

Recommendations for informal STEM topical groups (e.g., JNIPER)

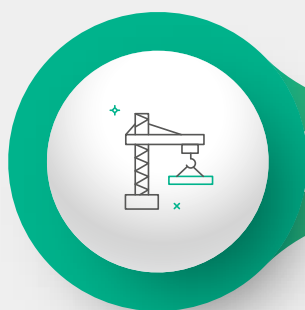
GOAL

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.10: Host a member directory or other mechanism for facilitating partnerships among IPE practitioners, IPE researchers, and other physicists**
- **S.11: Publish a regular newsletter to support community building, help disseminate members' work, and provide visibility and recognition**
- **S.12 (*same as P.16): Provide toolkits and training to support implementation of partnership-focused IPE programming** — Resources will lower the barrier to starting and improving an IPE initiative because interested parties will not have to “reinvent the wheel.” Examples include: a playbook of how IPE practitioners should connect to communities, defining best practices for building partnerships; “cheat sheets” that synthesize research findings and provide suggestions for how IPE practitioners can apply the findings in their work; a list of models or examples for how departments might incorporate IPE in their curriculum, major, or departmental activities and culture.
- **S.13 (*same as P.13): Provide workshops on effective grant writing, impact reporting, and evaluation strategies** — This training can help individuals prepare an IPE-focused grant proposal, and/or help individuals to directly connect their physics research meaningfully to their broader impacts components of their physics research grants.
- **S.14: Set a recognized standard for ethical and effective IPE practice and research** — These standards can be emulated and boosted by science societies, funders, and other IPE partners. Examples of standards include paying and/or recognizing students facilitating IPE programs; cultivating long-term community partnerships; engaging in research-practice partnerships; and establishing clear metrics and evaluation plans. For more on standards for research, see Section III.D.
- **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.15 (*same as R.15): Publish IPE research “digests”** — To help the IPE community and partners stay informed of recent results and findings. This digest should be shared with science societies (e.g., APS, AAPT, AIP) and others outside the immediate IPE community.
- **S.16: Create and disseminate mentorship opportunities** — To mentor people new to IPE into career pathways that incorporate IPE.

Successful example: The JNIPER Fellows program trains a small cohort of students in science communication skills [24]. The students then apply their skills to produce content for APS Public Engagement programs. The cohort design and connection to the broader JNIPER community provide exposure to multiple pathways that incorporate 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.13 (*same as S.13): Provide workshops on effective grant writing, impact reporting, and evaluation strategies** – This training can help individuals prepare an IPE-focused grant proposal, and/or help individuals to directly connect their physics research meaningfully to their broader impacts components of their physics research grants. Training in evaluation helps practitioners know what to assess (e.g., participant value, motivations) and helps with messaging to funders and leaders because they often require metrics of IPE program impact.
- **P.14: Highlight successful IPE programs** – Concrete examples of programs that are meeting their goals and those of their community partners help promote buy-in from parties who have not experienced an IPE initiative. Similarly, sharing stories of challenges and how programs have overcome them will add to buy-in.
- **P.15: Highlight institutional practices that uplift IPE work** – Collect concrete examples of institutions that are recognizing the IPE work of their students/staff/faculty and examples how they are supporting the work. This helps facilitate change at similar type institutions.
- **P.16 (*same as S.12): Provide toolkits to support implementation of partnership-focused IPE programming** – Resources will lower the barrier to starting and improving an IPE initiative because interested parties will not have to “reinvent the wheel.” This, in turn, promotes buy-in. Examples include: a playbook of how IPE practitioners should connect to communities, defining best practices for building partnerships; “cheat sheets” that synthesize research findings and provide suggestions for how IPE practitioners can apply the findings in their work; a list of models or examples for how departments might incorporate IPE in their curriculum, major, or departmental activities and culture.
- **P.17: Organize forums and roundtable discussions to discuss the role of IPE in achieving broader educational goals throughout communities** – This will engage policy makers, community members, and education/academia leaders.
- **P.18 (*same as R.18): Support strategic messaging**– Equip members to leverage research findings to promote buy-in for IPE among funders, departments, and institutions. This can include curated lists of benefits and metrics of success to demonstrate the case (with evidence) that IPE efforts align with institutional and community values; templates, examples, and resources for recruiting local champions; and training on advocacy to policy makers.
- **P.19: Connect K-12 education standards to common IPE programming** – This will promote buy-in from K-12 educators, leaders, and parents, and ease implementation of IPE in school settings.



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

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

- **R.15 (*same as S.15): Publish IPE research “digests”** — To help the IPE community and partners stay informed of recent results and findings. This digest should be shared with science societies (e.g., APS, AAPT, AIP) and others outside the immediate IPE community.
- **R.16: Facilitate practitioner-researcher connections** — Support sustainable RPPs and foster collaborative research teams that bridge disciplinary boundaries by providing mechanisms for community members to connect and seek partnerships on evaluation and research. Connections are also needed to share methodologies, research/evaluation questions, and approaches. S.10 provides one example of how to implement this recommendation.
- **R.17: Provide training and resources around evaluation, assessment, and research** — Offer training in both qualitative and quantitative research methods, IRB support, and a repository of resources on methods, IPE literature, and theoretical frameworks. Training and resources can also include guidance on how different methods align with specific research questions, and how to handle data collection challenges. For example, if you cannot collect data from minors, you can collect retrospective data from undergraduates on their IPE experiences as minors. (This recommendation expands on the evaluation training mentioned in P. 13 (same as S.13)).
- **R.18 (*same as P.18): Support strategic messaging** — Equip members to leverage research findings in advocating for IPE with funders, departments, and institutions. This can include curated lists of research findings on benefits and metrics of success to demonstrate the case (with evidence) that IPE efforts align with institutional and community values.
- **R.19: Convene the community to define key research questions that need to be addressed** — The community should come to consensus on necessary research directions and how different research questions apply across a variety of IPE formats. This includes enumerating classical/existing questions: what are processes of change; who benefits and how; and why / how do programs work, as well as generating questions that the IPE community is just starting to ask: longitudinal impacts of IPE programs; international comparisons / context; and other novel, emergent questions.