

Recommendations for departments & institutions

GOAL

Culture shift whereby Informal Physics Education (IPE) is widely recognized as an essential physics practice

LEVER 1

Structures

Amplify structures that frame IPE as an essential activity worthy of resource allocation.



LEVER 2

Engagement of interested, influential, and impacted parties

Identify techniques for recruiting and empowering people to engage in and/or support IPE as essential physics practice.



LEVER 3

Integrating Research-Based Practices in IPE

Leverage research to understand, develop, and advocate for IPE as essential physics practice.





LEVER 1 - Structures

Amplify structures that frame IPE as an essential activity worthy of resource allocation.

- **S.2: Leverage the connection between IPE and service learning** – Some undergraduate education courses are designated as “service learning” courses, in which students must engage in real-world teaching/education experience as part of the course. Physics departments and individual informal physics/STEM programs should partner with these courses to provide opportunities for students to engage in IPE and to simultaneously support the success and sustainability of the informal programs. It would be ideal if this was a structure embedded into departments and undergraduate (or even graduate) programs.

Successful examples: Mobile Making at California State University [63,64] & Eric Hazlett’s Analytical Physics 3 course at St Olaf College, which includes an active civic engagement component where students create hands-on demonstrations that are shared at local community events and with students in the St. Olaf TRiO Educational Talent program.

- **S.3: Integrate IPE efforts with other existing efforts to broaden participation** – Integrating IPE with existing initiatives aimed at expanding access and engagement can help departments and institutions make efficient use of established structures rather than creating new ones from scratch. This approach strengthens IPE while also fostering a more welcoming and supportive environment for a wider range of participants in physics. As with all recommendations, implementation will be highly context dependent and should attend to the organizational climate in which the department finds itself.
- **S.4 (*same as P.9): Hiring and promotion policies should include and reward IPE work** – IPE activities should not only be acknowledged in tenure and promotion cases [65], but they should be rewarded and encouraged, contrary to the existing norm in which IPE activities can hinder an individual’s opportunities for tenure and promotion. For more context on this recommendation, please see the white paper published by the American Physical Society Committee on Informing the Public [66,67].

Successful examples: At Lansing Community College, faculty contracts include a specified number of hours that must be dedicated on non-teaching assignments, and community outreach and events explicitly count towards this time. Dr. Bryan Stanley, LCC physics faculty, shares that in their hiring interview, they were asked about their community engagement work and plans for future community engagement they wanted to do in the position they were interviewing for.

Similarly, the University of Texas at Austin’s policy for promotion for professional track faculty (including teaching faculty) includes a statement on your primary area plus another statement on “Contributions to the Academic Enterprise” which is a broad category that can include any substantive additional work, including in IPE [68].

In Ireland, the University College Dublin ‘Framework for Faculty,’ used by academics in their applications for promotion, includes a specific public engagement dimension. Within this, expectations are set out for faculty with the highest levels associated with public engagement scholarship at international scale [69].

- **S.5: For faculty at academic institutions or other roles with “service” requirements, IPE activities should fulfill said service requirements** – Departments can also consider how IPE could fulfill teaching requirements if, for example, a faculty member includes an IPE component to their physics course (see recommendation S.2).
- **S.6: Provide funding for IPE work at multiple scales** – Funding need not only come from large-scale, national foundations, but should also come locally from departments, universities, etc. Funding mechanisms should prioritize IPE activities that are utilizing evidence-based practices and are designed to effectively engage the audiences of focus. Opportunities for renewable funding will help make IPE programs sustainable, and funding available to students and other junior members of institutions will help support a large population of IPE practitioners. Departments and institutions are well-suited to provide commonly needed (and relatively cheap) resources like materials, room rentals, parking waivers, and stipends for student interns.
- **S.7 (*same as R.14): Establish recognition mechanisms for exemplary IPE programs and practitioners, including students** – Such recognition could include site or practitioner awards, digital badges or professional certificates for completing IPE training, and features in institutional communications. Recognition can be implemented at the department, community of practice (e.g., JNIPER) and international organization (e.g., APS) scale.
- **S.8: Create or expand community engagement/campus extension offices** – These offices are often staffed by experts in community partnerships whose job it is to build relationships with local community members and groups. These offices can be a resource for physics faculty and students seeking to engage in IPE, as well as local audiences interested in STEM. This recommendation relates to institutions ensuring these offices have the capacity and expertise to support these kinds of connections that would be beneficial for physics/STEM public engagement.
- **S.9 (*same as P.12): Obtain the Community Engagement Elective Carnegie Classification for your institution [70]**– This classification requires a campus-wide commitment to partnership with the local community. Applications require detailed examples of academic-community partnerships, such as an IPE program. A push from institutional leaders to obtain this classification for the institution will promote buy-in from multiple interested, influential, and/or impacted parties in IPE.



LEVER 2 - Engagement of interested, influential, and impacted parties

Identify techniques for recruiting and empowering people to engage in and/or support IPE as essential physics practice.

- **P.8: Invest in infrastructure that supports public engagement and evaluation –** Reducing administrative and resource barriers facilitates buy-in from faculty, staff, and students. Examples of infrastructure include dedicated space and materials that can be used for IPE programming, partnerships with social scientists for program evaluation, and teaching assistant lines dedicated for facilitating IPE programs.
- **P.9 (*same as S.4): Recognize IPE activities in tenure and promotion processes –** This is important for faculty and staff to buy-in to IPE as a practice they should engage in [65–67].
- **P.10: Integrate IPE activities into the curriculum and provide academic credit for participation in IPE efforts –** This provides an important marker of disciplinary value to students. It is easier for students to buy-in to IPE as an essential disciplinary practice if they get academic credit for their participation. IPE can be incorporated into curricula as part of a service-learning credit, a lab course, a pedagogical/communication requirement, or an independent study.

Successful example: Eric Hazlett’s Analytical Physics 3 course at St Olaf College, which includes an active civic engagement component where students create hands-on demonstrations that are shared at local community events and with students in the St. Olaf TRiO Educational Talent program.

- **P.3: Meet with policy makers to advocate for supportive policies and funding for IPE –** Highlight the benefits of IPE for constituencies and their connection to existing educational goals. This can be done via various mechanisms such as policy briefs, roundtables, and 1:1 meetings.
- **P.4: Invite policy makers, administrators, leaders, and faculty to interact with IPE programs –** Observing, showing up, and even participating in IPE programs will increase awareness of programs, their funding needs, and common values. These people can then be recruited as program champions, to bear witness to their importance.
- **P.11: Acknowledge the IPE career pathways that students can take and legitimize the rhetoric around those IPE careers –** Career panels and talks should include examples of physics majors who have gone on to a career in IPE, including the option to pursue the academic track with a research-focus on IPE. Job boards and career resources should also illustrate the many forms an IPE career can take.
- **P.12 (*same as S.9): Obtain the Community Engagement Elective Carnegie Classification for your institution [70] –** This classification requires a campus-wide commitment to partnership with the local community. Applications require detailed examples of academic-community partnerships, such as an IPE program. A push from institutional leaders to obtain this classification for the institution will promote buy-in from multiple interested, influential, and/or impacted parties in IPE.



LEVER 3 - Integrating Research-Based Practices in Informal Physics Education

Leverage research to understand, develop, and advocate for IPE as essential physics practice.

- **R.10: Hire faculty who research IPE** – This will indicate that the department/institution values scholarly IPE, and will facilitate the generation of new knowledge. These faculty will also train students in evaluation and research methods, expanding the research skillset of the IPE community.
- **R.11: Incorporate IPE evaluation and research into the curriculum** – Evaluation and assessment methods for both formal and informal learning environments should be included in pedagogy courses, as part of the broader body of investigation techniques.
- **R.12: Support graduate study of IPE** – Physics graduate students should be encouraged to focus on IPE research for their dissertation work, and their work with informal physics education programs should be recognized both as service and as research work.
- **R.13: Staff IRB offices with experts in the ethics and logistics of RPPs and other community-based research projects** – This will provide support for physics students and faculty who are engaging in IPE research. The IRB staff should be able to offer guidance on research involving minors and how to partner with local school districts.
- **R.14 (*same as S.7): Establish recognition mechanisms for exemplary IPE programs and practitioners, including students** – Here, exemplary refers to programs that incorporate research-based practices and evaluate the impact of their program. Such recognition could include site or practitioner awards, digital badges or professional certificates for completing IPE training, and features in institutional communications.