

Practices of Teaching & Learning in ABESIT: A Case Presentation of Even Semester 2015-16 & Odd Semester 2016-17

Pawan Singh Mehra¹, Gaurav Agarwal²

^{1,2}Department of Computer Science & Engineering,
ABES Institute of Technology, Campus 2, 19th KM Stone, NH-24
Vijay Nagar, Ghaziabad, Uttar Pradesh, India

¹pawan.mehra@abesit.in

²gaurav.agarwal@abesit.in

Abstract: The educational governing bodies such as UGC, AICTE which are responsible for the quality of Higher Education in India emphasize on adopting the best practices in Teaching-Learning to yield superior results. In past few decades, several Engineering Colleges and Universities have been established, especially after the establishment of All India Council for Technical Education (AICTE). The conventional curriculum and traditional teaching-learning in academics have proved to be less effective in terms of design and delivery of pedagogy, which needs regular revision to ensure quality education in India. In this paper, qualitative and quantitative analysis of Teaching-Learning practices in ABES Institute of Technology (ABESIT) has been carried out.

Keywords: Technical Education, Best Practices, MOODLE, Teaching and Learning, Outcome based Education, ABESIT.

1. Introduction

ABES Institute of Technology, affiliated to Dr. A.P.J. Abdul Kalam University, Lucknow, started in 2007 with a mission to prepare outstanding Technocrats, scholars and researchers who can make effective use of Technology for the cause of society [1, 2]. ABESIT is committed to create an ambience for effective Teaching-Learning process; to nurture students by providing them the opportunities to develop/enhance their skills through Institute- Industry Interaction (III) and infuse in them a passion to excel professionally.

A case study can be described as an in-depth study or examination of a distinct, single instance of a class of phenomena such as an event, an individual, a group, an activity, or a community [3][4]. Case Study can therefore be

Corresponding Author

Pawan Singh Mehra, Department of Computer Science & Engineering, ABES Institute of Technology, Campus 2, 19th Km Stone, NH-24, Vijay Nagar, Ghaziabad- 201009 (U.P)
pawan.mehra@abesit.in

particularly appropriate to address research questions concerned with the specific application of initiatives or innovations to improve or enhance learning and teaching. In United States of America, the main focus of engineering education is the class room based studies of student learning [5]. Changing assessment practice does not merely involve the adoption of a set of new techniques leaving all other matters of pedagogy unaffected [6]. Any significant change in assessment practice requires “Seeing things differently” alongside “Doing things differently”[7].

2. Admissions

Students take admission through counselling of Uttar Pradesh State Engineering Examination (UPSEE). Admission against vacant seats and Management quota is done with one to one interaction with students and their parents. There is No Donation, No Capitation, No Consultant and No Mediator. For motivating & appreciating the diligence of students from inception to completion of graduation, we have two scheme of grants as shown in Fig. 1-2. The objective of scheme of grants is to attract the meritorious students at intermediate level. As per the “inverse relationship of economics”, meritorious students will be allured to the institute by paying economical fees for the same education and modern facilities as compared to other institutes.

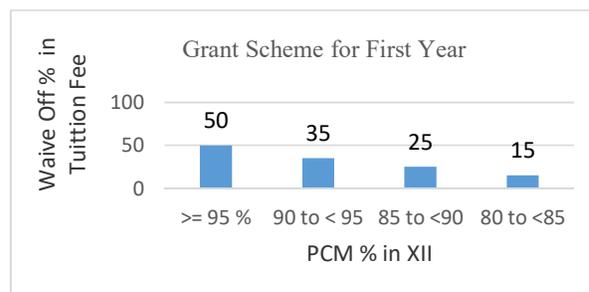


Fig. 1 Grant Scheme for First Year

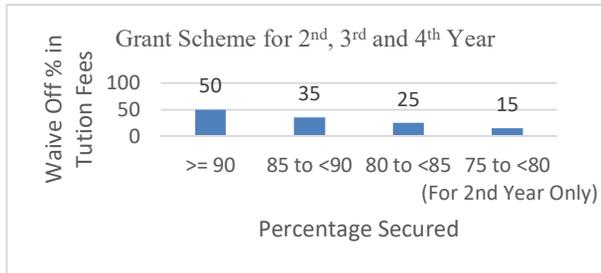


Fig. 2 Grant Scheme for 2nd, 3rd and 4th Year

At the time of admission, parents and students often ask about the placement issues and want to have an assurance for placement. In this regard, we don't give any assurance for placement, however we definitely assure them that in our college effective teaching is imparted by qualified teachers and continuous mentoring and monitoring is also done wherever there is a need. We assure them that during the course of study, we work on improving the capabilities and competency of students through various training programs, participation in centers of excellence, field trips, workshops and expert guidance from Industry so that they can perform better and become employable.

3. First Year Teaching Model

Orientation of first year students and their parents takes place on the very first day to make them familiar with ABESIT policies, activities and teaching model. Out of the available faculty in the institute, faculty for the first year is identified and groomed to teach first year subjects. A workshop is conducted to prepare handwritten notes for all lectures of the semester prior going for the first lecture of the first semester. These notes are provided to the students as per the requirements so that if the student is absent from class due to unavoidable circumstance, he can cover up with these notes. To consolidate student's confidence, we have a practice of conducting four (4) Class Tests and two (2) sessional exams prior to End Semester Examination to analyse the learning of the students and appropriate measures are taken subsequently. After the first sessional, viewing the students' performance and realising the area to be addressed, each student is individually taken care of in the form of "special classes" on working Saturdays. Mentoring /Remedial Classes/Counselling are conducted for the students through their teachers to monitor the academic and non-academic issues of the student.

These issues are resolved by discussion with parents/guardian on regular basis. While taking the attendance, faculty mark the absentee as the attendance is invariably more than 98%. For the total understanding of the student, we keep the complete data about the student as shown in fig.3. We provide a platform to the students of first year to showcase their talent in the form of Freshers/Annual Fest/Sports Fest. Following the best practices available suiting our objective, we are improving the overall pass percentage semester by semester from ODD 2014-15 to Even 2015-16 as have set a target to achieve the same upto 80% this year as shown in Fig. 4.

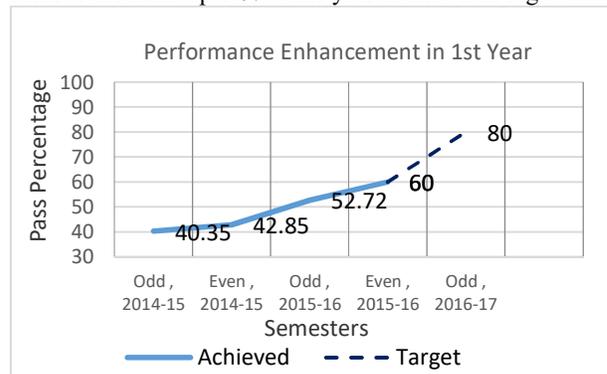


Fig. 4 Performance enhancement in first year

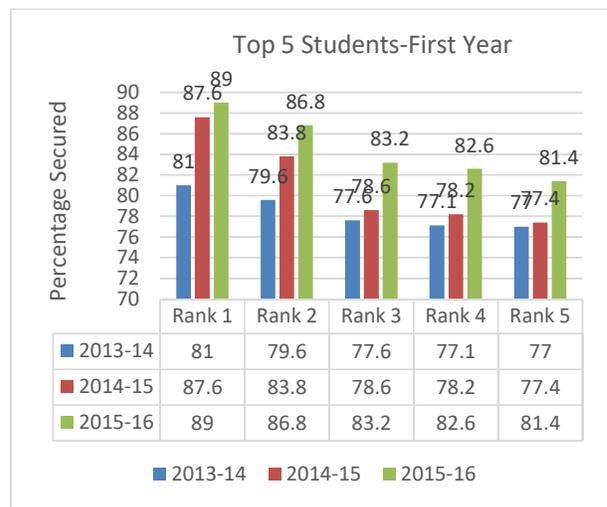


Fig. 5 Top 5 students of first year

ABES INSTITUTE OF TECHNOLOGY										PHY					MATHS					BEC					BEE					PC				
SESSION 2016-17										RAS 101					RAS 103					REC 101					REE 101					RAS 104				
SECTION - 2										Marks										Attendance(%)														
S.No	Admission No	Student Name	M/C	D/H	10 Agg.%	12 Agg.%	12 PCM %	TEST	RAS 101	RAS 103	REC 101	REE 101	RAS 104	TOTAL	RAS 101	RAS 103	REC 101	REE 101	RAS 104															
1	2016CS172	ANKIT SINGH	C	H	83.60	87.20	88.86	T1	9	10	9	4	7.5	39.5	100	100	100	95	100															
2	2016IT003	ANKIT KUMAR ATRAS			79.80	66.20	52.66	T1	7	6	9	1	6	29.3	100	89	86	90	100															
3	2016IT005	ANKIT KUMAR ROY		H	79.40	67.40	57.33	T1	9.5	8	8	9	9	43.8	100	100	100	100	100															
4	2016IT041	ANKITA SAXENA		H	91.20	63.00	52.60	T1	9	A	6	1	9	25.3	81	83	86	90	90															
5	2016CS069	ANKUR PANDEY		H	53.33	81.80	83.00	T1	4	3	4	1	6.5	18.8	100	100	100	100	100															
6	2016CS027	ANMOL GARG		H	79.80	74.40	67.66	T1	9.5	6	7	5	7.5	35.3	100	100	100	100	100															
7	2016CS013	ANUSHREE AGARWAL			87.40	68.20	56.66	T1	9.5	10	7	2	8.5	37.0	100	100	100	100	100															
8	2016CS012	ANUSHRUTI GUPTA			83.60	68.40	55.00	T1	9.5	4	7	7	8	35.2	100	100	100	100	100															
9	2016IT053	APOORVA SINGH	C	H	90.67	77.20	66.66	T1	A	A	A	A	9	9.0	63	72	71	65	80															
10	2016EC004	APURV SRIVASTAVA			81.70	56.40	58.66	T1	9.5	6	7	6	8.5	37.0	100	100	100	100	100															

Fig. 3 Student monitoring table

4. Modular Object Oriented Dynamic Learning Environment (MOODLE)

The MOODLE [8] is incorporated in order to promote the flipped class room concept in ABESIT. Individual login to students and teaching faculty are provided to access MOODLE. Lecture notes are provided prior to the beginning of the semester and uploaded to the MOODLE for 2nd, 3rd and 4th Year students. References for lecture videos are provided for in-depth learning of the concept. Instead of photocopying the notes, students can download the notes of their respective subjects directly from the MOODLE. Solution of last three (3) years University End Semester Examination question papers are provided to the students in the MOODLE which may help them to perform better. For the better understanding of the subjects, assignments are provided in the MOODLE.

5. Software for Institutional Management (SIM)

Attendance of the students are recorded online by the respective teachers on daily basis and maintained in the SIM Software. If student is absent for three days in continuation without intimation, an SMS is sent to his/her parents through SIM Software. Status of attendance is sent to the parents on monthly basis. The record of all the students are maintained by the mentors to keep an eye upon the students.

6. Induction of Teachers

Advertisement about the vacancy is published in the leading newspapers like Times of India (Ascent). A panel for interview is formed which comprises of experts as per the AICTE/University Guidelines/Norms [9, 10]. After proper scrutiny, based on Academic Performance/Research exposure & minimum qualifications approved by AICTE, candidates are called for an interaction. Shortlisted candidates after phase I of personal interaction have to demonstrate their ability of using the black board in a class room situation. HR policies of ABESIT are explained to the candidates after the selection and before the joining so that the candidates can plan their line of action. Salary structure in ABESIT is strictly as prescribed by AICTE. Orientation Program of newly inducted teachers take place before the start of the semester so as to make them comfortable and familiar with the ABESIT culture. We encourage faculty members to pursue higher education. Beside technical FDP's, motivational lectures are also organised. To encourage research, we provide every kind of support to faculty members [11]. Research papers published [12] by faculty are shown in Table 1.

Table 1. Research exposure

Year	Research Papers published by Faculty	Research Papers published by Students under the guidance of Faculty
2014-15	46	2
2015-16	58	12

7. Enhancing Classroom & Teacher Effectiveness

All the teaching faculty explain the importance of the subject and its relevance to the real world or industry. The first five minutes of the lecture always have a quick recap of the last lecture. At the mid of the lectures, students are asked about what they have understood in the class. At the end of the lecture, faculty tell the students about the next day lecture contents and the reference book for the same. Students are encouraged to ask questions in the class. Weak students are encouraged to come forward in every aspect to increase their confidence level. All class rooms are air conditioned and equipped with roof mounted projector for enhancing visual learning. Audio Visual Room is provided to each department for project presentation, seminar, etc. All faculty members write the topic of the lecture on one side of the black board and explain the topics one by one so that the lectures can progress according to the lecture plan. There is a provision of feedback of the teacher from the students once in a semester. Subsequently, on the basis of feedback received from the student, faculty take measures for improving the performance & delivery. Following the standard practices, the satisfaction level of the student is increasing semester by semester as shown in fig. 6

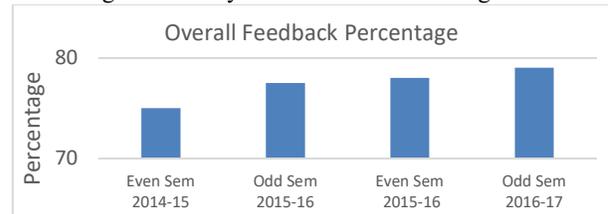


Fig. 6 Overall Faculty Feedback

8. Examination Cell

We have a fool-proof system of examination which is taken care by our examination cell throughout the year and examination committee during the exam. Sessional Exam is of 3 hours and of 100 marks so that the students get familiar with the pattern of End Semester Examination. On the basis of attendance, Admit cards, as shown in fig.7, are issued to the eligible students to appear in sessional exam.

Fig. 7 Admit Card for Sessional Exam

Proper duty chart is displayed at least four (4) days prior to commencement of the examination. Strict invigilation is observed where mobile phones are not allowed even to faculty members. There is a provision of UFM (Unfair Means) to book the students for the same. Model answers of the sessional question papers are uploaded to the MOODLE on the same day immediately after the exam for improving the understanding of the students regarding answers to the questions. Model Test Papers are provided to the students before the sessional and End Semester Examination so as to make them familiar about the pattern of questions that can be asked in examination. Proper & dynamic seating plan is prepared for sessional examination to ensure free and fair environment.

9. Library

The Library is fully computerised with latest Library Management Software. To help the students financially, college provides book bank facility to all the students of the college. Student can also issue books in addition to the books allocated in book bank. New Arrivals are notified through email and notice board. Library Web Page is daily updated and maintained. Library Committee is in place for proper and fruitful functioning of the Library [13]. During the examination period, library is open throughout the week including institute holidays from 9 am to 8pm.

10. Institute Website

Institute website is dynamic and updated on daily basis. Each and every relevant information pertaining to the institute is made available in the institute website. Our Institute website is a single source from where one can connect to institute links on different social media like Facebook, Twitter, Picasa, you tube videos concerning the Institute. Institute develops a dedicated website for every major event like convocation, alumni meet, cultural fest etc. organised in the Institute which is invariably web linked to the Institute Website. Modular Object Oriented Dynamic & Learning Environment (MOODLE) is linked to the Institute website so that the student can be connected to the class on the go. A picasa link is available in the Institute website due to which students need not to bother about clicking the photographs during the events as one can have an easy access to all the photographs therein.

11. Work Culture/Code of Conduct/Amenities

All Saturday of every month remains holiday for students to consolidate five days learning of various subject. Second and Fourth Saturday remains holiday for Faculty & Staff. Faculty & Staff are also entitled for 6 days summer and 6 days Winter Break. There is also a provision of 12 days general leave and 3 short leaves (1 hour) per month for all the employees. Salary of all the employees get credited to their account on or before 15th of every month. Concept of Self-Appraisal is also in place for Faculty & Staff self-assessment and improvements. A proper service book is also maintained for each faculty and staff members. For outstation faculty & Staff members, Institute provides Faculty Residence on Nominal Charges with 24 hours water supply & power backup A Medical Cell with

qualified doctor is available in the campus round the clock .Hygienic food is available from dawn to dusk in Canteen. Bus facility is provided to the students coming from various places. Uniform and I-Cards are mandatory in College premises. Proctorial Board and Campus Vigilance committee are there for the smooth conduction of day to day activity in the campus. We are having a regular practice of sharing the academic calendar well in advance (two months prior) in every semester so that either students or the faculty make their plans accordingly. The Institute is praiseworthy neat and clean symbolising “Swachh Abhiyan” since institute establishment in spite of regular functioning. Suggestion Box is kept at central place of the institute for inviting suggestions for better functioning. After Working Hours, Interaction between In-Campus Faculty and Hostel students is in place for guidance, counselling and mentoring in order to provide them Feel at Home.

12. Sports & Cultural Activities

Sports is promoted in campus to digress from monotonous academic routine. Sports Week is celebrated in concurrence with Annual Fest on yearly to build Team spirit and inculcate Sporting attitude among the students. Team games & Individual games are organised to provide equal opportunities to all the students in the college. Trials are organised to encourage large participation of the students providing them fair chance in competitive events. Winners are appreciated and awarded with individual or team prizes, medals and trophies. Team Games for Faculty members are organised to enhance inter departmental cooperation & interaction. Proper milieu is provided (Football ground, Cricket ground with International Standard pitch, Basket Ball court, badminton court, volleyball court) to students for promoting sports at College level. Students are encouraged for participation in Zonal/Regional/ National level games or cultural events throughout the year. Annual Fest (Festin-o-Beat) is organised in our Institute where cultural and technical events takes place with enormous and enthusiastic participation. Freshers Day/Foundation Day/ Teachers Day is celebrated on 5th September every year. Our Students participate at university level and always get rewarded as winners.

13. Social Platform

Regular practice of organising Blood donation camp for faculty, Staff & Students in the Institute with different governmental and non-governmental organisation. Tree plantation drives are organised in the institute on yearly basis to awaken the consciousness of the students for the mother earth and its environment. The old clothes and articles are collected in the institute through voluntary donation. Subsequently, these old items and clothes are given to Old age home and orphanages.

14. Bureau of Training & Development

During the placement drives, along with Bureau of Training & Development, the teaching faculty of various Academic Departments also empowers CRC in the placement process with various technical and academic inputs. The role of Bureau of Training & Development is to arrange Training

programs/Workshops/Seminars/Guest Lectures/ Orientation Programs of technical nature and other development programs to improve soft skills like communication, etiquette inculcation and training of participation in Group Discussion and Personal Interviews. Special attention to the students is given under the heading Personality Enhancement Program (PEP) for 2nd year, Employability Skill Program (ESP) for 3rd year and Pre Placement Program (PPP) for 4th year. We provide Summer Training Program in our campus in collaboration with Industry experts. The data shown in fig. 8. depicts the response from the students in terms of understanding the importance of PEP, ESP and PPP.

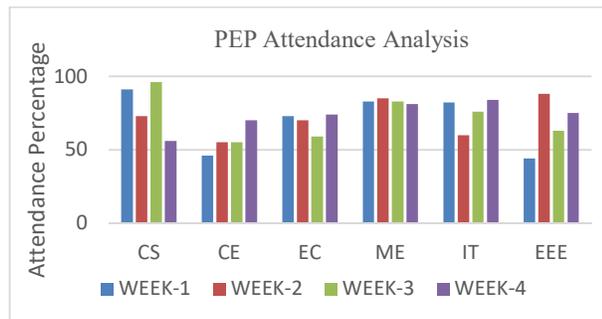


Fig. 8 PEP Attendance Analysis

15. Industry-Institute Interaction (III)

Centers of Excellence & Centers of Training are one of the key resources for placements. By having these centers we are bridging up the gap between the industry and academia. The day we started these centers a significant change can be seen in placement statistics as shown in Fig 9.

A. Enhancing the Technical Capabilities via Centers of Excellence (CoE)

Center of Excellence for Big Data and IoT is running since June 20, 2016 in collaboration with Datreon, Delhi, where experts from Datreon are imparting training to the students of ABESIT and other colleges as well on Big Data Analytics. This center would also provide opportunity for the students to work on Live Projects which are based on Smart Cities. Twenty five students are undergoing the training program in two separate batches. Center of Excellence for Big Data and IOT was inaugurated along with two days FDP on Big Data Analytics on August 7-8, 2016 by Honourable Prof.(Dr.) Vinay Kumar Pathak, Vice Chancellor, Dr. APJAKTU, Lucknow at ABESIT, Ghaziabad.

Center of Excellence for Analog and Embedded Systems is running under Texas Instruments University Program with EdGate Technologies Pvt. Ltd. Bangalore to provide training to the students on Analog and Embedded Technologies enabling them to work on Real Time Projects. Four days Training Program for Teaching Faculty was conducted by the experts of EdGate Technologies Pvt. Ltd. [14] Bangalore in two phases. Now the training program on Analog Technologies has been designed for the students

and will commence from October 1, 2016. Center of Excellence for Analog and Embedded Systems was inaugurated on September 7, 2016 by Mr. Sanjay Srivastava, Director, Texas Instruments University Program.

Center of Excellence for Power Electronics & Drives is one of the three center which has been allotted by Dr. APJ AKTU, Lucknow. MoU was signed on 17th March 2016 between Dr. APJ AKTU, Lucknow and Entuple Technologies Pvt. Ltd.[15], Bangalore (Technology partner of ANSYS & CADENCE) at University Campus for developing a Center of Excellence for Power Electronics & Drives. This center will virtually act as a Nodal Center on behalf of Dr. APJ AKTU for empowering the various engineering colleges to get expertise on issues related to Power Electronics & Drives. On the onset Entuple, Bangalore experts will periodically conduct empowerment programs for the faculty members so that they can understand the intricacies of the subject. In turn, their expertise will be translated to the students so that the students will become industry requirement ready and employable.

B. Empowering the students via Centers of Training (CoT)

Center for Advanced Robotic Control for Industrial Automation is running since 17.08.2015 in collaboration with Indo Euro Synchronization [16] and APS GmbH-European Center for Mechatronics, Germany.

Academic Visit of our Institutes' Faculty to Germany – Two professors of Mechanical Engineering Department, Dr. Ravindra Kumar and Prof. Balbir Singh, had gone to Germany for two weeks from 27th June – 7th July 2015 at APS-European Center for Mechatronics, Germany.

Visit of our Students in Germany to Autosol 2016 Program-Two meritorious students of Advanced Robotic Control(ARC) batch 1, Ms. Amrita Yadav, Final Year, B.Tech(IT) and Mr. Ankit Kumar Singh, Pre-Final Year, B.Tech (ME) were sponsored by the Management of ABESIT to attend the Autosol 2016 Program in Germany which was from 22nd February- 3rd March, 2016.

28 Students of various streams were trained by our trained teaching faculty and by German Experts in two batches. The third batch will commence from October 8, 2016.

Centre for Computer Aided Design and Engineering Analysis is running in association with CADPLUS Software Solutions since September 29, 2015. It is a highly professional CAD/CAM/CAE training center equipped with the latest state of the art mechanical design software like AutoCAD and SolidWorks.146 students have already been empowered in 6 batches.14 students are undergoing the training program in 7th batch.

Centre for Structural Design and Analysis is running to empower the students of Civil engineering with the state of art Bentley Software Suite which includes 24 software specially Staad.pro, MX- Road, Water Gem and Sewer Gem. 94 students have been trained on Staad.pro, 50 students are undergoing training on MX-Road module.

e-Yantra Lab Setup Initiative(eLSI) in Embedded Systems & Robotics- e-Yantra [17] is a project supported by IIT Bombay to spread education in embedded systems and Robotics. This project is sponsored by Ministry of Human Resource Development (MHRD) through the National Mission on Education through ICT (NMEICT). e-Yantra Lab Setup Initiative(eLSI) supports infrastructure creation by providing a platform for training teachers both in theory and applications of Robotics. ABESIT Team of Teaching Faculty of Prof. Pawan Singh Mehra, Dr. Ravindra Kumar, Prof. Balbir Singh & Prof. Pradeep Kumar won “**Class-A**” award and a Cash Prize of Rs. 6000/- in e-Yantra Task based Training Program in which teachers from 40 colleges of 7 regions had participated.

C. Promoting the participation in National/ International level multidisciplinary competitive projects

Electric Solar Vehicle Championship 2016- ABESIT team “VAIROCANA” of students participated in Asia’s largest solar event, ESVC-2016 organised by Imperial Society of Innovative Engineers. Of the 176 team participated in the event at all India Level, only 94 teams cleared the virtual design round. Total 30 teams took part in endurance race (final round). As an outcome of the performance, Team VAIROCANA secured **13th Rank AIR**.

Elite Go-Kart Championship 2016- ABESIT Team “The Hawks” of students cracked the design virtual round of EK-15 organised by Elite Techno Group, Jaipur. Of the 181 teams, only 61 teams cleared the virtual design round. Now, the team “The Hawks” has started working for the manufacturing of the vehicle for the dynamic round (final round) which is scheduled in January 2017.

D. Promoting Creativity and the Spirit of Innovation among the students

IDEA-11 Contest (2015-16) was organised for the conversion of Innovative Ideas into products which can help in grooming the skill set of students. These ideas were nurtured and monitored in every stage ensuring their correct accomplishment. Of the 200 ideas received from the students, only 30 ideas were identified for the detailed presentation. The reward ceremony was organised on 5th November 2015 where top 11 ideas were awarded with a Certificate of Appreciation and a Cash Prize of Rs. 1000/- for each idea.

16. Corporate Resource Center/Placement Cell

Corporate resource centre (CRC) serves as an interface between students & the corporate and helps in organizing and arranging on-campus and off-campus placement drives. From 2nd year onwards, we work with the students through PEP, ESP and PPP for 2nd Year, 3rd Year and 4th Year respectively to make their candidature strong for the industry. The institute had signed an MoU with nationally renowned TPC Global [18], Delhi for campus recruitment training for students by industry experts in ABESIT campus.

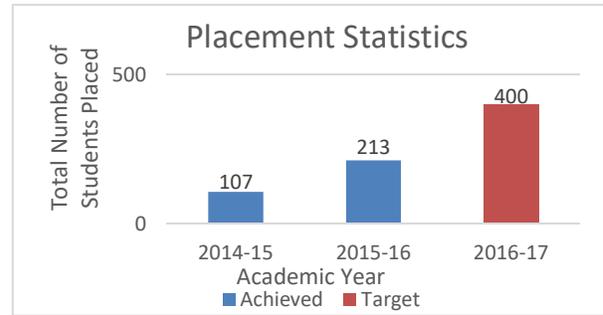


Fig. 9 Placement statistics

17. Conclusions

The emphasis of educational governing bodies in India is to improve the Teaching-Learning process in Higher Education. ABESIT has evolved so far the Teaching-Learning process by adopting the following best practices:

- No Donation, No Capitation, No Consultant and No Mediator in the admission process.
- Improvement in results because of scheme of grants to the students from inception to completion of graduation.
- Proper mentoring and regular monitoring of the students resulted into the improvement in attendance and performance in examinations.
- Students are getting benefitted due to an access to the MOODLE as they can download their teacher’s notes, assignments, videos, solution of question papers of their respective subjects.
- Attendance of the students are recorded online on daily basis and maintained in SIM software which is not only helping parents to know their wards status but also has curbed the absenteeism.
- Special attention to the students is being given for Personality Enhancement Program (PEP), Employability Skill Program (ESP) and Pre Placement Program (PPP) to make them ready for the placement.
- Centers of Excellence and Centers of Training are helping students in enhancing their technical capabilities.
- We do not assure for placement, however assure for mentoring and monitoring at the initial stage followed by developing technical competencies and capabilities.

Acknowledgement

We would like to express a deep sense of gratitude to Prof. (Dr.) Vipin Garg, Advisor, ABESIT, Prof. (Dr.) Bhavesh Kumar Chauhan, Director, ABESIT and Prof. Sandeep Garg, Head-CEI for their valuable support and guidance.

References

- [1] Available: <http://www.aktu.ac.in>
- [2] Available: <http://www.abesit.in>
- [3] Abercrombie, N., Hill, S., & Turner, B. (1984). *Dictionary of sociology*. Harmondsworth, UK: Penguin
- [4] Shepard, J., & Greene, R. W. (2003). *Sociology and you*. Ohio: Glencoe McGraw Hill.

- [5] Jeniffer.M.C, Gregory.L, Emerging methodologies in engineering education research, Journal of Engineering Education, Vol.100, No.1 pp.186-210, 2011
- [6] Mcdowell. L, White.S, Davis.C.H, Changing Assessment practice in engineering: How can understanding lecturer perspective help?, European Journal of Engineering Education, Vol.29, No.2, pp.173-181,2004
- [7] Biggs.J, Teaching for quality learning at university (Buckingham: SRHE & Open University Press),1999
- [8] Available: <http://www.moodle.org>
- [9] Available : <http://www.ugc.ac.in>
- [10] Available: <http://www.aicte-india.org>
- [11] Land R, Gordon G. *Teaching Excellence Initiatives: Modalities and Operational Factors*. York: Higher Education Academy; 2015.
- [12] ABESIT Record Room
- [13] Vyas, S. D., Best Practices in Academic Libraries in India: A Study. In proceeding of: International Conference on Academic Library., Oct 2009.
- [14] Available: <http://www.edgate.in>
- [15] Available: <http://www.entuple.org>
- [16] Available: <http://www.indoeurosync.com>
- [17] Available: <http://www.e-yantra.org>
- [18] Available: <http://www.tpcglobal.in>