Research Training

Overview: Advanced research training is at the core of the India RISE Fellowship's mission to **build scientific excellence** among early-career women in STEMM. The Research Training Pillar delivers a progressive, competency-based curriculum that equips fellows with the knowledge and technical skills to design, conduct, and disseminate high-impact research. This pillar spans structured online modules, hands-on workshops, and a capstone research project, all contextualized to India's research ecosystem. In close integration with the mentorship and leadership pillars, the research training empowers fellows to become independent investigators capable of contributing innovative solutions to scientific challenges. The fellowship's comprehensive approach ensures that by the end of the program, **fellows can apply advanced research skills in study design, analysis, and dissemination** while also demonstrating leadership in their research endeavors.

Goals and Objectives

The Research Training Pillar aims to develop fellows' technical expertise and research acumen so they can excel as scientists and innovators. Key goals and objectives include:

- **Mastery of Core Research Skills:** Enable fellows to gain advanced skills in **research design, methodology, and analysis**. This includes formulating rigorous research questions, designing studies (experimental, observational, qualitative, etc.), and applying appropriate analytical techniques. Fellows learn to develop **competitive research proposals** and experimental designs that address real-world problems. An emphasis is placed on integrating ethical considerations and feasibility into study design from the outset.
- **Project Management and Grant Competitiveness:** Train fellows in effective **research project management** – planning and executing projects within time and resource constraints. They practice setting project milestones, coordinating teams, and adapting to challenges to ensure successful completion. Additionally, a strong focus is placed on **grant writing and funding strategies**: fellows learn how to prepare grant proposals that meet international standards and align with funding priorities, thereby improving their ability to secure research funding for their work.

- **Scientific Communication and Collaboration:** Develop the fellows' ability to **communicate research findings clearly and persuasively**. Skills in scientific writing (manuscripts, reports) and oral presentation are honed so that fellows can tailor their message to diverse audiences – from academic peers to policymakers and the public. The program also promotes **collaboration across disciplines** and participatory research methods, preparing fellows to work effectively in multidisciplinary teams and engage stakeholders. By doing so, fellows can enhance the relevance and societal impact of their research.
- **Knowledge Translation and Impact:** Inculcate skills for evaluating and translating research outcomes into practice. Fellows learn to assess the impact of their research and explore how findings can inform policy or implementation (a form of translational science). The training covers principles of research utilization, encouraging fellows to think beyond publication toward real-world impact. A goal is that each fellow's work contributes to **advancing India's STEMM landscape and addresses local priorities**, positioning them as contributors to national and global scientific progress.
- **Capstone Research and Innovation:** Guide fellows in executing a **Capstone Project** that serves as a capstone of their learning and a demonstration of their capability. The Capstone is an individual research project aligned with each fellow's professional interests and institutional priorities. It is both a learning vehicle (where the fellow applies new skills) and a scholarly contribution. A key objective is that each fellow produces an original piece of research (such as a manuscript draft, policy brief, or other research output) by the end of the fellowship. The Capstone synthesizes learning from all pillars – requiring technical skill, project leadership, and often, community engagement – and **showcases the fellow's growth** as a researcher.

In summary, the Research Training Pillar's objectives center on transforming fellows into well-rounded researchers who can not only conduct robust studies but also manage projects, secure funding, collaborate widely, and translate their work into meaningful outcomes. Achieving these goals sets the foundation for the fellows' long-term success in academia or industry and contributes to a stronger, more innovative research ecosystem in India.

Structure and Implementation

The research training in India RISE is delivered through a **blended learning structure** that balances flexibility for working professionals with rigorous, practical training. The

curriculum is organized into sequential modules and experiential components that build upon each other:

- **Structured Online Curriculum:** Fellows engage with a series of online modules hosted on the Johns Hopkins Canvas platform, which provide core content in research methodology and related skills. Each module has **clearly defined learning objectives and competencies**, ensuring an outcomes-driven approach. Content is delivered via video lectures, readings, and interactive exercises. Topics are covered in a logical progression – starting from research foundations (e.g., literature review techniques, research ethics and integrity) and advancing to more complex skills (e.g., advanced statistics, proposal writing, translational research). Modules are self-paced within given timeframes, allowing fellows to absorb material at their own pace each week. Periodic **knowledge checks and quizzes** ensure understanding and allow fellows to gauge their mastery of the content.
- **Live Virtual Workshops:** Complementing the asynchronous modules, the program features **live virtual training workshops** led by faculty and experts. These workshops focus on applying knowledge to real-world scenarios. For instance, a workshop on *Grant Writing* might involve fellows drafting sections of a grant proposal and receiving feedback, while a *Scientific Publishing* workshop could include analyzing example manuscripts or practicing the peer review process. Other workshop topics include data analysis software training, research ethics case studies, stakeholder engagement strategies, and scientific presentation skills. The workshops are highly interactive – using case studies, group exercises, and Q&A – and give fellows a chance to directly engage with instructors. They serve as a bridge between theory and practice.
- **Project-Based Learning and Capstone:** The heart of the research pillar is the **Project-Based Learning (PBL)** approach, culminating in the Capstone Project. From early in the fellowship, each fellow works on designing and executing her own research project (the Capstone) under guidance. This real project provides a practical arena to apply every skill learned. The fellowship encourages fellows to align their Capstone with *institutional or national research priorities* (such as topics relevant to India's National Institutional Ranking Framework (NIRF) focus areas in STEMM), ensuring relevance and potential impact. The Capstone timeline spans the fellowship year, with defined phases:
    - *Proposal Development (Months 1–3):* Fellows formulate their research question and methodology. They submit a Capstone proposal and receive feedback from faculty and mentors. This phase integrates skills

from the early curriculum (literature review, study design, proposal writing).

- *Research Execution (Months 4–8):* Fellows carry out the research – obtaining ethical approvals if needed, collecting data (or conducting experiments), and making iterative adjustments. During this period, they practice project management: setting milestones, troubleshooting issues, and perhaps working with collaborators. Regular check-ins with Research Advisors (subject experts) ensure technical guidance.
- *Analysis & Writing (Months 9–10):* Fellows analyze their data and begin drafting their Capstone report or manuscript. They employ statistical or qualitative analysis techniques covered in training. They also refine their scientific writing skills by composing their findings in a structured format.
- *Peer Review & Revision (Month 11):* A unique element is the **peer review exercise** – fellows exchange draft reports with each other or present their findings in group sessions to receive feedback. This simulates the peer-review process and helps improve their work. Program Mentors and Research Advisors also give feedback on the drafts.
- *Final Presentation & Submission (Month 12):* The fellowship concludes with a Capstone Symposium where fellows deliver oral presentations of their research with accompanying visuals (posters or slides). They also submit a final written product (which could be a journal article manuscript, a detailed project report, or policy brief, depending on project type). Fellows complete a self-reflection on their research process and what they learned.

- **Mentorship Support:** Integral to the research training structure is the mentorship support embedded throughout (as described in the Mentorship Pillar). Each fellow's **technical Research Advisor** provides domain-specific mentorship on the research project – advising on experimental techniques, analysis methods, etc., in regular one-on-one meetings. Simultaneously, the **Program Mentor** helps ensure the fellow is managing her project effectively and aligning it with fellowship milestones. The mentorship triad (fellow, Program Mentor, Research Advisor) may convene to problem-solve any major research hurdles and to keep the project on track. This structure means the fellow is never alone in her research journey; experts are available to guide her, and peers offer collaborative input during group mentorship sessions and peer reviews.
- **Competency-Based Progression:** The curriculum uses a competency-based education model, meaning that fellows are expected to demonstrate mastery of specific research competencies as they progress. For example, a competency might be "ability to formulate a research hypothesis and design an appropriate

study to test it." Assessments – such as a proposal outline, a data analysis assignment, or a mini literature review – are designed to let fellows show their competence. If a fellow doesn't meet the standard initially, she receives feedback and can improve, ensuring by the end of the program each fellow has achieved key research competencies. This approach makes the training rigorous but also personalized: fellows can take extra time or seek extra help via mentors on areas they find challenging, rather than moving on with gaps in understanding.

- **Contextualization to Indian Research Environment:** The program thoughtfully contextualizes training content to reflect the realities of doing research in India. For instance, when covering research ethics, the curriculum addresses both international standards and India's specific regulatory frameworks and cultural considerations. Case studies might include scenarios in Indian laboratories or field settings. When discussing stakeholder engagement, fellows examine examples of community-based research in Indian communities. This ensures that the skills learned can be directly applied by the fellows in their home institutions and communities, increasing the likelihood of sustained impact.

Throughout implementation, the Research Training Pillar is coordinated to run **in parallel with leadership development activities**, reinforcing each other. For example, as fellows learn to manage their research projects, they are simultaneously learning leadership skills such as team management and strategic planning – and they get to practice those skills by leading their own research. This integrated structure produces a training experience that is **holistic and practical**, turning knowledge into action.

Key Activities and Components

Under the Research Training Pillar, the fellows engage in a variety of activities and components that build their research skills step by step. Some of the key components include:

- **Core Research Skill Modules:** A series of online learning modules cover the essential research skills. Topics include: **Research Proposal Development** (how to formulate research questions and design studies), **Research Ethics and Compliance** (ethical conduct, IRB processes, data privacy), **Biostatistics and Data Analysis** (statistical methods for quantitative research and analysis techniques for qualitative data), **Laboratory Techniques or Field Methods** (depending on fellows' disciplines, covering methodologies relevant to their projects), **Scientific Writing and Publishing** (manuscript structure, selecting journals, responding to reviewers), and **Grant Writing** (identifying funding

sources, writing grant applications). Each module typically ends with a practical assignment, such as drafting a specific section of a proposal or analyzing a sample dataset.

- **Interactive Workshops and Webinars:** Live training sessions are interspersed throughout the year. Some highlight workshops are:
    - *Grant Writing Bootcamp:* Fellows work through the components of a grant proposal. They might critique examples of successful and unsuccessful grants, and draft a mini-proposal for feedback.
    - *Scientific Communication Workshop:* Focused on enhancing presentation skills, data visualization, and writing for varied audiences. Fellows practice pitching their research to a lay audience and creating effective research posters or slides.
    - *Publication and Peer Review Webinar:* Covers how to select journals, the manuscript submission process, and what to expect in peer review. Fellows may do a mock peer review of a sample article to learn how to give and receive scientific critique.
    - *Research Leadership Seminar:* Although overlapping with leadership development, this seminar addresses leading research teams and projects – e.g., managing collaborations, supervising students, and research integrity as a leader.
    - *Emerging Methods Talks:* Guest lectures by experts on cutting-edge research methods (for example, sessions on machine learning in healthcare research, or community-based participatory research methods relevant to social sciences). These broaden fellows' perspectives on innovative techniques.
- **Capstone Project Work:** As a continuous component, fellows dedicate time each week to their Capstone Project tasks – whether it's reading literature, conducting experiments, or writing up results. The fellowship intentionally builds in **Capstone checkpoints**. For instance, by a certain date fellows must submit their research question and approach for approval, later a mid-term progress report, etc. These checkpoints keep the project momentum and allow the program faculty to intervene with support if a fellow is facing difficulties. The Capstone experience is highly individualized – one fellow might be doing a lab bench experiment, another conducting field surveys – but all follow the common framework of proposing, implementing, and reporting research with mentorship oversight.
- **Peer Learning and Review:** Peer interactions are leveraged as a learning tool. Fellows might be grouped by similar research interests or methodological approach for some activities. They review each other's project proposals in a

constructive manner, which not only improves the proposal in question but also teaches the reviewer new ideas and critical analysis skills. Group discussions on research case studies or recent journal articles also take place, moderated by faculty or mentors, to deepen understanding and encourage a culture of collaborative inquiry.

- **Resources and Libraries:** The program provides access to a range of research resources – for example, each fellow might gain access to academic databases/journals through the partnership with Johns Hopkins, software tools (statistical packages, reference management software), and toolkits like a **Research Methods Handbook**. These resources serve as references during the fellowship and beyond. Additionally, fellows are given templates and exemplars (e.g., a template for an Individual Development Plan focusing on research goals, or a sample completed grant application) to guide their work.
- **Evaluations and Assessments:** To ensure that learning outcomes are met, various assessments are woven in. Quizzes in each module test conceptual knowledge (e.g., about study design or statistical concepts). Practical assignments (as mentioned) are assessed by instructors or mentors with feedback. The Capstone Project itself is evaluated at multiple stages (proposal, draft, final presentation) against rubrics that reflect the core competencies (like clarity of research design, quality of analysis, etc.). At the end, an overall evaluation of the fellow's research competency is made, which, if satisfactory, contributes to the fellow earning a **Certificate of Competency and a JHU micro-credential**. The emphasis of assessment is largely formative – meant to guide and improve learning – with the fellowship adopting a Complete/Incomplete grading approach for modules to encourage mastery without excessive pressure.

This blend of activities ensures that the research training is not just theoretical but deeply applied. By actively doing research (Capstone) while learning, fellows reinforce their skills. By interacting with peers and mentors, they broaden their perspective and troubleshoot effectively. The structured-yet-flexible nature of these components recognizes that the fellows are working professionals – thus, the program spreads learning tasks reasonably over time and provides support to balance fellowship work with their jobs. Fellows are expected to devote about 1–4 hours per week on fellowship activities, which is manageable alongside a full-time role, due to the program's efficient design.

Expected Outcomes and Achievements

Upon completing the fellowship, the outcomes of the Research Training Pillar for the fellows are significant:

- **Advanced Research Competency:** Each fellow will have demonstrably **applied advanced research skills** in practice. They will know how to independently conceive a research study, design the methodology, carry out the investigation, and analyze the results. In essence, they become capable of leading research projects from start to finish. This is evidenced by their completed Capstone Project and by the variety of research outputs (proposals, reports, presentations) they produce during the program.
- **Capstone Project Completion:** A major tangible outcome is the successful completion of a Capstone Project. Fellows will have produced a **scholarly output** such as a draft journal article, a conference presentation, or a detailed project report based on their Capstone research. Many fellows will be ready (or very close) to submit their work to a peer-reviewed journal or present it at a conference. The quality of these projects reflects the high level of research training – they are expected to be on par with work done by researchers at international standards, given the input from expert mentors and the rigorous feedback process.
- **Publication and Funding Potential:** With enhanced skills in writing and grantsmanship, fellows are well-positioned to publish their work and secure funding. By program's end, fellows will have developed at least one **competitive research proposal** (often the one used for their Capstone or a future grant) and received iterative feedback on it. They also build a pipeline of ideas for future projects. Many fellows will go on to submit grant applications using the proposals they started during the fellowship. The program's connection to a **$50,000 Research Grant opportunity** for alumni is a further incentive and outcome – fellows become eligible to apply for this seed grant, and their training prepares them to make a strong case.
- **Improved Communication & Leadership in Research:** Fellows exit with polished scientific communication skills: they can write more clearly and persuasively, and they can present with confidence. They also learn to communicate across disciplinary lines and to non-specialists, an increasingly important skill. Additionally, by managing a year-long project, they gain project leadership experience – coordinating with mentors, perhaps supervising any assistants, and making strategic decisions. This experience builds **leadership**

capacity in a research context, complementing the formal leadership training from the other pillar.

- **Contribution to Institution and Community:** Many fellows' Capstone Projects are designed to solve practical issues or answer pressing research questions at their home institution or community. Thus, a direct outcome is that each fellow contributes something of value back to her context – whether it's a new protocol in the lab, preliminary data for a larger study, or evidence that can inform local policy. The fellowship often works with institutions to ensure support for the fellow's project, meaning these outcomes have a pathway to implementation. In broader terms, the collective impact of all fellows' projects **advances India's research ecosystem** by addressing gaps, introducing new methodologies, or highlighting women-led research in important fields.
- **Confidence as Independent Researchers:** An intangible but crucial outcome is the boost in each fellow's confidence and identity as a researcher. Over 12 months, fellows transform from perhaps being inexperienced or hesitant researchers into proactive scientists who feel ownership of their work. The combination of mentorship and training helps dispel self-doubt. By presenting at the Capstone Symposium and defending their work, they solidify their voice in the scientific community. Fellows are often more motivated to pursue higher positions (like enrolling in a PhD or taking on lead investigator roles) after experiencing success in the fellowship. As one of the program learning goals states, they **develop confidence, resilience, and strategic skills to thrive in STEMM research communities**.

In quantitative terms, by the end of the fellowship each fellow will have: completed all required modules and quizzes (demonstrating knowledge), produced at least one research proposal, one full research report, and one presentation, and met the competency criteria for the JHU Certificate. Qualitatively, they emerge as more inquisitive, skilled, and **networked researchers**, ready to contribute at a higher level to their institutions and to mentor others in research.

Role in the Overall Fellowship Experience

Within the broader fellowship, the Research Training Pillar serves as the **technical backbone** and the primary vehicle through which the program's mission is realized. While mentorship and leadership development provide support and soft-skill growth, it is through the research training that fellows achieve the concrete scholarly outputs and hard skills that define their career advancement. The pillars are highly interdependent: the skills from leadership training (like strategic thinking, resilience) enable the fellows

to tackle research challenges more effectively, and the mentorship ensures they stay on track and can personalize the training to their own projects. This integrated design means fellows are *not* learning in isolation – they immediately apply leadership concepts to leading their research, and they discuss research hurdles in mentorship sessions to get advice, thereby reinforcing learning from multiple angles.

The Research Training Pillar also creates many of the fellowship's **milestones and communal experiences**. The intensity of working on Capstone Projects and the excitement of the Capstone Symposium bring the cohort together. Fellows often collaborate informally – sharing methods or even data if their projects overlap – which ties into the networking goals of the program. In this way, research training isn't a solitary pursuit here; it's a community-supported journey. The pride and accomplishment the fellows feel in completing their Capstones are frequently cited as highlights of the program.

From the program's perspective, the **impact of the fellowship is largely measured** through the success of the research training pillar – the publications, conference presentations, and follow-on projects or grants that fellows achieve post-fellowship are key indicators of success. Thus, the fellowship heavily invests in making the research training robust and relevant. By anchoring the leadership and mentorship experiences around the research project, the fellowship ensures a **cohesive learning experience** where every element reinforces the others. As noted in the curriculum design, the result is a *practical, engaging, and responsive curriculum that prepares fellows to advance their research careers with confidence and clarity*.

In summary, the Research Training Pillar is where theory meets practice in the India RISE Fellowship. It transforms abstract learning into tangible outcomes and positions the fellowship as a program that not only **empowers women researchers** in theory but demonstrably advances their capacity to contribute to science. Coupled with the other pillars, it produces fellows who are not just trained in research, but are also inspired leaders and effective mentors – well-rounded professionals ready to push boundaries in India's STEMM domains. This pillar ensures the promise of the fellowship (to support women in becoming leading researchers) is fully realized by program's end, thereby fulfilling a critical part of the fellowship's integrated vision.