# Best Practice-1

**Stimulating Culture of Multidisciplinary Research**

**1. Objectives of the Practice**

- To inculcate culture of multidisciplinary research and innovation among UG/PG/Ph.D. students and Faculty
- To provide platform and opportunities for students and faculty from different discipline to collaborate and share research activities and ideas
- To establish Centre of Excellence in the multidisciplinary research areas by collaborating with advanced research institutes like IISc. /ISRO/NAL/CAIR/ etc.

**2. The Context**

In the Indian higher education system, different research/study disciplines are treated as opaque walls. This hinders quality research and innovation to be part of the higher education system. These walls need to be adequately porous so that any student pursuing in any discipline has to necessarily go beyond the frontiers of his/her own domain thus enabling them to pursue knowledge of yet another discipline. In such an environment, the horizon of research one pursues gets deeper andleadsto newer and innovative practices.

However, Multidisciplinary research requires adequate background of numerous specialized disciplines, which aim at achieving a common goal. It leads to improved opportunities and flexibility to the students to get better employment/research careers.

**3. The Practice**

Most of the current requirements need expertise of several disciplines. In this context, NMIT has encouraging the practice of Multidisciplinary Research. The faculty and students of different disciplines will come together to work towards a common goal.

**Practice:**

Established Multi-Disciplinary Research Centers,
- o Small Satellite Research in collaboration with ISRO
- o Robotics Research.
- o Nanomaterials and MEMS in collaboration with IISc
- o Design and Process Simulation in collaboration with Dassault Systems

- o Computational Fluid Dynamics in collaboration with NAL.
- o Aerospace and IoT in collaboration with Dassault System & PTC
- o Cyber Security & IoT in collaboration with Subex Company.
- Seed money for the Faculty to pursue multidisciplinary research.
- MoUs with R&D Organizations of India & Abroad.
- Monthly Faculty Colloquium.
- Reduction in workload for the faculty working in Research CoE.
- Financial assistance for research activities.

4. **Evidence of Success**

- UG/PG/PhD students are involved in multidisciplinary Research activities.
- Faculty members who are working in the research canters are able to get Funding from National funding agencies such as DST, DIT, AICTE, DSIR, VGST, VTU etc.
- Research articles are published in SCI/WOS/Scopus Journals & Conferences.
- Three Indian Patents have been granted & 34 Patents have been published.
- About Rs. 1 crore has been given as seed money to the faculty.
- MoU with North Dakota State University (NDSU), USA
- Robotics Engineering-Lego Mindstorms and TETRIX for 3rd and 4th semesters.
- Faculty and students are involved in Small Satellite Research Program.
  - o First time in India, under thisCenter, first Pico Satellite "STUDSAT-I" which was launched through ISRO''s PSLV-C15 vehicle, from Sriharikota.
  - o STUDSAT team has created a National Record entering into LIMCA BOOK of RECORDS.
- NMIT has setup an unique Ground Station to track the Satellites (NASTRAC) which has already obtained an Indian Patent.
- Students have developed Pick & Place Robot which has been kept as permanent exhibit at Birla Science Centre, Hyderabad
- Graduates who worked in these centres got
  1. Admitted at the premier Universities like Surrey/Texas/Oxford/Indiana/etc.
  2. Better placement offers with high CTC from Core Industries/ R&D Organizations.

5. **Problems Encountered and Resources Required**

Since UG students actively participating in R&D work leave the college after their graduation, continuing the projects undertaken requires financial support to retain them after their graduation. This requires some additional financial resources and availability of senior faculty.

Availability of time for UG students to work in these multidisciplinary Centres is less because of   tight academic schedule.

# Best Practice - 2

**Effective/Innovative Delivery Methods**

1. **Objectives**

   - To provide platform and opportunities for teachers to experiment and practice the most relevant innovative teaching methods - such as project-based learning, non-formal education, outdoors education, new technologies.
   - To explore trending innovative teaching methods and strategies as well as a cooperative, inspirational and stimulating space where to experiment and practice new tools, strategies and approaches.
   - To improve student engagement, motivation and attainment.

2. **The Context**

In the Indian higher education system, using **innovative methods of teaching** is a crucial skill for teachers and education staff. Scientific research has shown that innovative teaching methods and approaches can significantly enhance the student learning process. Experimenting new methods and strategies of teaching can **improve student engagement, motivation and attainment**.

3. **The Practice**

NMIT has adopted OBE, and Effective/Innovative Delivery Methods. In Effective/Innovative Delivery methods teachers deliver the course content with the help of following delivery methods.

1. **Case Study**

   A case study helps students to generate an in-depth, multi-faceted understanding of the concept under investigation. Faculty will assign a case study to every student which is accompanied by a list of questions that asks students to reflect on the information and formulate a response to it.

2. **Literature Reviewing/Presentation**

   Faculty encourage students to go through the relevant research papers based on the course contents. Literature review activity will enable students to understand the contribution of other researchers and get a deeper insight into the research problem being studied.

3. **Simulation**

   In simulation activities, concepts are demonstrated to students with the software tools and hardware devices. These tools and devices mimic real-life scenarios in a controlled environment. Simulation-based learning offers more realistic learning than reading a just plain textbook.

4. **Debate**

   In debate, students express their opinion and thoughts on the topic of consideration. Debate activities enable students to practice speaking and listening skills. It also motivates students, develops argumentation strategies, and encourages learner autonomy.

5. **Video-Based Learning**

   In video-based learning, faculty will demonstrate the course concepts with the help of videos. These videos are created by faculty, otherwise, faculty will seek the help of online resources.

6. **Project Based Learning**

   Students are asked to implement a real working model of the concepts discussed in the classroom. Students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex problem.

7. **Flipped Classroom**

   Students are assigned with some topics in prior, and when that concept would be discussed in the classroom, that student who is assigned with that topic, would talk about it and the teacher would give more insight on that and other students would give their viewpoint on that topic.

8. **Role Play**

   Students were shown some animated videos related to the corporate office, they had to pick one character from that video and do the role-play of that character, by doing this, they would understand how other people are likely to respond to different approaches.

9. **Business Charades**

   In This approach, 2 teams were made, and topics were given from the course, one student from a team would come, and that student would enact and show, other team members had to guess the right term/sentence.

10. **Hands-on Training**

    Through the hands-on sessions, students will gain a better understanding of the theoretical concepts taught in the classroom environment by practicing them practically.

11. **Demonstration Based Learning**

    Faculty demonstrate the course concepts through experiments/simulation - using software or hardware tools/devices. Course contents with the aid of demonstration will give the increased understanding to students.

### 12. MOOC based learning

NMIT students are encouraged to learn from the Massive Open Online Courses (MOOCs) offered by well-known platforms such as NPTEL, Coursera, Udemy, etc. This will enable students to browse the topic of interest on their own and start learning on their own. This will promote lifelong learning capabilities to students.

### 13. GATE oriented aptitude test

GATE-oriented aptitude test is used to promote the importance of engineering-based aptitude knowledge. NMIT uses GATE standard questions for conducting this activity. Through this student will be able to partially prepare for GATE, and understand the quality/standard of questions that will appear in such examinations.

### 14. Programming Assignment

Faculty will assign a problem/ concept to students to implement and demonstrate using the programming language of their choice or the pre-specified programming language. Through this students will gain the skills required for scenario based coding. The evaluation of the programming assignment is done with the help of a pre-defined rubric

### 15. Tutorial

Faculty conduct the interactive sessions with students, and teach by example and supply the information to complete a certain task. This enables students to gain much deeper knowledge on the course contents.

## 4. Evidence of Success

- Increasing number of students are participating in national and international level events like Hackathon, Ideation, Coding competition. Students have won the awards of national (Smart India Hackathon) and international (MIT bitcoin expo, UC Berkely) repute.
- Students are pursuing higher studies (M. E/ M.Tech./ Ph.D.) at national and international premier universities.
- Students were able to get placed in reputed core companies with handsome pay compensation.

## 5. Problems Encountered and Resources Required

- Pandemic situation posed a great challenge for teachers as well as students for un interrupted knowledge transfer, training and guidance.
- Hands-on and experiment oriented teaching got interrupted in a great extent in online teaching learning environment.
- Students were not able to connect online classes due to their location and network problems.

## 6. Notes (Optional)