A NOVEL METHOD FOR ANALYSIS OF STUDENT FEEDBACK IN HIGHER EDUCATION

Dr. Swati A. Bhavsar
Associate Professor, Computer Engineering, MCERC, Nashik, India
swati.bhavsar@matoshri.edu.in

Dr. Varsha Hemant Patil
Professor, Computer Engineering, MCERC, Nashik, India
varsha.patil@matoshri.edu.in

Dr. Ranjit M. Gavande
Associate Professor Computer Engineering, MCERC,
Nashik, India, ranjitgawande@gmail.com

Dr. Neeta A. Deshpande
Professor, Computer Engineering RHSCOE,
deshpande_neeta@yahoo.com

Abstract—Student feedback plays an important role in strengthening the teaching-learning process. Feedback system contributes to professionalizing the teaching process; especially in higher education. Most of the time feedback about teachers from students is collected in a traditional way with a set of questionnaires that are set based on various parameters. Further, it is assessed and analyzed by giving equal weightage to the parameters that may lead to an improper assessment of teachers. A feedback system helps in knowing the strong and weak points of the teacher for self-improvement. The feedback system also supports the appraisal system of the institute. In this paper, we present an online automated process for the collection and analysis of feedback using the weighted average technique. The efficacy and efficiency of the feedback system depend on appropriately chosen parameters and its correct analysis. The proposed process has defined the most appropriate 20 parameters to collect 360-degree feedback about the teaching-learning by giving appropriate weightage to the parameters justifying their relevance. Experimentation for 30 different courses for the last 5 years by varying teacher's assignments for the course and set of students has been conducted. Continuously measured with the help of a higher authority, experts, and remarks by the teacher himself/ herself have justified the accuracy of the proposed feedback system. We are sure that the proposed system will be catalyzing definitely in rewarding and improving the teaching-learning process leading to a better learning experience for the students.
Keywords—feedback, assessment, teaching-learning, weighted average

I.   INTRODUCTION
The Teaching learning process plays an important role in any education system. Teaching-learning practices with efficacy are used during the class room sessions and laboratory [1,2].

Teaching learning quality is evaluated by collecting regular feedback and from students' remedial actions if any [1,3]. The feedback is helpful for the teacher as well as the learner also; as the teacher can understand his strengths and weaknesses from the analysis of collected feedback. He/ she can improve himself in the weak areas by putting more effort that may lead to professionalizing the teaching process whereas a professionalized teaching process directly helps the students for better understanding, gain the deep knowledge of the course which produces output in terms of overall development of the student [5, 6]. The steps involved in the feedback system are collection of feedback and analysis of feedback. In the first step, the feedback from the students about the teacher is collected in a traditional way by using a set of questionnaires/ parameters. In the second step, analysis and assessment of feedback is done manually by assigning equal weights to all parameters [7, 8, 9] But it may lead to improper assessment of the teacher. To overcome this drawback, an online and automated system can be designed that will analyze the feedback more efficiently that further gives proper analysis of feedback [1,4, 12].

Objectives

- To design the feedback parameters that will provide 360-degree feedback about teachers
- Assign appropriate weightage to all parameters
- Calculate the Rank or score of Teacher
- Analyze the strong and weak points of a teacher.
- Improve the overall teaching learning process.

II. FEEDBACK ANALYSIS SYSTEM

The feedback analysis system mainly consists of two steps as, collection of feedback from students and analysis of collected feedback as shown in figure 1. Student feedback is collected by designing 20 parameters those are covering 360-degree feedback about the teaching learning process as listed in table 1 with respective to remark options. The feedback system performs analysis of collected feedback and produces output in the form of parametric analysis, cumulative score, and Relative ranking.

Fig. 1. Feedback Analysis System

A.   Parametric Analysis

The parametric analysis is done by assigning grade to each remark of the parameter. The remark and its grade are listed in table I.

TABLE I STUDENTS FEEDBACK QUESTIONNAIRE /PARAMETERS

Question	Remark			
How does the teacher explain the course?	Exceedingly well	Adequately	Inadequate	Totally Inadequate
Whether the teacher was well prepared for the course?	Always	Often	Sometime	Never
How is clarity of communication and speed of Delivery?	Excellent	Good	Satisfactory	Poor

Whether the Teacher Encourage question from Student and Provide Satisfactory answer?	Always	Often	Sometime	Never
Neatness & Clarity of writing on blackboard	Excellent	Good	Satisfactory	Poor
Whether the teacher supports the lecture with practical case studies & Examples?	Always	Often	Sometime	Never
Whether teacher conducts lectures regularly?	Always	Often	Sometime	Never
What is the attitude of the teachers toward you?	Usually Sympathetic & helpful	sometimes Sympathetic & helpful	Avoid personal contact	Appears to be indifferent to the student
Classroom Control & discipline	Exceedingly well	Adequately	Inadequate	Totally Inadequate
Overall Impact of the teacher	Excellent	Good	Satisfactory	Poor
Would you like this staff member to teach you again in further semester?	Yes	No	--	--
Does the teacher victimize or show favouritism to some student? If yes, in what way?	Yes	No	--	----
Whether the teacher supports the lecture by using Audiovisual aids like LCD,OHP etc.?	Always	Often	Sometime	Never
Weather teacher uses teaching tools such as video lectures, google classroom, PPT with animations and similar?	Yes	No	--	--
Weather the teaching is supported with various pedagogical initiatives such as real life examples, exemplars, models, and other?	Yes	No	--	--
Whether the teacher helps in extracurricular & co-curricular activities like Industrial visits, Trips , Events etc.?	Always	Often	Sometime	Never
Whether the teacher encourages the students to do the activities like field survey, role play, workshop etc.?	Always	Often	Sometime	Never
Weather teacher conducts expert talks, industry visits, and technical	Yes	No		

event related to the respective course?				
Whether teacher solves or discusses University Question paper in Classroom?	Always	Often	Sometime	Never
Do you feel that you need additional coaching for this course in campus or outside campus?	Yes	No		

The parameters from table 1 are mainly classified into in to five domains as Knowledge, presentation skills, and soft skills, regularity, class control, support, and impact, Use of ICT and Pedagogy, Co-curricular Activities, Support for Continuous Internal Examination and External Examination are listed in table 2 with their respective weights.

Knowledge, presentation skills, and soft skills of a teacher is the most important as it helps students to understand the course thoroughly and gain deep knowledge of the course through his well preparedness for teaching the particular course, clarity of communication and speed of delivery, Providing satisfactory answers to the questions of students.

Regularity, class control, support and Impact is another supporting domain to the previous domain that could be analyzed by the student for an effective teaching process.

Use of ICT and Pedagogy domain helps better understanding of the course. The use of pedagogical tools like case studies, exemplars and analogies, Brainstorming Sessions, collaborative learning, Use of online coding and compilation tools /Github, Google Classroom, Quizzes, Puzzles helps the students in better understanding.

Co-curricular Activities help in overall development of students. Support for continuous internal examination and external examination boosts the confidence of students to appear for the examinations.

TABLE II PARAMETERS AND THEIR CLASSIFICATION

	Knowledge, presentation skills, and soft skills	Regularity, class control, support and Impact	Use of ICT and Pedagogy	Co-curricular Activities	Support for Continuous Internal Examination and External Examination
Parameters/ Question number from Questionnaire	1, 2, 3, 4, 7, 12	6, 8, 9, 14, 16, 17	10, 18, 19	11, 13, 20	5, 15
Weightage	W1=0.35	W2=0.25	W3=0.2	W4=0.15	W5=0.15

While analyzing the feedback, for the remark mentioned in table1, grades are assigned as shown in table 3.

TABLE 3. SAMPLE REMARK WITH GRADE

Remark	Grade

Exceedingly well	4
Adequately	4
Inadequate	2
Totally Inadequate	0
Always	4
Often	3
Sometime	2
Never	0
Excellent	4
Good	3
Satisfactory	2
Poor	0
Yes	4

Cumulative Score

Cumulative score for each teacher for the specific course is computer by using the equation 1 and 2.

$$Total = \sum_{i=1}^{6} W1x\, Pi + \sum_{i=7}^{12} W2x\, Pi + \sum_{i=13}^{15} W3xpi + \sum_{i=16}^{18} W4xpi + \sum_{i=19}^{20} W5xpi \quad (1)$$

Average = $\dfrac{Total}{\frac{4}{N}}$ (2)

Where w1= 0.35   weight of first domain
w2= 0.25
     w3= 0.2
     w4= 0.15
     w5=0.15
    pi: the sum of grade points for ith parameter
    N: Total count of students given feedback

Relative Ranking:

   It is computed for all the teachers who are teaching to the particular class with reference to the top ranker among them.

III.   RESULTS

    To determine the effectiveness of student's feedback about teachers, the experimentation is carried out by considering different courses of engineering for the last 5 years by varying teacher's assignment for course and set of students. h. A google feedback form for the teacher's evaluation as shown in table 1 is designed. It is given to the third-year undergraduate students

during their mid semester. The student having minimum 75% attendance is allowed to fill the form anonymously.

Figure 2 shows the distribution of 149 feedback responses received from student for the 5 courses as per mentioned in the figure. Figure 3 to figure 22 shows the parametric analysis of each parameter mentioned in the table I for all 5 courses cumulatively listed in figure 2.

Name of Course/Subject :

149 responses
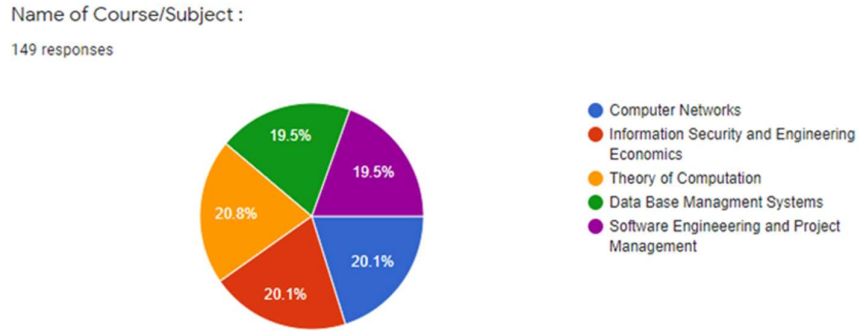
Fig. 2. Courses Contribution in Feedback
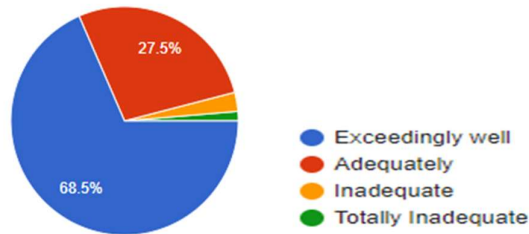
Fig. 3. Teacher explains the course
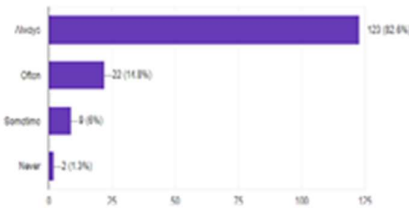
Fig. 4.Teacher well prepared for the course
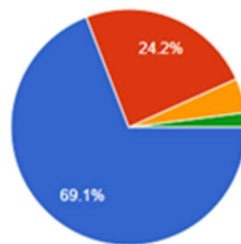
Fig. 5. Clarity of Communication and speed of Delivery
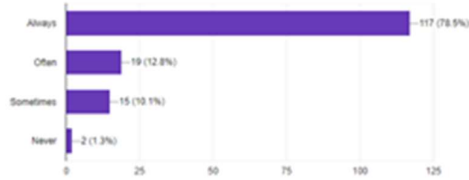
Fig. 6. Whether the Teacher Encourage question from Student and Provide Satisfactory answer
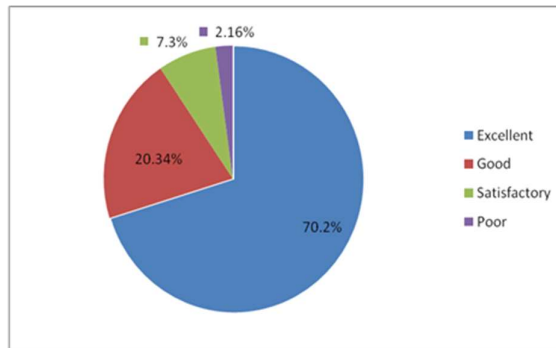
Fig.7. Neatness & Clarity of writing on blackboard
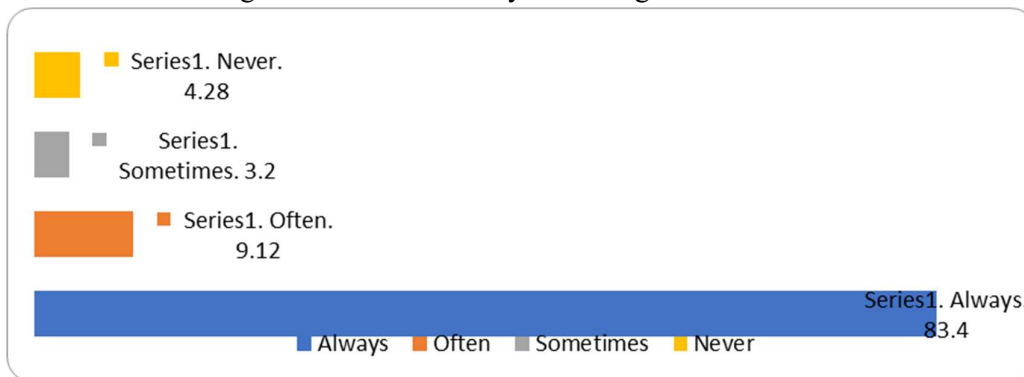
Fig. 8.The teacher supports the lecture with practical case studies & Examples
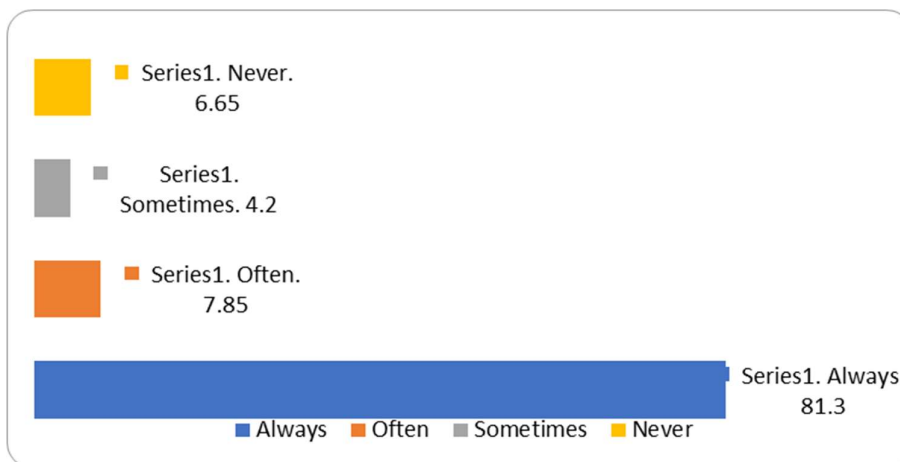
Fig.9. Teacher conducts lectures regularly
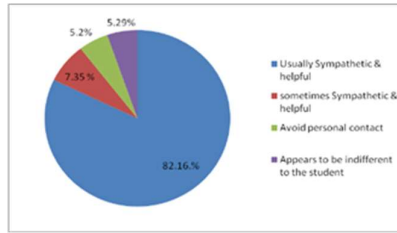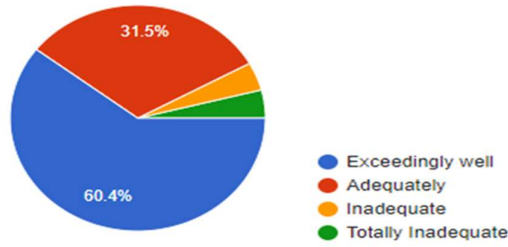
Fig. 10. Attitude of the teachers toward you
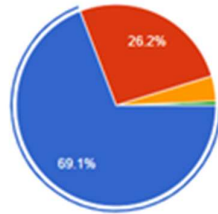

Fig. 11. Classroom Control & discipline
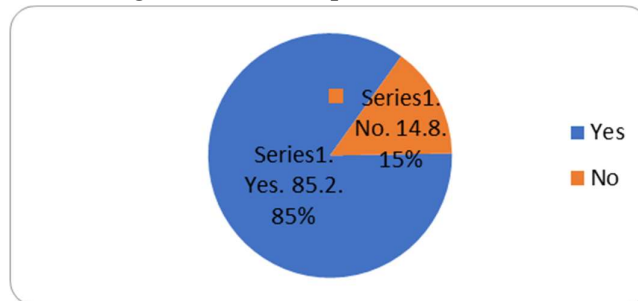

Fig.12. Overall Impact of the teacher

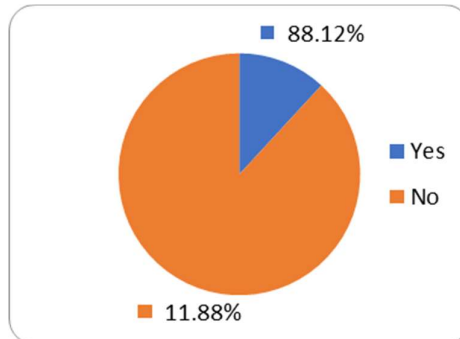Fig.13. Would you like this staff member to teach you again in further semester

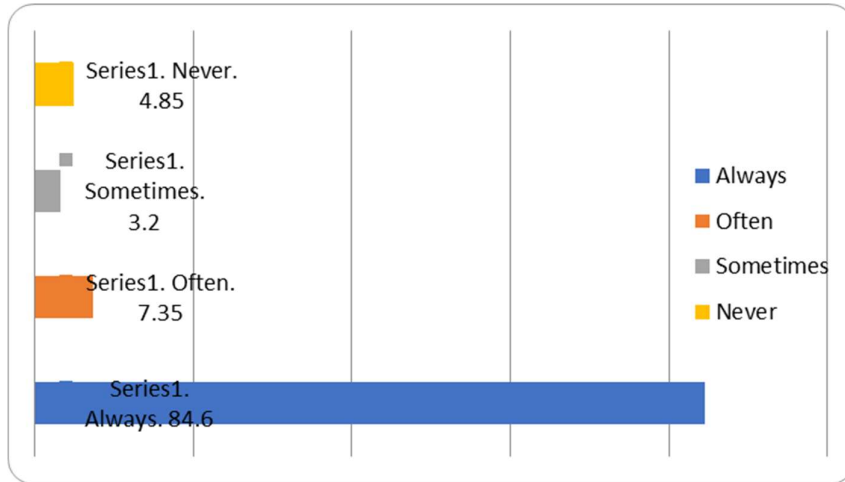Fig.14. The teacher victimize or show favouritism to some student

Fig. 15. The teacher supports the lecture by using Audiovisual aids like LCD,OHP etc
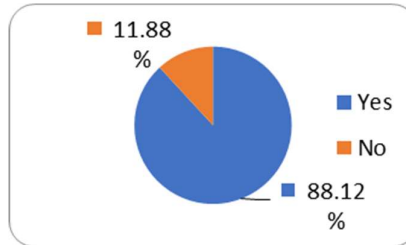

Fig. 16. Teacher uses teaching tools such as video lectures, google classroom, PPT with animations and similar
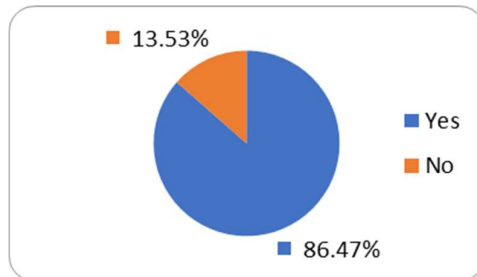

Fig. 17. the teaching is supported with various pedagogical initiatives such as real life examples, exemplars, models, and other
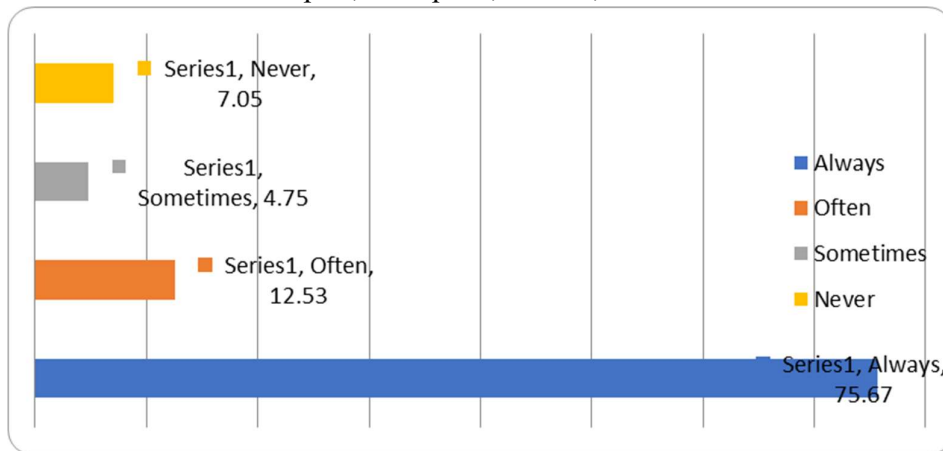
Fig. 18. The teacher helps in extracurricular & co-curricular activities like Industrial visits, Trips , Events etc

Fig. 19. Teacher encourages the students to do the activities like field survey, role play, workshop etc.
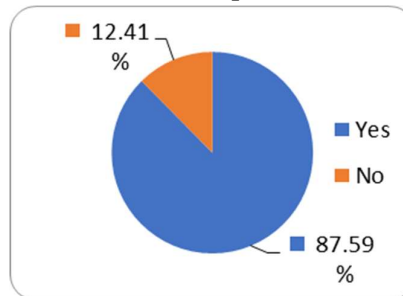

Fig. 20. Teacher conducts expert talks, industry visits, and technical event related to the respective course
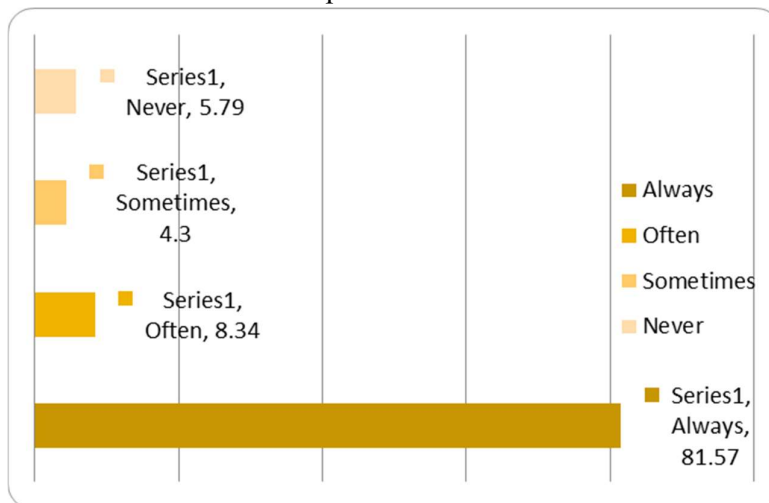

Fig. 21. Teacher solves or discusses University Question paper in Classroom
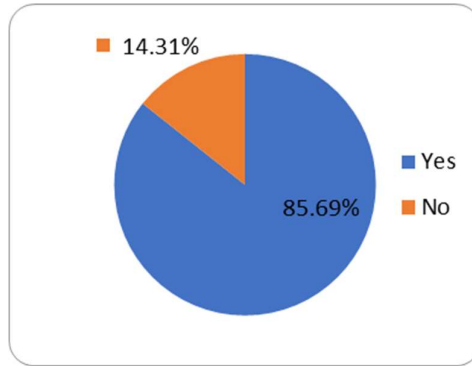
Fig. 22. You feel that you need additional coaching for this course in campus or outside campus

From figures 3 and 4, it is observed that the overall explanation of the course by the teacher, preparedness for the subject is good, clarity of communication and speed of delivery. Figure 8 and 9 indicates that the teacher supports the lecture with practical case studies & examples and conduction of lectures is also regular. Figure 10 indicates that the overall attitude of the teacher is usually sympathetic and useful. Figure 11 indicates that some of the teachers are lagging in classroom control. Figure 12indicates that the overall impact of the teacher is excellent. That's why most of the students are in favour of the teacher to be continued in upcoming semesters as shown in figure 13. Figure 14 indicates that the teacher less victimizes or shows favouritism to students and treats them at equal level. Figure 15 to 17 indicates that the teacher uses video lectures, google classroom, ppt with animations and similar for providing better understanding to students. Figure 18 to 20 indicates that the teacher helps in extracurricular & co-curricular activities, conducts expert talks, and encourages students to participate in various activities.
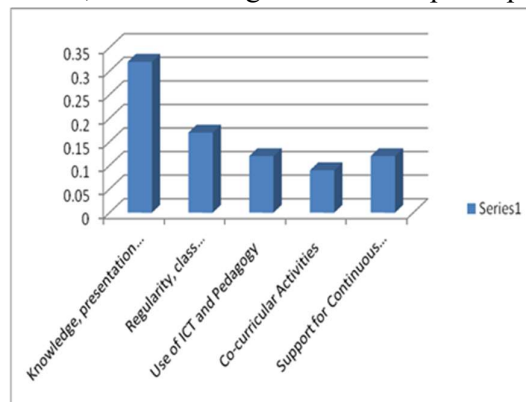

Fig. 23: Performance of Teacher XXX for the course Computer Networks

The performance of teacher is measured using classification of parameters in 5 domains. Figure 23 indicates that the staff XXX has good knowledge, presentation skills, and soft skills and has to improve the participation of student in co-curricular activities and use of Use of ICT and Pedagogy practices while teaching the course. This feedback analysis is shared with the concerned staff that is useful for himself/ herself to know the strength and weakness and improve himself/herself accordingly.
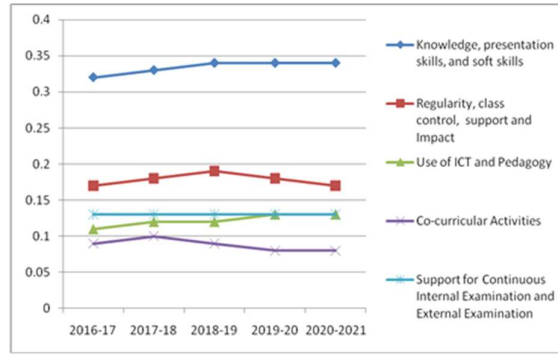
Fig.24 Analysis of Feedback for Recent 5 years

Figure 24 shows analysis of feedback for recent 5 years. From figure 24, it has been observed that the overall performance of teachers in the domain of knowledge and support for continuous internal examination and external examination is excellent. Regularity and class control is good, use of ICT tools is growing exponentially from 2016-17 as nowadays due to COVID pandemics, the lectures are conducted using online mode. There is still scope for improving the student participation in co-curricular activities.

TABLE IV CUMMKULATIVE SCORE OF TEACHER PER COURSE

Name of Course In charge/ Teacher	Name of Course	Cumulative Score percentage	Relative Rank
XXX	Computer Networks	82.30	2
YYY	Information Security and Engineering Economics	79.58	4
ZZZ	Theory of Computation	85.60	2
AAA	Database Management System	80.65	3
BBB	Software Engineering and Project Management	78.50	5

Table 4 shows name of teacher, name of course, and respective cumulative score for the academic year 2019-20. It is observed that the cumulative score of staff ZZZ who taught Theory of Computation is 85.60 % whose rank is 1. It is also observed that the relative rank of each teacher is computed with reference to the teachers who are having higher cumulative scores. The relative ranks of XXX is 2, AAA is 3, YYY is 4 and BBB is 5 respectively. This relative rank is further used by higher authority at institute level for appraisal of teachers.

OUTCOMES AND IMPACT

The proposed feedback system has been successfully implemented and used at the department of Computer Engineering of our institute for the last 5 years. For overall feedback and ranking of teachers among teachers of respective class for particular semester can be considered. Higher authorities can get a ranking of teachers for a particular semester or for an academic year, or for a particular course. Individual teacher can know his / her strong and weak parameters.

Further, the respective teacher can further strengthen strong parameters and can work for improving weak parameters leading to overall impact of teaching and boosting of learning among the students. The same analysis and ranking can be used at institute level for assessment of teacher and annual appraisal.

The overall teaching learning improvements as outcomes of proposed feedback system include-

1.   Individual Course assessment and recommendations
2.   Individual teacher assessment and analysis
3.   Overall analysis of department
4.   Institute level assessment of teacher and annual appraisal

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