

Recommendations for individuals/ individual programs

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.1:** Structural changes are often brought about by individual ‘champions’ who lead organizations in adopting the change. While **we encourage individuals to advocate for the following structural changes**, especially those individuals in positions of relative organizational power, **we also recognize that no one individual ought to be responsible for ensuring the following recommendations come to fruition** within their, or any, organization.



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.1: Track program effectiveness** — University administration, funders, and others often request data on IPE program impact in order to support the effort. Sharing these impacts with interested, influential, and impacted parties can help make the case for the value of IPE. These data can be a mix of quantitative and qualitative metrics. See section III.D on research-based practices for a discussion of a variety of possible metrics.
- **P.2: Align goals with funders’ missions** — Funders want to see how the project aligns with their goals. It is important to have a clear plan for the direction you want your project to go, and how support will help you get there. Additionally, proposals should incorporate rich and robust evaluation frameworks and plans for sharing evidence of impact.
- **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.5: Consistently engage community members at every stage and level of an IPE program** — Community members can be both advocates and avid participants for IPE programs. Co-creating programming with the community and your participants will lead to greater participation and impact. Co-creation can also mean leaning into the “messiness” of multiple voices and priorities.

- **P.6: Integrate IPE into your research goals** – This can take the form of a research project studying the design and impact of an IPE program, or can be incorporated into an area of traditional physics research. For example, you can engage various publics in your data collection and analysis through “community science” platforms. You can also host roundtables with community leaders to understand their needs and how they can shape your research direction.
- **P.7: When engaging in dialogue with different** interested, influential, and/or impacted parties, **articulate a relevant value proposition for supporting IPE** – This is a more general statement of a number of the other recommendations. Find the message that resonates with your audience by understanding their goals and how they connect to those of your program. For example, faculty and department leaders may be interested in the benefits to university students who facilitate IPE programs, while K-12 schools or community organizations may be interested in the benefits for younger students and their families.



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

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

- **R.1: Clarify audience and goals** – Begin by clearly defining who you aim to serve or work with through your IPE program. Reflect on who your target audience is, what interests or needs they may have, and how your program can best meet those needs. Practitioners should consider conducting initial audience analysis to better understand what drives engagement within their communities. This could involve community feedback sessions, exploratory surveys, or informal discussions with representatives of the target audience. Identifying and articulating program goals aligned with the unique needs, backgrounds, and interests of your audience will make program design and evaluation more focused, meaningful, and effective [32].
- **R.2: Engage in continuous evaluation and assessment** – Evaluation should be an ongoing process rather than a one-time activity. Incorporate opportunities for iterative feedback from participants and partners throughout the program. This feedback can inform adjustments to the program and ensure it remains relevant and responsive to the needs of those it serves.
- **R.3: Align research with program goals, institutional missions, and community needs** – For those interested in conducting research, designing studies that align with program goals ensures that collected data will be directly relevant for assessment and evaluation. Research that explores how IPE can support both institutional missions and community needs (which should already be incorporated into program goals) offers a path forward for integrating IPE more fully into physics departments, labs, and national initiatives.

- **R.4: Seek broad expertise and partnerships** — Assemble teams with people from varied backgrounds, drawing on expertise from multiple disciplines, such as sociology, education, and communication studies. Forming research-practice partnerships (RPPs) or collaborating with other community organizations can help practitioners access a wider range of insights and resources, ensuring that programs and studies are better informed and more comprehensive.
- **R.5: Engage in dialogue rather than presenting a pitch** — Rather than presenting IPE as a “pitch” to be sold, IPE practitioners should draw on the growing body of research demonstrating its benefits to initiate dialogues that celebrate multiple perspectives and encourage collaboration — similar to the ways in which research communities typically operate. IPE provides demonstrable value to departments and organizations, and facilitators and practitioners should engage in open dialogue with the systems that could support them.
- **R.6: Define success in audience-relevant terms** — Be flexible in how success is defined, tailoring success metrics to the specific context of each program and audience. For example, if your goal is to engage younger audiences, success might focus on fostering curiosity and confidence in exploring physics. When communicating to institutions, however, metrics like participant retention and program reach might be more relevant. This approach ensures that the value of IPE is communicated effectively to different groups.

Example: In an ongoing longitudinal research study, the Partnerships for Informal Science Education in the Community (PISEC) program at CU Boulder [85] tracks a range of impacts on youth participants, including sustained STEM interest and career aspirations. Researchers examine factors like STEM identity, college attendance, and persistence in STEM, while also capturing other emergent impacts reported by participants such as increased confidence in discussing science and fostering personal relationships, regardless of STEM career interest.

- **R.7: Collect a variety of metrics to tell the full story of an IPE program** — As discussed above, both quantitative and qualitative metrics are important in developing a complete picture of the impact of IPE programs for institutions, program leadership, community partners, and participants.
- **R.8: Document audience, facilitator, institutional, and community impacts** — Systematically document the impacts of IPE on the audience, the facilitators, the local community, and other impacted institutions, considering how all groups benefit from engagement. This includes tracking both quantitative metrics, like the number of participants, and qualitative indicators, such as identity development or shifts in attitudes toward science. It may not be possible or practical for one study to document the full suite of impacts, but a comprehensive picture should be built over time by the IPE community with multiple studies and evaluations. Sharing these impacts with interested, influential, and impacted parties can help make the case for the value of IPE.
- **R.9: Read IPE research digests to stay on top of latest research findings and how they apply to your practice** — Not all practitioners need to become IPE researchers, but it is important to stay abreast of how research findings can inform better practice.