Report on the Two-Day Workshop on Project Design and Execution Planning

Venue: Delhi Pharmaceutical Sciences and Research University (DPSRU), New Delhi
Dates: November 3–4, 2025

The Two-Day Workshop on Project Design and Execution Planning was graced by the presence of Hon'ble Vice Chancellor Prof. Ravichandiran V and Dr. Ramchander Khatri, Registrar, DPSRU, marking the formal beginning of the event. The workshop was conducted in line with the vision of the Anusandhan National Research Foundation (ANRF) to strengthen the nation's research ecosystem by nurturing young researchers and promoting interdisciplinary collaboration. It served as a deeply enriching academic experience designed to equip Pre-Ph.D. scholars with essential knowledge and practical guidance in research conceptualization, proposal development, scientific ethics, and the integration of innovative methodologies in modern biomedical and pharmaceutical research. This workshop was organized under the ANRF-PAIR Project by Dr. Mukesh Nandave, Associate Dean (Research & Consultancy), in collaboration with the ANRF-PAIR team and the organizing committee.

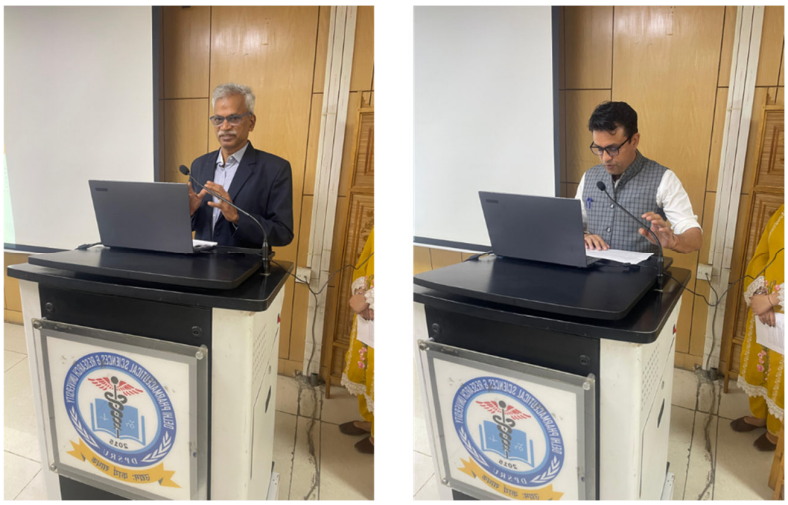

Photo 1: Inauguration of the workshop by of Hon'ble Vice Chancellor Prof. Ravichandiran V (left hand side) and Dr. Ramchander Khatri, Registrar, DPSRU (right hand side)

The event brought together distinguished speakers from premier research institutions of India, including CDFD Hyderabad, JNU New Delhi, IIT BHU Varanasi, CDRI Lucknow, and JNCASR Bengaluru, offering participants valuable insights into contemporary research practices and fostering a spirit of innovation-driven scientific inquiry.

The following compilation synthesizes the learning experiences and reflections shared by the participating Pre-PhD scholars regarding each expert's lecture, highlighting the intellectual wisdom and methodological depth of the workshop.

Photo 2: Inauguration of the workshop by deep prajvalan

Session 1 – Dr. K. Thangaraj, Director, Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad

Photo 3: Inaugural lecture from Dr. K. Thangaraj held in online mode

Dr. K. Thangaraj inaugurated the workshop with a seminal lecture on genetics, human evolution, and microbial diversity, laying the foundation for understanding how genetic variation drives both biological complexity and disease susceptibility. He provided a comprehensive overview of how genomic diversity influences health outcomes, host–pathogen interactions, and evolutionary adaptability. Drawing extensively from his pioneering research on Indian population genetics, Dr. Thangaraj illustrated how genomic studies can trace ancestral lineages, define population-specific traits, and identify genetic markers linked to disease predisposition.

He emphasized the importance of multigenic and mutational studies in understanding disease mechanisms and the interplay between inherited and environmental factors. His lecture also

delved into the emerging field of mitochondrial genetics, explaining how mutations in mitochondrial DNA (mtDNA) are associated with disorders such as infertility, diabetes, neurodegenerative diseases, and cancer. Dr. Thangaraj discussed population-specific variations in mitochondrial haplogroups across India, explaining how these can serve as potential predictors of disease susceptibility and evolutionary adaptation.

Another focal point of his lecture was mitochondrial replacement therapy and gene-editing technologies, including CRISPR, which hold potential in treating inherited mitochondrial disorders. He also stressed the significance of genomic databases and bioinformatics in identifying research problems, selecting patient cohorts, and fostering collaboration across disciplines.

Throughout the session, Dr. Thangaraj consistently highlighted the need for a multidisciplinary and ethically guided approach to scientific research, combining genetics, microbiology, and computational biology. He urged young scholars to pursue research that is both scientifically rigorous and socially responsible. The session inspired participants to view genetics not only as a molecular discipline but also as a framework for understanding human diversity, disease, and the ethical dimensions of modern biomedical research.

Session 2 – Dr. Ram Sagar Mishra, School of Life Sciences, Jawaharlal Nehru University (JNU), New Delhi

Photo 3: Presentation by Dr. Ram Sagar Mishra and felicitations

Dr. Ram Sagar Mishra delivered an extensive and highly practical lecture on Research Proposal Writing, Funding Mechanisms, and Research Planning in India, which provided invaluable insights for early-stage researchers. His talk was structured around the fundamental components of a successful research proposal, guiding participants through each essential section, from defining a compelling title to articulating the background, rationale, hypothesis, objectives, methodology, expected outcomes, and references.

He emphasized that every proposal should begin with a clear identification of the research gap, establishing the novelty and necessity of the study. The methodology, he stressed, must be

logically aligned with the objectives and feasible within the proposed timeline. According to Dr. Mishra, the key to a strong proposal lies in its clarity, originality, and societal relevance.

He discussed the major funding agencies in India, including DST, DBT, CSIR, ICMR, and SERB, explaining their distinct mandates and focus areas. By mapping real examples from his own grant experiences, he illustrated how proposals can be tailored to align with the strategic goals and review criteria of these organizations. Importantly, he cautioned young researchers against designing projects solely based on trending research topics and instead recommended focusing on core areas of expertise while building collaborations across complementary domains.

Dr. Mishra also elaborated on budget structuring, emphasizing realistic allocation and justifications that reflect both the scientific and logistical needs of the project. He encouraged scholars to invest adequate time in conceptualizing ideas before submission and to maintain coherence between the research problem, objectives, and methodology.

A notable part of his discussion addressed interdisciplinary and industry–academia collaborations, highlighting how such partnerships strengthen the translational potential of projects and enhance their relevance to real-world problems. He also shared advice on proposal writing style which included formatting, presentation clarity, and concise articulation of objectives in order to improve readability and reviewer engagement.

The session was deeply appreciated for its strategic and actionable guidance, leaving participants equipped to design proposals that are both scientifically robust and aligned with India's funding ecosystem.

Session 3 – Prof. Sairam Krishnamurthy, Department of Pharmaceutical Engineering and Technology, IIT (BHU), Varanasi

Photo 4: Presentation by Prof. Sairam Krishnamurthy and felicitations

Prof. Sairam Krishnamurthy's lecture on Pharmacological Design and New Drug Discovery Approaches provided participants with a nuanced understanding of the evolving paradigms in

pharmaceutical innovation. His session compared Target-Based Drug Discovery (TBDD) and Phenotypic Drug Discovery (PDD), two fundamental yet distinct strategies in drug development.

In TBDD, discovery begins with identifying a molecular target typically a receptor or enzyme and designing compounds to modulate its activity. While this approach is systematic and mechanistically driven, Prof. Krishnamurthy acknowledged that it often faces challenges such as high attrition rates and limited translation from laboratory to clinical success.

By contrast, PDD starts with observing measurable biological effects in cellular or organismal systems, without prior knowledge of the target. This approach, he noted, has historically yielded several successful drugs, including those whose mechanisms were elucidated only later as technology advanced. Prof. Krishnamurthy underscored that phenotypic approaches often yield higher success rates in discovering first-in-class drugs due to their emphasis on functional biological relevance.

He elaborated on the concept of "one disease, one gene, one target", demonstrating how pharmacophore modeling and the integration of both genotypic and phenotypic data can enhance precision medicine. Furthermore, he contextualized how major pharmaceutical companies like Novartis are now re-embracing PDD to improve productivity in early discovery phases.

His talk ultimately reinforced that innovation in pharmaceutical research emerges from flexibility, cross-disciplinary integration, and continuous validation of biological relevance, inspiring participants to think beyond conventional discovery boundaries.

Photo 5: Group photo for the Day 1 of the workshop

Session 4 – Dr. Prabhat Ranjan Mishra, Senior Principal Scientist, CSIR-Central Drug Research Institute (CDRI), Lucknow

Dr. Prabhat Ranjan Mishra's lecture was one of the most technically rich sessions of the workshop, focusing on Quality by Design (QbD) principles and their application in pharmaceutical formulation development. He characterized QbD as a systematic, knowledge-based, and risk-managed framework that ensures product consistency and regulatory compliance by embedding quality considerations right from the design phase.

He introduced the SMART framework: *Specific, Measurable, Achievable, Relevant, and Time-bound*, thus emphasizing its importance in defining research objectives and ensuring structured project execution. By applying these principles, he explained how researchers can ensure clarity in goals, feasibility in execution, and reproducibility in outcomes.

Dr. Mishra elaborated on his own translational research projects as practical demonstrations of QbD implementation. One example was a microneedle-based ribociclib (RB) delivery system designed for hormone receptor-positive, HER2-negative metastatic breast cancer. This HA–PVA–PVP microneedle array, integrated with ultradeformable transfersomes, provided controlled drug release, reduced systemic toxicity, and facilitated non-invasive administration.

Another exemplary case study discussed dacarbazine-loaded carbon quantum dots coated with breast cancer cell–derived exosomes, which improved targeted delivery through HSPG receptor-mediated uptake. These advanced nanocarrier systems enhanced drug half-life, minimized off-target toxicity, and improved therapeutic efficacy, representing major strides in nanomedicine.

He also discussed liposomal and polymeric nanoformulations for neurological and bone-related disorders, explaining how physicochemical characterization techniques like DLS, SEM, and TEM are vital in understanding particle size, morphology, and stability. Further, he highlighted in silico modeling and *Design of Experiments (DoE)* as powerful tools in formulation optimization.

Dr. Mishra's talk elegantly merged theoretical principles with experimental practicality, showing how QbD transforms research from trial-and-error to rational design. He concluded by urging scholars to adopt a systematic mindset that blends creativity with control, ensuring that scientific outcomes are both innovative and reproducible.

Photo 6: Students engaging with the speakers during interactive Q&A sessions

Session 5 – Dr. Tapas Kumar Kundu, Professor, Molecular Biology and Genetics Unit, JNCASR, Bengaluru

The concluding session, delivered by Dr. Tapas Kumar Kundu, offered an intellectually stimulating exploration of epigenetics, translational therapeutics, and diagnostic innovation. His talk bridged fundamental biology with clinical relevance, emphasizing how understanding the molecular mechanisms of gene regulation can yield transformative insights into disease treatment and prevention.

Dr. Kundu began by elucidating the concept of epigenetic regulation, encompassing mechanisms such as DNA methylation, histone modification, and non-coding RNA-mediated regulation, which serve as pivotal processes controlling gene expression without altering the underlying genetic code. He emphasized the significance of epigenetic regulators as promising therapeutic targets, highlighting Enhancer of Zeste Homolog 2 (EZH2) as a well-validated and clinically relevant target in oncology drug discovery. Drawing from his own research, Dr. Kundu illustrated the roles of α-ketoglutarate-dependent enzymes and histone acetyltransferases (CBP/p300) in chromatin remodeling, transcriptional activation, and the progression of various diseases. His discussion underscored how deciphering these molecular regulators not only enhances the understanding of gene expression control but also opens new avenues for the development of targeted epigenetic therapeutics.

He discussed his team's work on glucose-derived carbon nanosphere (CSP) conjugated TTK21, a molecular activator of CBP/p300, developed as a potential therapeutic agent for neurodegenerative diseases like Alzheimer's. He further highlighted novel therapeutic targets and diagnostic tools emerging from epigenetic research, particularly in cancer and tuberculosis.

A major theme of his session was the need for translational and patient-centric research. He emphasized that true innovation arises when scientists align their hypotheses with actual clinical needs, ensuring that laboratory discoveries have tangible health impacts. He urged researchers to engage actively with clinicians to refine experimental design, improve patient relevance, and accelerate the *bench-to-bedside* transition.

Dr. Kundu also encouraged exploring diagnostic innovations as equal priorities to therapeutics, citing examples where early detection dramatically improved outcomes, such as in pancreatic cancer. He broadened the discussion to include veterinary and environmental health research, arguing that a "One Health" approach strengthens societal well-being.

His session concluded with a motivational appeal for scientific empathy, multidisciplinary collaboration, and national relevance, inspiring scholars to approach research as both an intellectual and humanitarian pursuit.

Photo 7: Group photo for the Day 2 of the workshop

Conclusion

The *Two-Day Workshop on Project Design and Execution Planning* at DPSRU was a transformative academic event that successfully bridged theoretical foundations with practical execution strategies. Each session collectively contributed to a comprehensive understanding of how research should be conceptualized, designed, executed, and translated into societal benefit.

Participants gained a deep appreciation for the continuum of scientific inquiry from understanding human genetics and proposal development to advanced drug design, nanotechnology, and translational epigenetics. The workshop emphasized that impactful research requires not only technical expertise but also ethical awareness, multidisciplinary collaboration, and societal vision.

The collective insights of the eminent speakers left a profound impression on all attendees, motivating them to pursue research that is scientifically sound, ethically responsible, and directed toward addressing real-world health challenges for national and global advancement.