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Five Point Strategy to Augment Teaching-Learning Process

Uma Kulkarni [1] Ashwini Desai [2] Aditya Ingale [3]

[1] Department of Electrical and Electronics, KLE Dr. M.S.Sheshgiri college of Engineering and Technology, Belagavi
[2 3] Department of Electronics and Communication, KLE Dr..M.S.Sheshgiri college of Engineering and Technology, Belagavi
[1]uma.k@klescet.ac.in
[2] ashwini.desai@klescet.ac.in
[3] 2kl19ec128@klescet.ac.in

Abstract:"Technology will not replace great teachers but technology in hands of great teachers can be a transformational". Going by the tagline, it is true nothing can replace great teachers but the teaching learning practices can be enhanced to transfer the knowledge in a more effective way. The pandemic years demanded sudden change in the teaching concepts, teachers did adapt to it but with limited resources and time. We are all now aware and know that to change is to evolve. We must enhance the teaching learning methodologies in a structured way. In this paper we are proposing a five point strategy to augment the Teaching Learning (TL) process. The points are selected based on the inputs given by participants through a pre implementation survey conducted by us. The points were later used to teach two subjects both from Electronics and Communication and Electrical and Electronics disciplines. The improvement in the learning curve was motivating.

Uma Kulkarni
Department of Electrical and Electronics,
KLE Dr. M.S.Sheshgiri college of Engineering and Technology,
Belagavi
uma.k@klescet.ac.in

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1. Introduction

Effective teaching is dynamic and evolving. Teachers are the important link between knowledge and learners. [5] Learners can be classified into two levels 1.Slow learners' 2.Fast learners [6]. Effective transfer of knowledge to both of them to bring them on par is a challenging task. Even more challenging is to teach students who are already tech savvy. Teachers should be updating continuously, change their old beliefs and levels of comprehension. Teachers must expand their expertise and upgrade instructional abilities so they can integrate new information to what they already know. Methodologies should reflect upon what they know and construct new paradigms for deepening the understanding of students [5].The strategy used by any teacher must be power packed and effectively implemented. This will help the students enjoy the class and increase his/her productivity. The ICT and LMS system are available to enhance learning but do the students want to learn so. The most effective learning method would hence be to involve students in every aspects and it should eventually lead to of the students, by the teacher and for the students. The teacher should be able to create unique learning experience like experiential, real life industry driven and analytical. In order to create this

paradigm shift in TL process we have herewith suggested the five point strategy which has proven effective in the case studies.

2. Literature Survey

The yardstick to measure the effectiveness has changed. It's no more dependent on marks but on the knowledge assimilated. A study conducted by "Aspiring minds" claims that, Engineer Education in India Fails to Impart Requisite Skills The study reported that only 4.7% of graduated Indian students possessed the required skills [4]

Teaching and Learning activities in Engineering Education is done by seeking answers to such fundamental questions as 'What is the nature of Education?', 'What are Universities for?', 'How do students learn?' and 'How can we use technologies to enhance the Teaching & Learning experience for our students? Recent examples of innovative Teaching & Learning activities from the Faculty of Engineering at the University of Sheffield are used to illustrate how academics there are moving with the times [2]

Research has shown that student's conceptions of learning are important factors in determining learning outcomes, but they are not only factors, the second factor is the approach that the student takes to learn a particular task. Two main categories can exist like deep and surface approach.[1] University teaching is a multidimensional process which involves various crucial factors in order of good teaching, leading to the meaningful learning outcome. The teaching/ learning process of any discipline may have several dimensions but if we think about high-quality teaching practices, certain traits of an instructor or a particular environment of a class room comes first in our mind. Further, the engineering faculty needs to learn new approaches for teaching and learning, which in turn requires effective professional development. [3].

In order to achieve an effective teaching the authors combined the classic techniques and methods with the modern ones. The literature highlights that not only the technical aspects of training determine the achievement of educational goals; human resource is a very important factor too. The way we teach is influenced by the way we perceive learning. Learning theories are closely related to IQ theories. The latter highlights the existence of a general intelligence that determines the level of development of learning capacity. [6]

3. Preimplementation Survey and its outcomes

A. Survey Questions

The table below contains a list of all the questions that were given to all the participants. A Google form was created for a structured unbiased survey.

Table 1 : List of Questions

Q.No.	Questions
1.	What changes do you want in engineering teaching methods?
2.	How satisfied are you with the current teaching methodologies?
3.	Which kind of activity would you learn the most?
4.	Should every subject have a supporting activity?
5.	How would you rate cooperative study?(working in groups)
6.	Will thinking based in learning beyond memorizing?
7.	Will competency based learning help in developing skill sets and work habits?
8.	Should flipped classroom be implemented for critical subjects?

B. Survey Outcomes

The results of the survey are shown below and are listed in the same order as the questions in the Table I. The results are motivating and synchronizing with our thought process. Majority of the participants want a change in the teaching methodologies. A total of 100 stake holders were selected for the survey which included industrialists, teaching fraternity and engineering students and a Google form link was shared, which allowed the participants to select the answer of their choice. The excel sheet so generated was used to get survey outcomes.

The results of survey question1 are shown in Figure 1. Majority of them want to shift to new teaching methods and also want a supporting activity to be inducted for better learning.

The second survey question is framed to assess the level of satisfaction achieved through the current teaching methods. The survey participants were asked to rate on 10 point basis. 70% of the participants are not satisfied with the existing methods and are expecting reforms. Surprisingly 30% of the participants are either ignorant or they are don't care category.

The bar graph in figure 2 shows a comparison of inputs given by the survey participants. The kind of activity they are expecting for enhanced learning. It is clear from graph that students want every subject to have added doing activity and the other popular ones are skill based learning and interactive learning. This actually gives an added dimension to the TL process.

The Graph in Figure3 refers to the outcome of questions 4 to 8 which are basically representing the five strategy points. The results show that all points

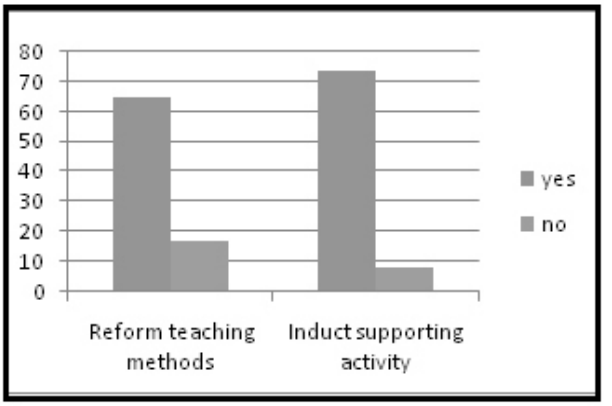

Fig. 1: Survey outcome 1

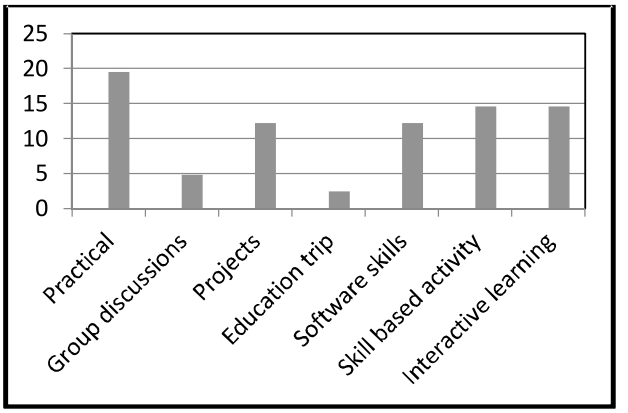

Fig. 2 : Survey Outcome 3

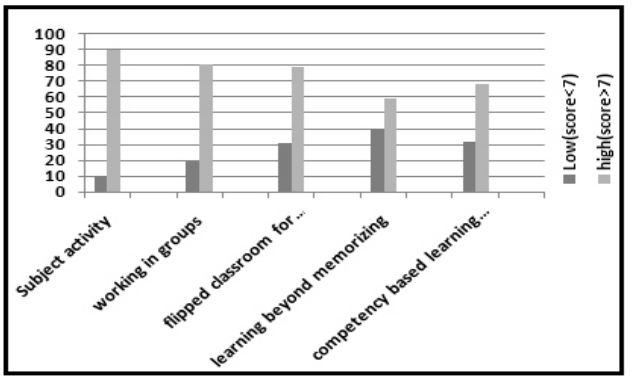

Fig. 3 : Survey outcome 4

are accepted by the participants and are given nearly equal score. It gives an insight that these points can be the upcoming learning strategies. It will help teaching fraternity to drive the subject effectively and enhance learn ability in students.

4. Methodology

The implementation of the TL model is based on the five points listed below. These are the same points agreed upon by the survey participants as shown in the survey outcomes.

A. Five point strategy

Table 2 : Five point strategy

Point Number	Strategy
1	Subject Activity (SA)
2	Cooperative Learning (CL)
3	Flipped class (FC)
4	Thinking based learning (TBL)
5	Competency Based Learning(CBL)

Each of the points are customized for the subjects under study and assessed with relevant tools. The assessment method can vary because every subject has its own yardstick and can also vary with the subject and the teacher handling it. The methodology is open ended as far assessment is concerned. Also it is not mandatory to use all the five points; choice can be made as per the subject. Here in order to prove the efficiency we have adapted the methodology to two subjects one from the Electronics and Communication domain and the other from the Electrical and Electronics domain. Both the subject were taught with the strategy mentioned above and were assessed using CIE (Continuous Internal Evaluation).

B. Electrical and Electronics Subject

The subject chosen for implementation was microcontroller for the 5th semester students. The regular method of teaching was changed to adapt the strategy and is tabulated below

Table 3: Change in Strategy

Point No.	Regular TL method	Five point TL Method
1.	Written Assignments	Practical Activity (SL)
2.	Individual learning	Group Learning (CL)
3.	Regular Class	Flipped Class (FC)
4.	Ability to reproduce	Ability to analyze and apply (TBL)
5.	Academic Grades	Subject Competency(CBL)

The table above shows the comparison of the regular teaching learning methodology and the suggested improvised TL methodology.

1. Implementation details

The assignments were give in the form of a do it yourself activity, the whole class was divided into four groups with each of them assigned a unique activity. Activity involved hardware and software design. It was given by the faculty and the students had to build a working model and exhibit it in fortnight duration. For a regular written assignment the student would copy the solutions and submit, with no learning outcome. But the with change in strategy the students were able to acquire the following skills sets

•Team work

•Purchasing components with the right specification

•Learning how to assemble it and integrate with the software.

•Right kind of output device to show the working.

•Presenting it for assessment.

In another implementation the regular classes were converted to flipped class. Flipped class had a new definition. Interested students of the class were given certain topics from the subject modules and were instructed to prepare the content and present it in the class. Every topic had different set of students. After the presentation, the class was open for discussion among students with the faculty member moderating. A simple talk and chalk class was now converted into a discussion forum where concepts were discussed instead of being taught. This strategy was able to enhance the skill sets of the students making them more competent. The final skill sets acquired are

•Eliminate stage fear (required for vernacular students)

•Preparation and Presentation

•Group discussions and learning

•Enhanced grades

C. Electronics and Communication Subject

1. Implementation details

Driving management concepts to engineering students is a challenging task. But owing to the competency and industry demands the concepts are essential. The thought process was to make changes in the TL methodology to drive the subject effectively and enhance its value not by credits but by its virtue.

For this subject only three of the five listed strategy points were selected and are listed below

•Group Activity (activity based)

•Product Launch (competency)

•Magazine Preparation (thinking based)

Students were given a group activity to build a unique product and launch it. To implement these model students were divided into various groups with each of them getting a one complete task. The students had to ideate and conceptualize it by coming up with a virtual company. The final product had to be launched and advertised for selling it. Surprisingly students came up with several virtual companies and launched wonderful products. An exhibition was arranged and the best ideation won the prize.

In yet another activity, group of students were asked to come up with a magazine for any relevant business model. All this made learning management interesting and improved their credits. They acquired following new skill sets

•Work in team

•Ideation and implementation

•Writing and Editing skill

5. Results

The student performance in the subjects' viz. Microcontroller and Management were compared using Continuous Internal Evaluation (CIE) both before and after adapting the five point strategy. The students were able to assimilate the subjects much better and perform better in the assessment tests. The details of the same are given below.

A. Electrical and Electronics subject

Table 4: Comparison of performance in CIE before and after five point strategy (Microcontroller)

	Number of students	Students below minimum marks	Students above minimum marks	Highest marks
Before	58	42	16	24
After	58	23	35	28

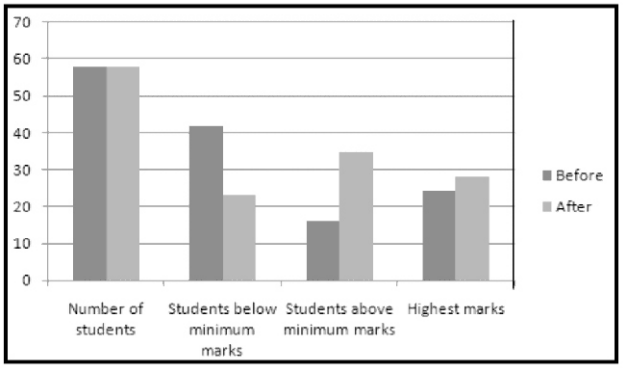

Fig. 4 : Results in the graphical form

The results were analyzed keeping mind the slow learners and hence the change in average marks was tabulated instead of the highest marks. There is an increase of 42% in the number of students getting marks above average. It also indicates that slow learners have also developed better learning capability.

B. Electronics and Communication subject

The students were able to understand the subject much better and the outcome was clearly visible in their CIE performance shown in Table V. The assessment of the students was divided into two parts viz. Oral presentation for the product launch and advertisement. Written examination was conducted for ideation and architecture of the product. This strategy also helped to increase the popularity of the subject, was evident with 30% rise in the student attendance. The subject is now taught using the

Table 5 : comparison of performance in CIE before and after five point strategy (Management)

	Number of students	Students below minimum marks	Students above minimum marks	Highest marks
Before	49	33	16	23
After	49	05	44	30

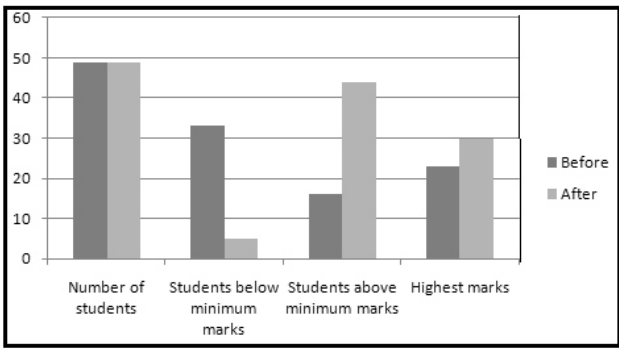

Fig. 5 : Results in the graphical form

suggested TL process across all departments and in fact the magazines were useful addition for the NBA accreditation process.

6. Conclusion and future scope

The results show that the strategy has worked well for the chosen case studies and apart from increasing the happiness quotient of learning it has also improved their credits. Since it was first time experimentation, it was applied to only two case studies. It can be applied relevantly to various other subjects and assessed for outcomes. Small changes can also be made in the suggested strategy to suit the subject.

The outcome also shows that there is a need for change in TL process for better outcomes. The change should address the gap in teaching learning methodologies. Eventually engineering education must create an environment to produce engineers who will acquire skill sets and contribute to the inclusive development of mankind.

For the survey only 100 participants were considered. The participant base can be expanded and more intense inputs can be obtained. This will also help in fine tuning the statergy.The assessment tools can also be varied, to suit the subject needs and the teacher.

Acknowledgment

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