

Implementation of Strategy Based Innovative Teaching and Learning Schemes for Engineering Students

Ravishankar Desai¹, ShreyasDeshpande²

¹Instrumentation Engineering, PVPIT, Budhgaon – 416304.

²Instrumentation and Control Engineering, PREC, Loni – 413736.

¹ravishankardesai@gmail.com

²shreyas.deshpande19@gmail.com

Abstract: In this paper, innovative teaching and learning (ITL) schemes for engineering students is being implemented on the root of curiosity, observation, intellectual and decide-focus-act strategy. The scheme is divided into three parts. In first part evaluation scheme are implemented on personality and behaviour, conceptual motivation, process of self-evaluation, before you assess yourself, assessment skill, plan-act-improve audit, get engaged in value addition drive. In second part the students are evaluated by 30%-70% scheme and it is implemented on empirical approach, observations, questions, hypotheses, experiments, analyses, conclusions, replications. The third scheme is skill enhancement i.e. assessment scheme and it depends on part first and part second. The above strategy and schemes are implemented on 50 engineering students and its results are tabulated. It is ascertained that, this scheme and strategy is working excellently.

Keywords: Innovative teaching and learning (ITL), innovative teaching and learning (ITL) strategy, innovative teaching and learning (ITL) scheme, strategy and scheme.

1. Introduction

The evaluation of teaching and learning is defined as “a systematic attempt to determine the effects of an educational initiative, innovation or experiment on student learning”. Using this definition, the success of a teaching innovation will be determined principally by evidence of changes or improvement of some kind in student learning (Richard J.). A template for innovation or ideation exercises that integrates thinking from the entrepreneurial cognition literature with practical course design elements to systematically develop individual’s ideation capabilities (Kevin et al. 2014). For enhancing the learning methodology used for inductive teaching (includes inquiry, problem based, project-based and discovery, case-based and just-in time) method, highlights commonalities and specific differences, and reviews research on the effectiveness of the methods (Michel and Richard, 2006). In (Khe and Thomas, 2007) identify several current knowledge gaps pertaining to the barriers and strategies of technology integration and offer pertinent recommendations for future research are demonstrated. The major model of design pedagogy, project-based learning and recommended that available research suggests that, these kinds of courses appear to improve retention, student satisfaction, diversity, and student learning (Clive et al. 2005). To introduce innovative in teaching and learning (Tedman and Jain 2000) represents a valid image of the nature of the interaction between science, technology and society. Each field is challengeable and sensible in the arena of engineering education, to attract many students and nurturing well-trained engineers. To fulfill these ways student need to think differently.

The paper is organized as follows. In section 2 ITL strategies are presented, and section 3 represents ITL scheme. The result of ITL strategy and scheme is reported in section 4. Finally, conclusion is drawn in section

2. Innovative Teaching and Learning (ITL) Strategy

Ravishankar Desai

Department of Instrumentation Engineering
Padmabhooshan Vasantrao Dada Patil Institute of
Technology, Budhgaon, Sangli - 416304, Maharashtra
(INDIA).
ravishankardesai@gmail.com

It allocated into four parts. The following picture stimulate you for how curious, how to observe, how to build intellectual and how to execute the strategy.

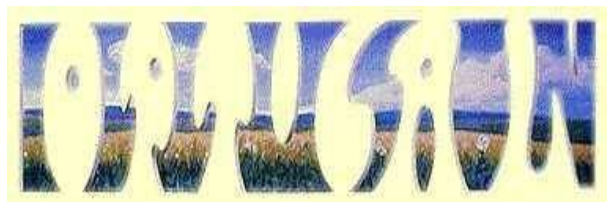


Fig. 1 Strategy to stimulate for implementation

A. Curiosity

A state in which you want to learn more about something means cognitive state from nature, survey, public communication and how motivating our self. A highly mind storming human activity used in the investigation of nature and matter that deals specifically with the manner in which data is collected analyzed and interpreted.

B. Observation

An important component in any scientific investigation is observation. In this sense, observation refers to two distinct concepts: being aware of the world around us and making careful measurements.

C. Intellectual

The scientific method can be described as a sequence of steps for systematically analyzing scientific questions; designing and executing innovative ideas, answers to those questions, and producing reproducible results. The method adds new knowledge and discoveries to the various realms and endeavors of the sciences.

D. Decide-Focus-Act

This one is the highly dominant strategy because, curiosity, observation, intellectual strategy is applicable for innovative idea and this one is reflective realism. What decided i.e. innovative idea that will be finalized, focus particularly on respective innovative idea and finally act accordingly to implement for application.

3. Innovative Teaching and Learning (ITL) Scheme

The scheme is divided into evaluation scheme, 30%-70% scheme, and assessment scheme. The Newtonian observation that apples fall from trees stimulated much innovation into the effects of gravity. Therefore, a keen eye to your surroundings can often provide you with many ideas for innovative studies.



Fig. 2 Scheme to stimulate for implementation

A. Evaluation

This scheme comes under non-technical part. This can be implemented as follows:

1) Personality and behaviour:

- Our physical personality and behaviour are the most visible parts.
- Behaviour, basically in the form of verbal and nonverbal communication, is the projective part of our personality.
- These are the main components of our behaviour: Our attitude and motive, the content, the process (i.e. why, what and how, how of our behaviour.)

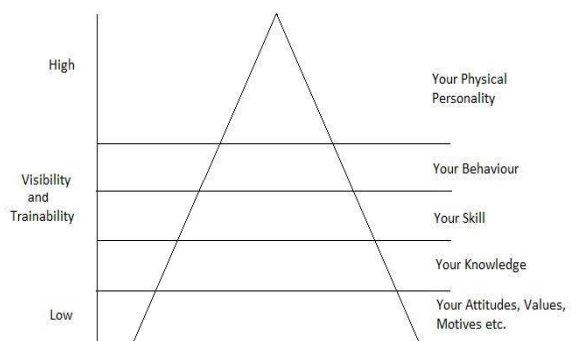


Fig. 3 Layer of personality

2) Conceptual motivation:

- To err is human. But, if the eraser gets consumed fully before the lead, it is a signal that the mistakes committed are a bit too many.

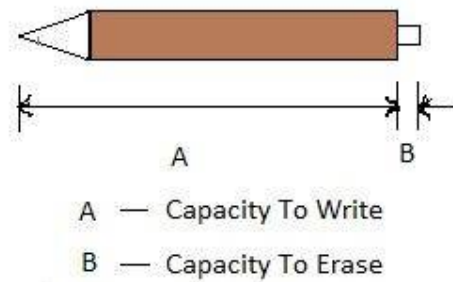


Fig. 4 Concept behind pencil and eraser

3) Process of self-evaluation:

- If you make the behaviour all the time, most of the time, sometimes, rarely and never.
- The assessment is done yourself and friend. Considering following points.
 - I logically breakdown the issue
 - I identify various elements
 - I collect relevant information and data.

4) Before you assess yourself:

- You think one or two critical situations requiring use of the skill in question.
- Consider what you did with reference to what you should have done.
- Do not get into justification of your actions.
- Be aware of the gap between the 'actual and the standard.

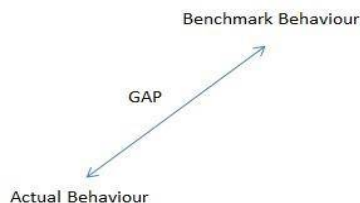


Fig. 5 Awareness of your behavior

5) Assessment skill:

- This task contains different situation and how this situation to be tackled or solve.
- It enhance analysis and creativity for problem solving, verbal and written communication, presentation, planning activities, team leadership and membership, initiative, self-confidence, achievement orientation, learning, and self-management.

6) Plan-act-improve-audit:

- After assessment identify your strengths and the behaviours need for improvements.
- Then follow the steps given below :
 - Plan - Plan to change.
 - Act - Act as per your planning.

- Improve - Get the result of your action.
- Audit - This is reflective monitoring process.
- Take some time to think and objectively audit the action and the result.

7) Get engaged in value addition drive:

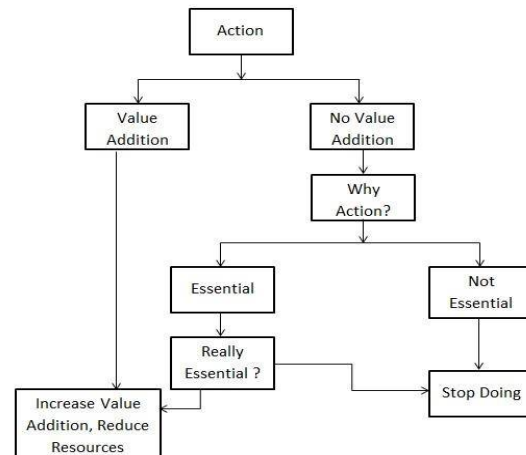


Fig. 6 Model of value addition

- We need to spend resources in the form of time, energy, money etc. The activity may add value or may not add any value.
- Refer the model of value addition. Reflect on the action points.
- Can we eliminate or reduce, to the extent possible, non-value adding activities from our life?
- Can we increase the ratio of value addition and resources used?

B. 30% -70%

This scheme it comes under technical part. In second scheme the students are evaluated by 30%-70% scheme. The 30% is depend on class room programme, it includes history (i.e. interlinks, references, importance), conceptwise information (using teaching tools i.e. black board, presentation, animated video), discussion (student to student discussion), and question-answer (clarification). The 70% is depends on laboratory programme, it includes demonstration, design, implementation, real time observation, result, analysis and conclusion. This can be implemented (Singh Y. K. 2006) as follow:

1) Empirical approach:

- The empirical approach is an evidence-based approach that relies on direct observation and experimentation in the acquisition of new knowledge along with scientific decisions

are made based on the data derived from direct observation and experimentation.

- Additionally, we may often reach conclusions or make decisions that are not necessarily based on data, but rather on opinions, speculation, and hope for the best.
- The empirical approach, with its emphasis on indirect, systematic, and careful observation, is best thought of as the guiding principle behind all innovation conducted in accordance with the scientific method.

2) Observations:

- Observations of the world around us often give rise to the questions that are addressed through scientific innovation.
- Contrast this approach to decision making with the way that most non-scientific decisions are made in our daily lives.

3) Questions:

- Many right questions can sort many things.
- It gives direction to start the innovative idea in right way.

4) Hypotheses:

- It is a tentative solution of a problem.
- It is part of innovative activities are planned for verification.
- It is very essential to formulate innovative ideas for innovator.

5) Experiments:

- It is hands on experience will encourage us for realism.
- Only experimental result provides conclusive evidence regarding cause-and-effect relationships.

6) Analysis:

- An investigation of the component parts of a whole and their relations in making up the whole.
- The abstract separation of a whole into its constituent parts in order to study the parts and their relations.
- Analysis is based on available basic data and new data.
- It is a technique and it has philosophical touch.

7) Conclusions:

- It comes under main findings, inferences, implication of the findings, limitations and suggestions for further studies.
- In the form of corrective measures for improving the current practices.
- It based on the concept of probability.

- It can be made easily with certain level of accuracy.
- For an accurate conclusion it is essential that all variables except experimental variable should be controlled.
- The results also concern only to the conditions.

8) Replications:

- It is sensible when an innovation has provided the basis of some current belief, that the findings still hold true.
- A treatment is repeated a number of times in order to obtain a more reliable estimate than is possible from a single observation.
- It provides an estimate of the error to which comparisons are subjected.
- It reduces the experimental error.
- It broadens the scope of experiment.

C. Assessment

This scheme, it comes under skill development, implementation and presentation. This can be implemented as follow:

1) Seminar

- It is an exchange of idea.
- It is a way of passing the information about respective topic.
- It is an essential platform where we share information.
- It includes questions, discussions, guidance, and encouragement of topics.

2) Workshop:

- It gives information about design tool used for innovative idea.
- It is a platform of where demonstrate the design tool.
- It is a portable industry where provide the hands on experience on design tool.

3) Conference:

- A prearranged meeting among participants especially one with a formal agenda.
- It is a place where we exchange information in the form of presentation, poster, animated videos etc.

4) Industrial visit

- It provides the awareness about realism.
- It gives information about working environment, function, practical aspects.
- It is a way of real and application based teaching.
- It is most effective way of teaching and learning.

5) Apprenticeship programme

- It is a real time small work in industrial environment; through provide awareness about innovation into realism.
- It is an initial stage of working in an industrial environment.
- It is boundary of relative and respective working field.
- It is a route of successful engineering.

6) Project Exhibition

- It is an implementation of idea into realism.
- It is a museum where we set-up, develop, and deliver theoretical and practical knowledge.
- It is an interaction among people.
- It creates enthusiasm and stimulates to do something different that one is useful to us.

4. Result of ITL Strategy and Scheme

The above strategy and schemes are implemented on 50 engineering students and their feedback of each month is tabulated based on average of individual students. Table 1 shows student response on ITL strategy. Fig. 7 represents the month-wise chart layout and Fig. 8 represents overall performance of student response on ITL strategy. From Table 1, the decide-focus-act strategy has major variation as compare with other strategy because in stressful situation student are not able to face the problems (exam period) and reason is that, pick period of curriculum. But, they are not distracting their curiosity, observation, and intellectual strategy accepts little bit variation.

Table 1. Performance of Students Feedback on ITL Strategy

ITL Strategy	First Month	Second Month	Third Month	Overall Performance
Curiosity	94	91	97.96	96
Observation	97	98	95	96.66
Intellectual	89	93	94	92
Decide-Focus-Act	87	90	96	91
Average	91.75	93	95.5	93.175

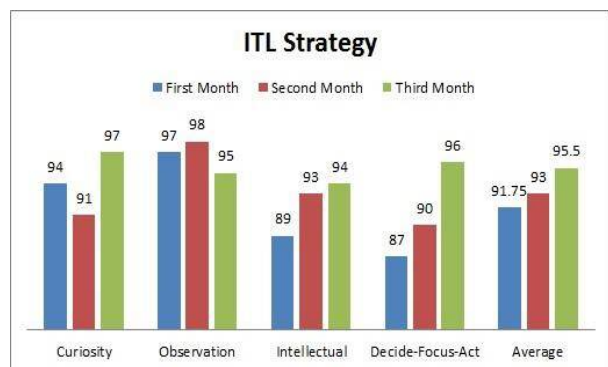


Fig. 7 Month-wise chart layout



Fig. 8 Chart layout of overall performance

Table 2 shows student response on ITL scheme. Fig. 9 represents the month-wise chart layout and Fig. 10 represents overall performance of student response on ITL scheme. The assessment scheme creates stepwise stress as curriculum is going on. But, it effects on evaluation scheme and 30% - 70% scheme. This scheme is based on regular analysis of individual student. Considering little bit variation this one is the highly stimulating and effective scheme.

Table 2. Performance of Students Feedback on ITL Scheme

ITL Scheme	First Month	Second Month	Third Month	Overall Performance
Evaluation	98	95	92	95
30%-70%	92	91	94	92.33
Assessment	88	94	98	93.33
Average	92.66	93.33	94.66	93.55

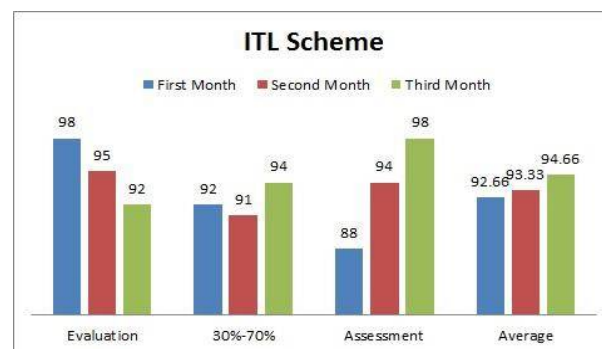


Fig. 9 Month-wise chart layout

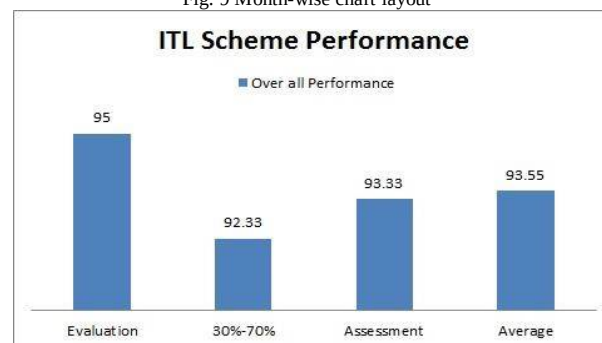


Fig. 10 Chart layout of overall performance

5. Conclusions

In this paper, innovative teaching and learning (ITL) strategy and schemes with their implementation is presented and it has been implemented on engineering students. The realism of results is reported in Section 4. The response in terms of feedbacks is tabulated separately in Table I, Table II and their chart layouts in Fig. 8 to Fig. 10. The results show very good output month-wise along with overall performance is excellent. We proved that, based on Section 3 information, the implanted method is outcome based with overall emerging methodology of student life.

References

- Richard J., Evaluating Teaching Innovation, Centre for the study of higher education.
- Kevin C., Bryan B., and Jack S., (2014) Thinking Innovatively about Teaching Innovation And Ideation: Getting Students to Think Differently, Journal of Research in Innovative Teaching, CA USA, Volume 7, Issue 1.
- Michel P., and Richard F., (2006) Inductive Teaching and Learning Methods: Definitions, Comparisons, and Research Bases, Journal of Engineering Education.
- Michel P., and Richard F., (2006) The Many Faces of Inductive Teaching and Learning, Journal of College Science Teaching.
- Khe F. H. and Thomas B, (2007) doi: 10.1007/s11423-006-9022-52013.
- Clive D., Alice A., Ozgur E., Daniel F., and Larry L. (2005) Engineering Design Thinking, Teaching, and Learning, Journal of Engineering Education.
- Tedman D. and Jain L.C. (2000), An Introduction to Innovative Teaching and Learning doi: 0.1007/978-3-7908-1868-0.
- Singh Y. K. (2006), Fundamental of Research Methodology and Statistics, New Age International (P) Ltd., New Delhi.