

A case study: Journey of Student skill development Center (SSDC) an interdisciplinary platform to actively engage millennial at HITAM

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Abstract: Research says that the retention span of millennials in class is about 10-15 min [1]. In this paper, the author shares his experience in engaging millennials actively. At HITAM, we introduced the Student Skill Development Centre (SSDC), which is a student-centered approach, combining two different learning methods: Problem-based Learning (PBL) and Interdisciplinary Learning. In SSDC, students work in groups and build open-ended projects. Project Based Learning in SSDC provides students an industrial experience, which makes them comfortable in understanding the real-time problems faced by the industry and helps them to gain experience in solving the issues [4]. So, designing a project becomes easy for the group because the group consists of students from different disciplines.

Keywords: Interdisciplinary Learning, Project Based learning, Student Skill Development Centre.

I. INTRODUCTION:

Interdisciplinary learning at SSDC involves students from different streams working together to design a project. Project-Based Learning (PBL) is easy with an interdisciplinary approach because it includes different streams of students who have prior knowledge in their respective streams[2]. In this approach, every student in the group will apply their core knowledge of their discipline to bring out the outcome of the project, which will help them to complete the project efficiently. So, we can say that PBL at SSDC is a form of integrating technology into projects in a meaningful way [3]. Since we are an affiliated college, we introduced SSDC to only selected students initially as an audit course.

II. SSDC PROCESS TIMELINE:

There are six steps in SSDC for the selection of the student.

Step 1: CREATING AWARENESS: As a part of creating awareness, the mentor conducts an introduction session and explains to students in detail the technologies and modules

on which students will get trained, such as sensors, actuators, processing devices like Arduino, Raspberry Pi, 8051 controllers, Node MCU, etc. Mentor also discusses the benefits of SSDC training like paper publication by students, participating in design competitions conducted by other institutions, employment opportunities, teamwork, etc.

Step 2: REGISTRATION AND SELECTION PROCESS: In this step, the entire process of short listing the student for SSDC is bifurcated into four main sections. They are online registration, online examination, interview, and results.



Fig.1 Interview and Online Examination

Step 3: LAB SESSIONS: After the selection process is completed, the lab session starts where the selected students will be divided into interdisciplinary groups. Each group comprises of students from ECE, CSE, EEE with girls and boys combination. The size of each group is four members, which comprise of academically strong, average, and weak

students so that all students adequately engaged. After the grouping of the students, the mentor trains the students weekly twice, each session of 2 hours. Complete six months schedule shared with students before the commencement of training. In each session, the mentor explains on which modules students are going to work and teach the necessary code for 10 to 15 minutes, and remaining time students work on an assigned task. For example, if a mentor explains how the IR sensor works, then the task is assigned to students to design visitor counting using an IR sensor. By the end of each session, the interdisciplinary group is expected to complete the assigned task. So, this is the everyday routine at SSDC.



Fig. 2 Lab Sessions

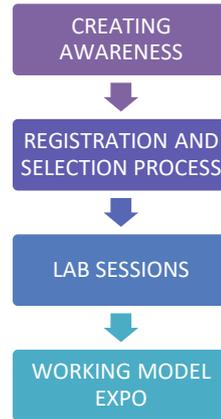
STEP 4: WORKING DESIGN EXPO:

Once a semester, the mentor organizes a working model expo in the college. All SSDC students showcase their projects, and this gives them a more significant opportunity to demonstrate their project in front of students and staff.



Fig . 3 Design competition at HITAM

FLOW CHART:



III. INTERDISCIPLINARY LEARNING AT SSDC

Contextual analysis has been attempted at SSDC to observe and assess the results of PBL through interdisciplinary learning. It was chosen to incorporate students from various streams in every group, and the mentor assigns the task. In this approach, every student in the group will apply their core knowledge of their discipline to complete the project efficiently. For example, CSE students contributed to coding, EEE students participated in electrical connections, and the ECE student contributed to integrate hardware and software.



Fig.4 Introducing hardware to the students by the mentor.



Fig.5 Different streams students working together in one group.

IV. ROLE OF THE MENTOR: In SSDC, we have three trained mentors from different streams. All of them know all the three streams that are electronics, electrical, and computer science. Mentors design the task and assign it to the students. After the job is assigned, they will monitor the

students whether they are going in the right way or not. Mentors are trained and experienced, and they are capable of helping the students to complete the task. Once in 6 months, the mentors conduct the design competition. One common project is assigned to the interdisciplinary group, and in three hours group should complete design, testing, and demonstrate a working model. Mentors follow rubrics, which is mentioned in the table below, to declare the winners.



Fig.6 Mentor clarifying the doubts of the student personally

V. RUBRICS FOLLOWED AT SSDC: Rubric followed in SSDC is mention below in table 1 [7].

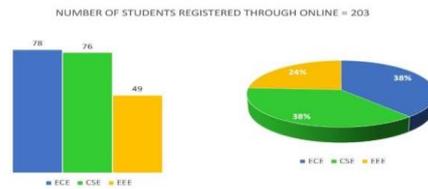
Table 1

Criteria	Exceed Expectations (8-10)	Meets Expectations (4-7)	Couldn't meet the expectations. (1-3)	Score
TECHNICAL SKILLS (Hardware & Software)	Design and development of the project along with appropriate use of hardware and software.	Partially designed and development of the project along with appropriate use of hardware and software.	No design and development of the project and inappropriate use of hardware and software	
Establish A PLAN TO SOLVE THE PROBLEM	The student was able to devise and execute a concise plan completely in a very short span.	The student was able to devise a mediocre plan and accomplish it.	Students wasn't able to reach conclusions or devise any plan even after utilizing to the fullest.	
TEAMWORK	Always listens to shares with, and supports the endeavours of others. Attempts to keep individuals functioning admirably together.	The student tried to impose their opinions upon others without considering their perspective.	The student reluctantly agreed to be a passive member of the group.	
CREATIVE & INNOVATION	The student was able to propose unorthodox ideas with substantial evidences for the given problem statements.	The student was able to make some considerable changes in the pre-existing solutions of the given problem statement.	The student was not able to come up with any ideas even after thorough brain storming.	
SELF LEARNING	Applies strategies independently for self-learning, solving problems and looking for proper assistance if necessary.	Applies methodologies and understands the problem with periodic instructor/proper assistance.	Needs procedures to adapt, once in a while takes part in critical thinking or looking for assistance.	
PRESENTATION SKILLS	Present data, discoveries, contentions, and supporting proof briefly, and coherently; the audience can easily follow the line of thinking. Clearly and totally addresses elective or contradicting viewpoints.	Present data, discoveries, contentions, and supporting proof in a way that isn't in every case clear, succinct, and coherent; the line of thinking is now and then difficult to follow. Endeavours to address elective or contradicting points of view, but not clearly or totally.	Doesn't present data, contentions, thoughts, or discoveries, briefly and logically; contention need supporting proof; the audience cannot follow the lines of thinking. Couldn't be able to address alternative or opposing perspective.	

VI. DATA:

The data given below is the total number of students from different streams registered online.

The data furnished above shows that total 203 students has registered from different streams.78 students from ECE,76 students from CSE,49 students from EEE.



.Fig.7.Number of students registered online

Number of students showed up for online examination are 152

The data furnished above shows that 68 students from ECE, 58 students from CSE, 26 students from EEE wrote the online examination. From the above, we can see 51 students did not appear for the online exam. College authority decided to conduct classes from 4:00 PM to 6:00 PM that is after college working hours, and the transported facility was provided for limited areas due to which a few students who travel from a far distance didn't want to join the training. Online exam conducted those who are willing to stay on campus up to 6:00 PM. The online exam question paper consists of 20 basic c and electronics questions for 20 min. The students who secured above ten marks were eligible for the interview. Out of 152 students, 113 students secured above ten marks.

NUMBER OF STUDENTS WHO APPEARED FOR INTERVIEW = 113

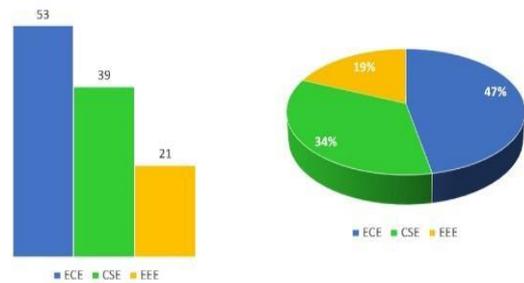


Fig.9.Number of students appeared for interview

The above-furnished data shows that 53 students from ECE,39 students from CSE, 21 students from EEE has appeared for the interview. The questions that were asked in the interview mainly focused on the interest and the commitment of the student. After the completion of the interview. A message was sent to the shortlisted students.

The number of students who were shortlisted for the training were 96.

NUMBER OF STUDENTS WHO APPEARED FOR ONLINE EXAMINATION = 152

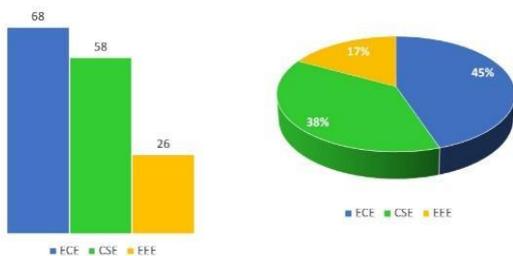


Fig.8.Number of Students showed up for online examination.

Number of students qualified exam and attended for interview are 113

NUMBER OF STUDENTS SHORTLISTED FOR THE TRAINING = 96

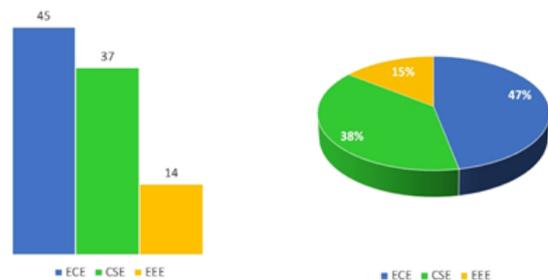


Fig.10 Number of students shortlisted for training.

The overall data of online registration, online examination, interview and the result are shown below in the form bar chart.

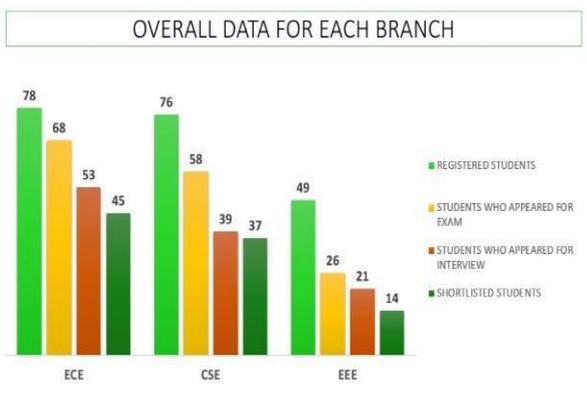


Fig.11 Overall data of each branch.

The above furnished data shows the whole procedure and how interdisciplinary learning is encouraged in SSDC.

II. SUCCESS STORIES OF SSDC STUDENTS:

1) Eighty seven students out of 96 were certified in the design competition held by Elegant Embedded Solutions (EES) Pvt Ltd.



Fig.12. Winners group of the design competition

2) SSDC students presented 7 research papers in national conference on recent challenges in engineering, science and technology (NCRCEST)2019 and successfully all the 7 papers were published in international journal of research in advent technology (IJRAT).

3) Students designed several interdisciplinary projects and bagged awards in design competition held at national level.



Fig.13. Projects designed by interdisciplinary group students.

4) SSDC students participated in innovation challenge and 3 ideas got accepted a national level.

5) Totally 25 students got internship opportunity in Elegant Embedded Pvt Ltd.

6) Successfully conducted several workshops on latest technologies like IOT, Raspberry Pi, Arduino, various sensors and actuators.

7) One of the interdisciplinary groups secured 3rd place Out of 603 students participated in design competition held in Pondicherry and received Rs 5,000 cash award.



Fig.14 Winners of design competition.

VIII SSDC VS NON-SSDC OBSERVATIONS:

A survey conducted on 60 students which comprises of SSDC and non SSDC students and observation of survey is showed below.

- SSDC students participated in workshops, and paper presentations, their skills like interpretation, project knowledge, stage fear, and presentation skills were better when compared to the students who did not opt for the training.
- The quality of the projects of SSDC students was excellent and completed the project on time compare to non-SSDC students.
- SSDC students work in teams; they have excellent team workability.
- The ability to adapt new technologies is more in SSDC students because they have experience of working on cutting edge technologies as part of the training.

IX EQUIPMENT AND MODULES USED AT SSDC

SSDC equipped with twenty-two sensors, seven actuators, four processing devices like Arduino, Raspberry Pi, 8051 controllers, Node MCU.

X RESULTS AND OBSERVATIONS:

Interdisciplinary learning at SSDC helped the students in gaining information about the interdisciplinary subjects. Students' coding skills, critical thinking, project design, teamwork, presentation skills are improved. Mentor and students' professional relationships developed.

XI CONCLUSIONS:

The author would like to conclude to engage millennial at authors institute they introduced an innovative centre called SSDC. This centre opts PBL and interdisciplinary approach to engage students actively. In this paper, we have also discussed student's selection procedures and student's success stories.

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