students

4. Design the program (individually or with other science departments) in collaboration with the College of Education to meet licensure requirements

5. Learn from existing models, e.g., PhysTEC and UTeach employ practices and strategies for recruiting, preparing, and supporting teachers that begin within the physics program

6. Be mindful not to add extra expense or time to graduation

Effective Practices for Physics Programs

The EP3 Guide

Using the Guide and Engaging the Community: David Craig

Project Goals

i. Disseminate the physics community knowledge and expertise contained in the EP3 Guide

ii. Encourage and support adoption of the effective practices

iii. Encourage and support development of a culture of continuous self-reflection and improvement in physics departments

iv. Support departments in achieving specific goals and objectives by employing the knowledge, practices, and underlying philosophy of the EP3 Guide

The overarching objective of the EP3 Project is to help strengthen and improve physics departments and programs nationwide by building on research and community knowledge and practice

Planned Initiatives

i.   Conference panels and presentations

ii. Workshops at APS, AAPT and other conferences

iii. Workshops at specialized meetings
     (e.g. bi-annual APS/AAPT Department Chairs Meeting)

You can find a list of talks, workshops, and presentations so far at ep3guide.org

iv. Commenting and tagging features at ep3guide.org

v.   Curated discussion board for Guide content so departments and chairs can share questions and successful examples

vi. EP3 Departmental Action Leadership Institutes (**DALIs**)

EP3 — Effective Practices for Physics Programs

Departmental Action Leadership Institutes (DALIs)

Who are they for?

DALIs are direct, intensive support for departments facing a challenge or opportunity or wishing to make a major change by training department members to lead change efforts

For example:

➢ Increase enrollment and retention

➢ Develop shared mission, vision and plan for department's future

➢ Implement major recommendations of a program review

➢ Implement evidence-based instruction

➢ Improve department climate

➢ Develop & implement program-level student learning assessment plan

Departmental Action Leadership Institutes (DALIs)

What is a DALI?

➢ Participating departments will create a "departmental action team" (DAT) — a local team charged with shepherding the change effort

➢ The DALI trains two change leaders to lead the DATs to assess and reflect on the situations their departments face, engage in the steps necessary for creating sustained change, and work with their DATs to achieve departmental goals

✓ 3-5 participating departments

✓ 2 representatives from each department who will be "change leaders" in their home dept.

✓ 2 EP3 facilitators (Joel Corbo and David Craig, initially)

✓ In-person kickoff workshop

✓ Bi-weekly video conferences

✓ One year minimum commitment

Departmental Action Leadership Institutes (DALIs)

What will the outcomes be for participating departments?

1. Departments will **develop capacity to create and sustain change**s to the department and its programs. This includes identifying goals and resources, developing plans, and implementing and assessing those plans.

2. Departments will **develop a culture of continuous self-reflection**, assessment, and improvement.

3. Departments will **make meaningful progress** toward addressing the challenges that led them to join the DALI.

EP3 — Effective Practices for Physics Programs

Departmental Action Leadership Institutes (DALIs)

How does my department join a DALI?

➢ Apply at ep3guide.org

➢ $5200 per department + travel to in-person workshop

➢ Have submitted proposal to fund scholarships for departments that may not be able to pay

➢ First in-person kickoff workshop planned for January 2021

Learn more and apply for a DALI at ep3guide.org/dali.cfm

Co-chairs:

- David Craig (craigda@oregonstate.edu)
- Mike Jackson (Michael.Jackson@millersville.edu)

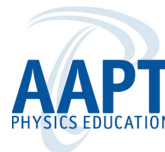**Editorial Director:** Sarah "Sam" McKagan (mckagan@aps.org)

APS Lead: Theodore Hodapp (hodapp@aps.org)

AAPT Liaison: Bob Hilborn (rhilborn@aapt.org)

External Evaluator: Stephanie Chasteen (stephanie@chasteenconsulting.com)

Community Engagement: David Craig, Joel Corbo, Sam McKagan

Research Team: Chandra Turpen, Joel Corbo

And join our mailing list at ep3guide.org