



Shilpangana

AN ASME BITS PILANI CHAPTER INITIATIVE FOR DAG '14

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PROJECT DETAILS

- ✚ ASME DAG Funding: 1000\$
- ✚ Total Project Budget:1160\$
- ✚ Partnering Organizations: Nirmaan Organization,RC club BITS Pilani,Robocon BITS Pilani
- ✚ Attendance: Total -250 ,Women- 250 Minorities-NA
- ✚ ASME Section/Region Reps : Subrahmanyam Pulipaka –Zonal Representative
- ✚ ProjectTitle: Shilpangana

PROJECT DESCRIPTION

Engineering, one of the largest growing sectors in the world. But due to some misconceptions and myths there are many girls, who are not opting for engineering as career, specifically mechanical engineering. In order to drive away their misconceptions as well as make them aware about the true facts project Shilpangana is started. The Project is named as Shilpangana, where Shilpa in Sanskrit is Mechanical (**Engineering**) and Angana is a girl. As the name suggests the project aims at promoting engineering especially mechanical engineering among the girls of class 11 and 12. The basic problem which we found was that lack of awareness and some ruthless misconceptions were the main factors preventing girls from choosing engineering as their career.

PROJECT GOAL/OBJECTIVE AND HOW ACHIEVED

Project Shilpangana`s objectives also include,

- Building interest and excitement through standards-based presentations at schools.
- Providing opportunities for hands-on experiences with STEM (Science Technology Engineering & Mathematics) subjects by conducting extra-curricular activities including clubs, competitions, and trips to museums.
- Raising educational aspirations, knowledge of STEM, and interest in attending BITS Pilani by coordinating activities such as structured campus visits, special events etc.
- Improving teaching of STEM subjects by collaborating with teacher preparation and professional development activities in 7 nearby schools.

The objectives of the project were achieved by organizing the following activities with respect to the specified time line.

PHASE 1: QUESTIONNAIRE

In this phase the students were given a questionnaire which consisted of questions that help the team in assessing the misconceptions or awareness of students regarding engineering/mechanical engineering. This Questionnaire was developed with the help of Nirmaan Organization an NGO which conducts career counselling workshops in and around Pilani

The following are the questions in the questionnaire given to the students

1. Name:
2. Class:
3. Stream:
4. What is the career option you want to choose after your class 12?
 - ⚡Engineering(B.E/B.Tech)
 - ⚡General Degree(B.Sc)
 - ⚡Architecture
 - ⚡Pilot

- ⤴ Fashion technology

Other _____

5. What engineering careers do you know?

- Chemical Engineering
- Civil engineering
- Electrical engineering
- Mechanical Engineering
- Computer Science Engineering

6. The Engineering stream you like the most is

- Chemical Engineering
- Civil Engineering,
- Electrical Engineering
- Mechanical Engineering
- Computer Science Engineering

Because _____

7. According to you which of the following are the true facts about mechanical engineering

- Mechanical engineering is an evergreen branch.
- You will be designing cars in your four years of study.
- Companies like BMW and Ferrari would be lined up for you.
- Mechanical engineers are most preferred for MBA.
- Mechanical Engineers are **MECHANICS**.
- Mechanical engineering involves physical and hard work which can only be done by men.
- Mechanical engineering is mostly learning and applying theoretical concepts, and there is little physical work involved that can be managed by a girl.

8. Rate future scope (jobs, lifestyle, working environment, stature in society) of a mechanical engineer on a 10 point basis. (1 being worst and 10 being best)

9. Do you know any mechanical engineer personally? If yes how do you rate their lifestyle on a scale of 10?

10. Do you have any negative opinions about mechanical engineering? If yes, what?

11. What future perspectives of mechanical engineering do you know of?

Some analysis of this questionnaire is given below

RESULTS

Number of people	Branch they like(A1=Chemical ,A2=civil ,A3=Electrical ,A4=Mechanical ,A7=computer science)	Rating they gave for mechanical engineering(average)
98	A7	6.32
63	A3	7.57
43	A4	8.33
25	A2	6.96
21	A1	7.38

Observations and Conclusions

Many of the girls felt that mechanical engineering is tiresome and hectic physical work involving area while some of them thought it's not for the girls to be mechanical engineers. They also had misconceptions like companies prefer boys to girls, peer group pressure etc. Based on these observations the team decided to go forward with phase-2 which is orientation.

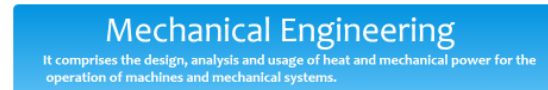
PHASE 2-ORIENTATION

After the analysis of the questionnaire this phase had an orientation session with all the students where they are exposed to various fields in engineering, scope, job prospectus etc. and all the misconceptions which they had were addressed in this session.

Some of the slides of the ppt used in orientation are below



- * [Engineers have diverse careers](#)
- * [Engineers are in Demand.](#)
- * [Engineers get to do cool stuff.](#)
- * [Engineers work everywhere.](#)
- * [Engineers get to travel.](#)
- * [Engineers work on interesting projects.](#)
- * [Engineers have good work and life balance](#)
- * [Engineers can earn good money.](#)
- * [Engineers have a great lifestyle.](#)



Mechanical Engineering	
It comprises the design, analysis and usage of heat and mechanical power for the operation of machines and mechanical systems.	
Aerospace Engineering	Also known as Aeronautical engineering, concerns the design, construction, and science of both air and space vehicles, primarily on the systems level.
Acoustical engineering	Concerns the manipulation and control of vibration, especially vibration isolation and the reduction of unwanted sounds
Manufacturing engineering	Concerns dealing with different manufacturing practices and the research and development of systems, processes, machines, tools and equipment.
Thermal engineering	Concerns heating or cooling of processes, equipment, or enclosed environments
Vehicle engineering	The design, manufacture and operation of the systems and equipment that propel and control vehicles



- * Companies prefer boys
- * Hard Work
- * Physical labor, training
- * Hectic work
- * Not for girls etc. etc. etc.



- * Women engineers are professionally respected, valued, and well-rewarded. Most employers accommodate the needs and schedules of their engineers with family.
- * women typically earn **better grades** than men in engineering courses and frequently find themselves in **leadership positions** in groups and student societies. Women have **bright futures** in Mechanical Engineering. They are actively recruited for the diverse perspectives that they can bring to innovation and public service. As the engineering profession becomes increasingly team oriented, interdisciplinary, and communicative, women are excelling.

Here are some of the glimpses of orientation



PHASE 3: ACTIVITIES AND HANDS ON SESSIONS-

A series of activities and hands on sessions were conducted in 3 different schools with more than 200 active participation and all of them being girls. The activities that have been conducted are conducted based on the **B T E R** principle i.e **Build, Test, Evaluate, Redesign.** Also these activities are designed in such a way that by taking part in them, students can get practical exposure to the subject that increases their interest in STEM subjects.

Activity 1:

Objective: To build a device that lets you grab different objects and drop them into a container that's at least two feet away.

In this challenge, they were demonstrated and given the design process to build a grabber that can reach at least two feet where they developed a way to open and close the grabber's jaw and figure out how to connect the "jaw" to a stick.

Key words: levers, mechanical arm

BTER Principle/Principles satisfied: B, T

Material used

- 4 brass fasteners
- corrugated cardboard
- hole punch
- objects to pick up (e.g., tennis balls, cotton balls, plastic soda bottles, and paper cups)
- 2 rubber bands
- sandpaper
- scissors
- string
- tape (duct or masking)
- 4 toothpicks
- 4 wooden skewers
- yardstick (or long paint stirrers for 5-gallon buckets, a thin wooden slat, or lath 2–3 feet long)

Number of attendees-235

Venue-Birla Balika Vidyapeeth, Pilani

Date-16th January

Activity 2

Water Rocketry

A small introductory session on how to prepare a water rocket was conducted followed by which the students were provided required materials like bottles, knife etc. were given.

After 1 hour a competition was held for the water rockets prepared. This competition consisted of 2 rounds.

Round 1 where the distance covered by the rocket was measured.

Round 2 –A target was given and the nearness of launched rocket to the target was measured.

Total Attendance-170 Girls

Date-16th March, 2014

Venue-Padia Public School, Pilani

Activity 3

As a part of activity 3, a remote controlled boat making workshop was conducted in collaboration with the Remote Control Club, BITS Pilani.

This workshop consisted of 2 phases.

The crowd present was divided into teams of 5 and in the first phase they were demonstrated on how to make a boat structure using wood.

In the next phase interfacing electronic circuitry to the boat for its remote control was taught and all the groups had interfaced the circuitry.

After this phase a fun involved competition was conducted among the boats built in the nearby swimming pool and prizes were given away to the winners.

Total Attendance-215

Date-28th April, 2014

Venue-BIRLA SHISHU VIHAR, PILANI

EVALUATION OF PROGRAM'S SUCCESS

For the evaluation of the effectiveness of program two types of parameters have been used.

- Short term Parameters
- Long term Parameters

Short term parameters- After every phase or activity an instantaneous feedback has been taken from the students present. This feedback included points like

- ✚ how useful the session was
- ✚ Was there a change in their views on specific issues after the sessions etc?

Instead of the conventional way of taking feedback through questionnaires this feedback was taken verbally during one on one interaction. This type of interaction helped the students to express their fears, views and ideas freely with which the efficiency and effectiveness of the workshops or sessions has been measured.

Long term parameters – Since the workshops and session were mainly carried out for 10, 11 and 12th class students, tracking down the career options they choose will help us in evaluating the project.

For example if a 10th class girl chooses science stream instead of arts, or a 12th class girl her choosing engineering career can depict the usefulness of work shop.

A data base has been collected of all the attendees of the workshops and their future options are being tracked down with the help of the respective heads of the schools.

Regarding the class 10th girls who have already finished giving their Final examinations and chose a stream for higher studies by the time of making this report, the statistics are shown below.

No of class 10 girls who were concentrated as a part of the project: 105

<i>No of girl students</i>	Stream choosen in class 11 th for the academic year `14-16	Careers they can opt
65	Science(Physics,Chemistry,Maths,Computers)	Engineering
28	Science(Physics,Chemistry,Biology,Computers)	Doctor,Nur sing
12	Arts(Physics,Chemistry,Maths,Economics)	Engineering /Chartered Accountant

INTRODUCE A GIRL TO ENGINEERING DAY

Feb 21 is celebrated as International Introduce a girl to Engineering Day(IGTE day).As a part of the Shilpangana on this day girls from different school in Pilani have been scheduled a visit to the BITS Pilani ,Pilani campus and the following is the time line and activities held during that day.

1 pm: 100 students from 3 different schools in Pilani have arrived to campus.

1:15pm: Lab visits

The students were divided into 4 groups of 25 each and each group has been taken to one lab at a time in iterations and all of them were showed all the three labs. In every lab a group spent at least 15 minutes where all the machines and their working in a lab were explained to them by faculty and teaching assistants in the labs.

The labs that have been visited are

Thermal Science Lab (TSL)

Measurement Techniques Lab

Electrical Machines Lab

2:15- Refreshments

Refreshments were already arranged in the institute's canteen for all the attendees. All the students assembled there and while having snacks some of them have even shared their feelings and learnings after visiting the labs

2:45- Work Shop

The workshop of BITS Pilani is one of the largest and oldest of its kind. In this workshop all manufacturing techniques starting from Carpentry, Lathe, milling, Filing, grinding, Welding, Using CNC machine etc are taught. The attendees were again divided into groups and were allowed to visit all shops in workshop. It took almost an hour and a half for them to completely visit the different machines and understand the techniques in the workshop.

3:30- Live Demonstrations

There were some live demonstrations from different technical societies of BITS Pilani

Robocon- Robocon, the robotics club of BITS Pilani demonstrated their bot which they have prepared for ROBOCON`14. They have explained them the principles behind construction and their working

RC Club- The remote control club of BITS Pilani have educated the crowd about Quad copters and have shown them a self-made quad copter. They have explained them the basic construction and working of the Quad Copter.

4:30- Lecture on Importance of Girls in Engineering

Speaker –Dr.Sangeeta Sharma, Associate Professor, Department of humanities, BITS Pilani , Coordinator, UGC Centre for Women Studies, AIJM Outstanding Editor 2011 Awardee, licensed trainer, **Springboard Development Program (U.K.)**, an internationally recognized women's development program.

An inspiring lecture was given by Dr. Sangeeta Sharma on the importance of women to pursue career in engineering. She emphasized on the issue of growing competence in the current world and the innate ability of women in fighting away stress and establishing themselves as successful. She also cited many examples where bolder decisions based on interests resulted in great success of women in many fields. Needless to say all the attendees were spell bound with her lecture. After the lecture a small interactive session was organized where the attendees interacted with the speaker.

5:30 –Conclusion

The attendees were asked to share their experience regarding this visit and how did it effect their views towards engineering or mechanical engineering. Many of them were really happy and satisfied about the visit. They expressed that the visit has completely changed their views about engineering which they never thought to be interesting, fun involving and less hectic and mere physical work involved.

Some of them have thanked the Shilpangana team for having organized such visits and also requested us to conduct such visits more often. The team was elated seeing attendees leave with happy and satisfied faces.

OTHER COMMENTS

On a whole Project Shilpangana can be called a successful one. The six months span of the project were eventful and the team feels that there has been an impact that's created. The whole team is looking forward to carry on the project furthermore. Additionally efforts are also being made to launch some program of same kind in fellow ASME chapters.

However there have been many issues that were faced in the course of execution of the project.

Lack of adequate funds- There were not enough funds because of which many planned activities were called off.

Delay in receiving the granted amount-The amount granted was not received almost till the end of the project. This has caused periodic delays in the phases as well as re scheduling some activities which were unexpected.

Irrespective of all the issues faced the team effort and co-ordination were the aspects which always ensured smooth running and on time completion of the project.

EXPENDITURE

Phase 1:

No of questionnaires given: 350

Cost of a questionnaire:4 INR

Total cost : Rs 1400/- (INR)

Phase 3

Activity 1

Cost per one set in the activity: 165/-

Number of sets issued during the activity: 100

Total cost : 16500/-

Activity 2

Cost per one set- 15

NO of sets issued-70

Total cost-1050/-

Activity 3

Cost per one set – 1000

No of sets issued-43

Total cost-43,000/-

Prizes for activity 2 and 3-1500

Introduce a girl to engineering day

Refreshments for the girls who visited the campus – 5000/-

The total Expenditure for the project: 68,450/- INR (1160\$)

TEAM

- + Ankit Bansal
- + Devesh Gupta
- + Jay Saxena
- + Subrahmanyam Pulipaka
- + Shuchita Banthia
- + Aditi Rastogi
- + Rishika Behera
- + Saumya Upadhyay