

7. SYSTEMATIC LEARNING PLAN (SLP) MODEL-TO MAP GLOBAL STANDARDS IN TECHNICAL EDUCATION

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Abstract

Technical education is in demand with the current boom in the IT market. Career opportunities in the field of IT are on the rise, not only in our country but also across the world. Industries come for campus placements but comment that present day graduates from engineering institutes are not fit for industry environment due to casual attitude and lack of technical skills. These graduates end up getting jobs in small scale IT sector at lower rates and with lower job profile. Industries want people with a mix of sound technical skills and soft skills. Hence, there is an urgent need to focus on teaching learning process and think of how to make this process more effective. The Systematic Learning Plan- SLP Model was implemented in various phases for effective teaching learning and thereby match the college output with what the

1. INTRODUCTION

Technical education is important for the progress and development of a country. It is a part of the tertiary education system taken by a smaller ratio of standard XII students. The Government of India has strongly focused on upgrading the educational standards of higher education Institutions. This focus will enable the students to face challenges ensuing from global competition and make them employable anywhere in the world. Earlier Government funding was used to finance the Technical Institutes but over the past two decades; self-financing Institutes have mushroomed all across the country. These institutes have made significant monetary investments for infrastructure but may lack in procuring competent faculty. This has resulted in a large number of pass outs hunting for good and lucrative jobs in the global market.

2. WHERE DOES INDIA STAND IN THE GLOBAL CONTEXT?

With open door policy, the foreign Universities have already started operation in our country. Students would rush to secure admission in these Universities at very meager costs as compared to the expenses abroad. From the platter of degrees given by foreign Universities, Indian Government and private Institutes, it is obvious what the students would choose. The other stiff competition we face is from our Chinese neighbors who have efficiently flooded the Indian market with cheap use and throw toys and accessories. They have also stepped actively in the IT arena and will very soon leave the Indian software brains behind.

Can engineering teachers ignore these issues? With the onset of globalization, it becomes all the more important to lay

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substantial stress on the quality of technical education. The teachers of Engineering Institutes have to gear up their technical competence, commitment and attitude and prepare the students to face the competitive challenges. They will have to train the students to superior level of competence to survive and thrive wherever they work. In today's competitive scenario, students across the world are equipping themselves with the right skills and up to date knowledge to achieve professional success. Don't we want students from our Technical Institutes to be a part of the IT race? First, let us understand how the process of building competence in technical education has worked so far.

3. CURRENT STATUS OF TECHNICAL EDUCATION

Technical education is in demand with the current boom in the IT market. Career opportunities in the field of IT are on the rise, not only in our country but also across the world. Industries are going global and they expect the student to have a combination of sound technical skills in multi domain areas and soft skills to face their clients. Personnel from industries comment that present day graduates from engineering institutes are not fit for industry environment due to lack of technical skills and casual attitude. When industries visit colleges for campus placements they select less than estimated number because quality professionals are not available. Nowadays industries are employing cost cutting techniques to survive the global competition. They prefer to employ graduates from the Bachelors degree of Science, Computers, IT, Physics, Chemistry and Commerce background at lower rates and give them appropriate training to suit their requirements. So, what happens to the engineering graduates from colleges across the country? They would end up getting jobs in small scale IT sector at lower rates and with lower job profile.

The Indian technical education has reached this state because of a variety of reasons and a

few of these are listed below:

- **Lack of infrastructure:** A large number of colleges are facing the problems of weak infrastructure including space, instruments and facilities. In places where there is sufficient infrastructure faculty may not fully utilize the existing infrastructure. For example in many colleges, teachers and students do not use Internet Learning Management Software and email even though all these exist.
- **Outdated curriculum:** It is important to review and revise the curriculum and course content regularly to keep pace with changing technology with frequent inputs from the industry. One technique is to group the subjects into two categories: conceptual and technology related. The latter category should be revised regularly so that students do not feel outdated when they join the industry.
- **Lack of competent faculty:** Very often freshers join the college to teach, merely as a stopgap arrangement until they get an industrial job. Many of them lack the passion, motivation and technical skills. In addition, technical education is one of the professions where the entry-level faculty does not have a teaching methodology background. What teaching do you expect from them? Secondly, whenever changes are made in the curriculum, teachers need to keep themselves updated by attending Summer and Winter Schools and Short Term Training Programs.
- **Student's attitude:** Right from the school days students have cultivated a mentality to score irrespective of whether they understand the subject or not. This superficial knowledge is exposed during viva examinations and campus placements. The students realize the importance of in depth studies during the

final year placements but by then it is too late. In the entire group of students, there exists only a small percentage of students who are committed to studies and have a concern for quality.

- **Lack of Industry institute interaction:** Teachers should tap the rich body of knowledge and experience from the industry for the betterment of the students. They should organize seminars or workshops which could include a variety of topics ranging from subject knowledge, hands on technology, project management, sharing of experiences to the importance of soft skills in industry.

Like every coin has two sides, the management, teachers and students have their own perception of the status of technical education in engineering institutes today. All these beneficiaries should come together, review the current state, and prepare a plan of action to raise the level of technical education. One of the key issues is the need to focus on teaching learning process and think of how to make it more effective.

4. EFFECTIVE TEACHING LEARNING PROCESS

Before we work out a plan to raise the standard of technical education we need to first understand the concepts of the teaching learning process, which is dependent on various factors shown as in Table 1:

Factors	Features
Context	Attitude and environment of students and faculty
Input	Attributes of students and faculty
Classroom processes	Teacher student relationship and behavior
Output	Learning metric after instruction

Table 1: Factors on which teaching learning process depends

The factors listed in the table decide the effectiveness of the teaching learning process. The proposed Systematic Learning Plan- SLP model focuses on the classroom processes. Instruction delivery is termed as effective if the student comprehends what is explained in the class and he/she can apply it to a problem independently using logical and creative thinking skills. The prime focus here is on understanding the concepts and then applying them to get a solution.

There is an enhancement in learning when the student becomes actively involved in the learning process and takes up his/her own responsibility. Hence, it is important to encourage critical thinking amongst students. Active learning promotes the students to listen, read, write and reflect during the course through the use of various teaching methods like lectures, discussions, case study, projects, presentations and role plays. The major techniques used for effective teaching learning process include a blend of the above listed techniques. Integrating technology with the teaching learning process will definitely prove valuable for enhancing the learning experience of students.

5. IMPLEMENTATION OF GLOBAL STANDARDS IN TECHNICAL EDUCATION

If Indian technical Institutes were to seriously think of improving their standards, the day is not far when all our students will be placed in industries that come for campus placements even before they graduate. The industry expects

professional graduates from technical institutes to have:

- ❖ Sound technical skills
- ❖ Multi domain knowledge
- ❖ Creative and logical thinking ability
- ❖ Independent goal setting and decision making skills
- ❖ Interpersonal and communication skills
- ❖ Team work ability
- ❖ Attitude to persist and excel in task at hand
- ❖ Professional ethics

All the above skills will instill confidence in the student to be a winner in the global IT race. The question to ask ourselves is: Are we producing this category of graduates? The answer comes from the number of industries, who are unable to select even a handful of freshers and finally end up conducting walk in interviews to hunt for good resources.

6. TEACHING LEARNING PROCESS IN INDIAN ENGINEERING INSTITUTES

Our engineering courses are of semester pattern consisting of 14-16 weeks of academic teaching. Majority of the faculty follow the lecture method of teaching in order to complete the syllabus. If by any chance the syllabi are not completed, students are also smart enough to leave it for option. There is no evaluation metrics used on a daily basis to gauge the effectiveness of teaching.

As per the syllabus, a set of 6-10 experiments / programs are completed by students in the entire semester as a part of practical work. At the end of the semester, students submit a journal along with a set of assignments. Very often, the journals and assignments are blankly copied by students due to shortage of time or otherwise and submitted. It is a fact that this last minute copying does in no way aid in the learning process. The students get around 2-3 weeks of preparatory leave, which is effectively, utilized for exhaustive last minute

reading after which the exams commence.

Once the final exams are over, the subject is forgotten, similar to a volatile memory. The next semester begins after 2-4 weeks break and the ritual is repeated itself. It is no wonder that the output of Engineering Institutes is highly unsuitable for the industry environment in terms of the knowledge and work habits of students. Feedback from the industry indicates that students are unable to integrate, discuss and comprehend the subjects during trainings.

7. IMPACT OF CURRENT TEACHING LEARNING PROCESS IN THE GLOBAL CONTEXT

Industries coming for campus recruitments return with a mere handful of selections in spite of expecting large number. Industry feedback makes it very clear that conventional teaching methods are not effective. Our student's performance in industry aptitude tests is similar to those of Science and commerce graduates. It is a good enough reason for industries to pay less, employ these graduates and shun the low performers for technical institutes. This has resulted in career uncertainty for students. Every week numerous industries advertise for walk in interviews for fresh engineers. A horde of applications is received but culminate in very few selections.

The moral of this story is that the college output does not match with what the industry wants. Is our technical education up to the mark? Is there a need to focus on the teaching learning process? How do we make our programs globally competitive? The Systematic Learning Plan - SLP model is the answer to all these questions.

8. SYSTEMATIC LEARNING PLAN-SLP MODEL

As the name suggests, the objective of the SLP model is to prepare students for global placements by mapping and imparting the skills necessary in industries. The basic principle of this model is to move from teacher centered

learning to student centered learning and impart a mix of technical skills and soft skills, which match the global standards. SLP model is the answer to deliver quality education and ensure sustainability of engineering students. This model requires appreciable efforts, commitment from faculty and an ability to excel in delivering quality education to students. The SLP model is designed with the IT students in mind, but it is suitable for any subject where the faculty would like to deliver quality education and ensure 100% placements. It is a training model for a specific subject taught in a semester.

The SLP model is sub divided into two major components: SLP course material and the SLP delivery component. These components are briefly explained below.

8.1 Component 1: SLP Course Material:

This component consists of the syllabus wise course material in the format described below:

- Theory sessions:
 - ❖ Teaching plan with duration per topic and a list of sub topics
 - ❖ Day wise course content consists of reading/teaching material per session or assign page numbers in a standard textbook per topic.
 - ❖ An exhaustive bank of quizzes, assignments and critical thinking questions per topic to gauge student's learning
- Practical sessions:
 - ❖ Teaching plan for experiments in sync with the topics covered in the class
 - ❖ A lab manual consisting of experiments and details like aim, procedure, theory and flowchart. Students write the program, conclusion and answer a set of questions while doing the experiment.
- Use information communication technologies like Internet group, email and website or learning management software to upload course content and hence have instant communication with

faculty and peers.

- Involve all students in classroom discussion
- A question bank for open book tests, to be conducted in between the semester.
- A list of projects out of which students pick up one projects in groups of maximum four, and requiring 8-10 hours of effort per student
- Invite at least one guest speaker from industry to address the students.

8.2 Component 2: SLP Delivery Component:

- At the onset of the semester, gather information about students learning styles.
- Based on the inputs modify the SLP delivery component.
- Put forth SLP to students listing the advantages and get their buying
- Give the entire course material and lab manual to the students before the semester sessions begin.
- Session delivery:
 - ❖ Interactive discussions based on reading material improve thinking ability and make the students understand the concepts better.
 - ❖ End of day test or quiz enable students to gauge their learning
 - ❖ Evaluate the quiz in the class so students can revise their study techniques.
 - ❖ Based on evaluation of the test/ quiz revise key points and clarify confusing issues
 - ❖ Give confidence to students for what they have learnt.
 - ❖ Facilitate discussion and enable logical thinking among students
 - ❖ Improve teamwork ability and listening skills

through discussions.

- ❖ Encourage students to give examples so they relate concepts and integrate the topics together

9. HOW DOES SLP MODEL MAP GLOBAL STANDARDS IN TECHNICAL EDUCATION

SLP model is implemented after adapting to the course syllabi and students. It is guaranteed that the teaching learning process moves on the path to achieving global standards. This model helps the faculty to shift responsibility of learning to the student's shoulders. By giving pre reading material and asking questions, students get an opportunity to comprehend and retain information longer. The tests taken at the end of each day is a direct indicator of what the student has learnt in the session. Interactive discussions among students during the session trigger intuitive minds, thus tapping their creative skills and increasing comprehension levels. Projects focus on improving information gathering ability from the Internet, and make students aware of recent developments related to the subject.

As the student's learning responsibility increases, self-dedication and commitment also proportionally rise. Over a period of time the study techniques become a habit for the student. It is important that the SLP model is uniformly implemented by majority of the faculty in an Institute. The students will use the same model for all subjects and hence see the curriculum as a whole and not in parts. The open book tests enable the students to gauge their applications skills. Active learning through the implementation of SLP model aids in development of sound technical skills and soft skills making students confident to face the global competition in the future.

10. IMPACT OF SLP IMPLEMENTATION

SLP model was implemented in four phases

during the last two years for students of Degree and MCA.

Phase A:

A lab manual was prepared and circulated to all students in the class. Each experiment in the manual consisted of aim, procedure and theory while blank space was left for flowchart and program. Some critical thinking questions based on practical were also included in the manual. Submission of soft copy journals per student led to saving of paper and no maintenance requirement of hard copies. The most important advantage was that student productivity increased because they spent more time in answering critical/ logical questions instead of blankly copying journals.

Phase B:

This phase involved the development of soft skills through projects, group discussions and role-plays. Students readily grasped the concepts and applied them in discussions. Soft skills like presentation, teamwork and interpersonal skills were inculcated through interactive discussions and project work.

Phase C:

Regular Faculty Interaction Programs were organized at the start of the semester to implement the syllabi uniformly across all the colleges affiliated to a University. Faculties teaching the same subject got together to discuss the books to be used, teaching plan, how to go about teaching the syllabus and sharing teaching resources. This specially helped the junior faculty to make the best use of technical and teaching related expertise of senior faculty.

Phase D:

The model for theory session delivery included the use of pre reading material, interactive discussions in the class, followed by tests and quizzes. The number of students who were convinced and went through the pre reading

material increased gradually in the ensuing three sessions. Feedback from all students at the end of the three sessions indicated positive response to the test. Students felt that end of session tests enabled them to recall and review the days learning. The interaction no doubt kept the class lively, and students got time to think and discuss in peer groups. A few students indicated that longer tests would enable them to recall more content and would definitely help them in the end. Additionally slow learners got time to cope and understand through interaction with peers. Rapid learners provide inputs to the slow learners leading to effective utilization of cooperative learning techniques.

Implementation of phase A and B indicated 95% result in a average batch of students who were otherwise finding it difficult even to clear other subjects. SLP model also reduced time and efforts spent on studies before exams. Implementation of the SLP model with integration of all phases will assist in mapping global standards of technical education by developing:

- ❖ Sound technical skills through the use of effective teaching learning process and active learning technique
- ❖ Logical and critical thinking ability through questioning technique
- ❖ Soft skills like Interpersonal, team work and communication through group discussions and projects
- ❖ Learning environment by shifting the responsibility to the learner.

The various beneficiaries of this model are students, faculty, Institute and the Industry sector. The SLP model's focus is on active student learning which instills confidence and life long learning skills among students. This will ensure 100% placement of students in top industries across the globe. Campus placements will increase because of good quality output from technical institutes. They will definitely require less learning time in the industry and will be productive on the job right

from day one. This will result in reduced cost and efforts for industry trainings.

11. CULTURAL CHANGE FOR FACULTY AND STUDENTS

Faculty and students alike need to go through a cultural change to implement the SLP model. Since it is not a traditional method for both parties, there is a need to make a change in habit and put in efforts for developing the course material and using it during the semester. It is important to make the students and faculty aware of this information before jumping to use the model.

The cultural change required for student would include:

- Take out time to go through pre reading material on a regular basis.
- Attend the sessions to understand concepts, think and apply them.
- Participate and contribute in all the activities
- Maintain continuity in attendance and read and come if unable to attend the session.
- Make maximum use of technology for internal class communication
- Spend quality time and efforts on projects.

Similarly, faculty needs to go through a larger magnitude cultural change:

- ❖ Should possess thorough conceptual knowledge of the subject and awareness about recent trends.
- ❖ Prepare schedule and content prior to commencement of the semester.
- ❖ Develop an exhaustive question bank to cater to both slow learners and the highly intelligent cadre of students.
- ❖ Prepare to facilitate the session and lead the class.

- ❖ Be flexible to make minor changes in SLP based on regular feedback from students.
- ❖ Mentor and build confidence among students.
- ❖ Have close interaction with industry through alumni or otherwise to know what is going on in the industry.

Faculty should possess/develop qualities like commitment, caring, passion for discipline, command for instructional techniques, sensitive to institutional issues like workload and exams and enable students to approach learning in a more meaningful manner.

It is possible to develop superior quality course content with synergy of ideas given by faculty from Institutes affiliated to a University. Faculty interaction programs can be organized to collectively plan and develop the SLP model and review its implementation.

12. CONCLUSION

Few campus placements of our graduate engineers indicate degradation of current technical education. With current globalization and open door policy, there is an immediate need to improve the quality of graduate engineers. To cater to this need the Systematic Learning Plan- SLP model was implemented in phases at the graduate level. SLP model considers both processes and content issues to achieve quality-learning experience since it focuses on the quality of the learning outcome. Students have exhibited commitment and agreed to take

responsibility for their learning. Use of SLP model has reduced unnecessary workload barriers, thereby increasing learning capabilities of students. Improvement in education quality was observed within a span of just two semesters for one subject. But it is estimated that you can get maximum benefit if all the phases of the SLP model are integrated and implemented together by all faculties in any Technical Institute. The Indian technical education standards will map global standards, thus opening up a vast number of career opportunities for students globally. The time will not be far away when we can ensure 100% placement of our students.

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