

# Case Study: Integrated In-house Textbook Companion Internship

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**Abstract:** The curriculum design is an integral part of engineering degree, which is nowadays taking a paradigm shift. The syllabi for engineering graduates a decade ago was completely academic but now there is a scope for more real time analysis, which makes the students, be industry ready. This is more beneficial as it will require less training period for the students, when they are absorbed in their respective industry. Therefore, the internship programme has been included in the curriculum of most of the universities and being a credit course, it allows more students to participate. In addition, if the interns score credits for the same, the method of evaluation and assessment tools needs proper design. Our Textbook Companion Internship was offered online during the outburst of pandemic (COVID-19). The main objectives of this internship is to provide an integrated learning experience, i.e., integration of theoretical knowledge and software tools (Simulation based study) i.e. essential to bridge academic-industry gaps. The objective is achieved by modifying the assigned tasks to interns on daily basis and evaluating their work and by giving feedback. This has helped the interns to understand the theoretical concepts together with simulations.

**Keywords**— Outcome Based Approach; assessment tools; textbook companion; internship.

## I. INTRODUCTION

The meaning of Internship for engineering graduates is define in the following manner: “An internship is a temporary work placement – sometimes a few months over a summer break, sometimes part-time work throughout your degree”. Therefore, engineering graduates are looking for some opportunities in the industry so that they can be industry ready for the future. Many universities in India are incorporating the concept of internship programme. The internships opportunities offered by many corporate organizations, start-ups and by public sector undertaking. Nowadays curriculum design keeps the provision for the engineering graduates to look for such opportunities and earn some extra credit for the same.

Since the internship programme is now mandatory in our university and the engineering graduates has to earn extra 16 credits for the same during four years of engineering programme. Therefore, in the present curriculum, there is a provision for both external and internal (in-house) internship. Interns gather external opportunities from various industries.

However, for in-house opportunities the professors working in the university float it as per their requirement and working areas of research. Since the industry cannot absorb all the interns, the interns are also motivated to take in house internships. Internship offered seek to help interns in the following manner.

- An opportunity to get hired by the Industry/ organization
- Excellent opportunity to see how the theoretical aspects learned in classes are integrated into the practical world.
- Opportunity to learn new skills and supplement knowledge.
- Opportunity to practice communication and teamwork skills
- Opportunity to learn strategies like time management, multi-tasking etc. in an industrial setup
- Enhances their candidacy for higher education.
- Helps them decide if the industry and the profession is the best career option to pursue

The defined objectives of the Internship in the curriculum of our university are as follows:

*1. Exposure to the industrial environment, which are not simulated in the classroom and hence creating competent professionals for the industry.*

*2. Provide possible opportunities to learn understand and sharpen the real time technical/managerial skills required at the job.*

*3. Exposure to the current technological developments relevant to the subject area of training.*

*4. Create conducive conditions with quest for knowledge and its applicability on the job.*

The observations are by the fact that engineering graduates have to be motivated to take in the **Outcome-Based Education (OBE) approach**, which is one of student- centered learning methods that focus on measuring student performance. [3], [4]

Researchers have found some of the advantages of an OBE approach which are mentioned as

follows

- a) Quality of the graduates produced
- b) Development of more systematic, innovative and flexible teaching methods
- c) Increase in student exposure to professional practice through internships and projects [3] so that every graduate is supposed to acquire attributes in knowledge, skill and attitude domain.

The OBE approach means a commitment not only to provide an opportunity of education and promotion but a commitment that all students will ultimately reach the same minimum standards. The methods of content delivery and assessment tools have to be properly developed. [4]

Observations through feedback and analysis obtained from interns after the completion of internship indicated that it has helped students to understand the practical (simulated result) of the theoretical problem solving technique. This has generated great interest in the minds of interns and motivated them to earn extra credit by utilizing their free time.

## II. METHODOLOGY

An engineer should be a designer, thinker, innovator and systems integrator. Hence, the educational system should inculcate into a student various aspects like engineering design, standards and practices, research methodologies, modelling and optimization capabilities, systems analysis and integration techniques.

Internship is a collaborative learning approach in which students actively explore real-world problems, challenges and acquire a deeper knowledge in their respective domain. A vigorous encouragement of higher order thinking and information skills, e.g. problem solving, access, organization, interpretation and communication of knowledge and this can be inculcated through internship [2]. Therefore, selection procedure of interns plays a vital role for successful completion of internship.

The awareness regarding this in-house internship on Textbook Companion conveyed via an email to the first year engineering graduates from Electronics (ETRX) and Electronics and Telecommunication (EXTC) stream. Since this internship is related to basic electronics and electrical circuits. We received around 44-interested student's applications but due to some constraint like limited human resources and evaluation time, the seats were limited to 24 only. This selection criterion was performance based on written

exam.

Following evaluation test were provided to the students

1. **Test Category 1:** General Knowledge (COVID- 19 Awareness) (20% weightage )
2. **Test Category 2:** Logical Reasoning (30% weightage )
3. **Test Category 3:** Verbal Aptitude (30% weightage )
4. **CGPA Score:** (20% weightage )

## III. TRAINING AND PROBLEM SOLVING

The start of any internship required some prerequisites.so that outcome can be achieved without any external factors during the pandemic situation.

- Core knowledge of solving Electronics circuits
- Laptop/PC in working condition with good internet connectivity.
- Prior knowledge of circuit simulation in LT Spice.(Open Source Software)
- For the usage of LT Spice, training was provided to the interns.



Figure 1.1 Training and Problem Solving Sessions

## IV. INTERNSHIP WORK FLOW

The internship workflow is a daunting task and the interns should be clear about the whole process as it was in online mode. The expectations of the mentors were high. The interns have to complete the work assigned by mentors to complete the duration of 40 hours and the credits earned by them is one. This was a time bound internship. Since the mentors used to assign work a day before and the next day, their work is evaluated.

Before the start of internship, the internship cell of the university about the duration in terms of days and date and other details of the interns.

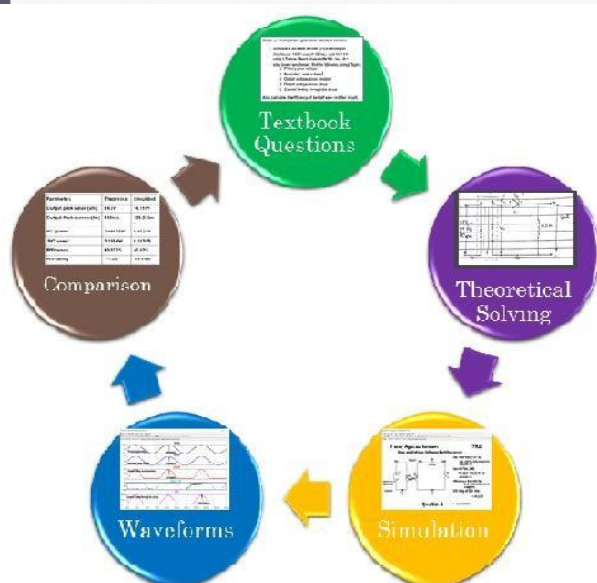
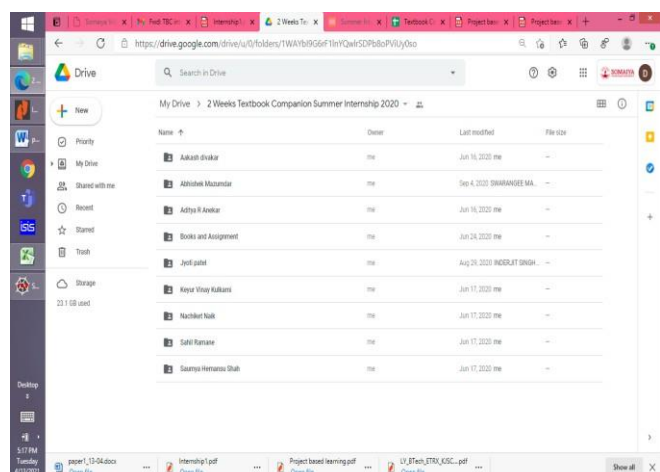


Figure 1.2 Internship Workflow

## V. TASKS ASSIGNED

The tasks assigned to the interns were theoretical concepts of Electrical and Electronics Engineering covered by the students in their first year. Concepts taught in the class were given as problems that had to be simulated and validation of theoretical results were achieved with simulated results. Following procedure was to be adopted by interns.

- Download & install the latest version of LT Spice in Laptop or PC.
- Rebuild textbook circuits assigned by the mentors in LT Spice.
- Create LT Spice “.asc file” along with waveforms for all assigned circuits.
- Save all circuit simulation .asc files in the Google drive Workspace

## VI. EVALUATION AND ASSESSMENT OF TASK

As mentioned earlier, the internship programme must

be a credit course and interns will get one credit for 40 hours work. This internship was offered during vacations for 3 weeks continuously. If conducted properly, internship programme can help in molding the career of students as successful professionals [1]

Since the main objective of the internship programme is to prepare the students for professional life and to make them to evenly understand their theoretical and practical knowledge, so during this period more emphasis was on achieving some changes in the outlook of interns. This has helped the interns in different manners. Such as

- Improvement in their interpersonal skills,
- Improvement in communication abilities (both written and oral)
- Make independent decisions,
- Improvement in practical knowledge domain,
- Meet the deadline. [1]

The hallmark of any educational programme is continuous evaluation irrespective whether it is in-house or off campus. Even in internship programme, similar to on- campus courses, the interns has to be evaluated through a series that are normally required for a student to be successful in their professional life

The total count of interns after clearing the first written test was 24. Since we were three mentors in this initiative, so for proper evaluation of their work groups of eight interns were assigned to each mentor. Each mentor created a separate folder for each intern and shared it with him or her.

Every day at the start of the day, each mentor assigns an online task to each intern and the intern has to complete that task in stipulated time and at the end of the day, each mentor evaluates the work through the online meet and cross check their theoretical result with practical values obtained from software simulation.

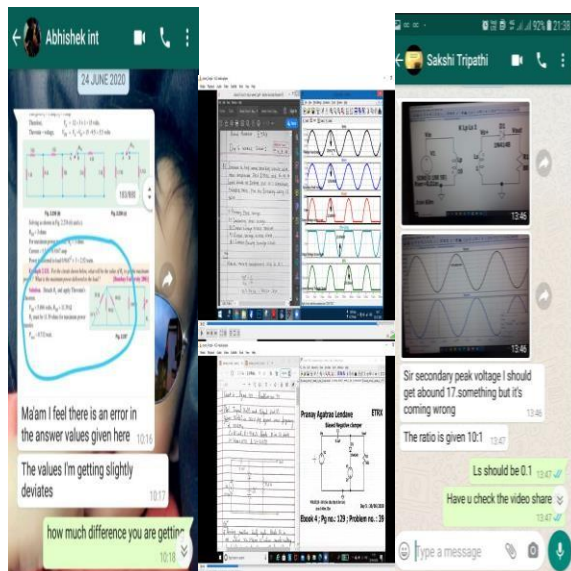
This evaluation process has helped the interns by engrossing them in their work and to get the results for the given problem. Later at the time of assessment, they could understand the issues and the problem solving techniques also.

Figure 1.3: Evaluation and Assessment of Task

The following given below clearly indicates the problem solving procedure adopted by the concern mentor for his or her intern. This procedure is to be adopted for the complete internship and at the end this work has to be shown, the mentor gives his or her opinions,

which in turn helps in solving issues. Hence, the mentors do evaluation of their work. Finally, interns keep all the data in the drive for future use.

Figure 1.4: E-evaluation



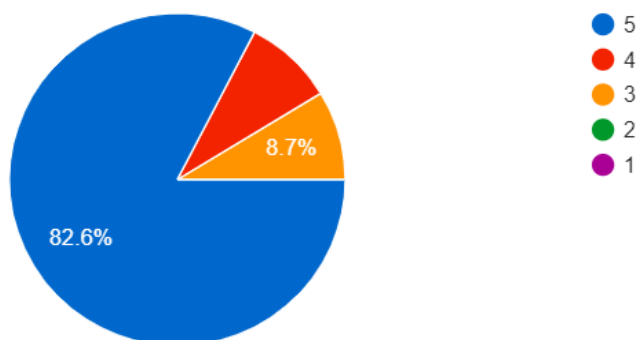
## VII. FEEDBACK

The internship programme was for 2 weeks, we were keen

**Q1-How many hours in average you have spent in completing the assigned work per day?**

Figure 1.5 Analysis of average hours spent in completing the assigned work per day

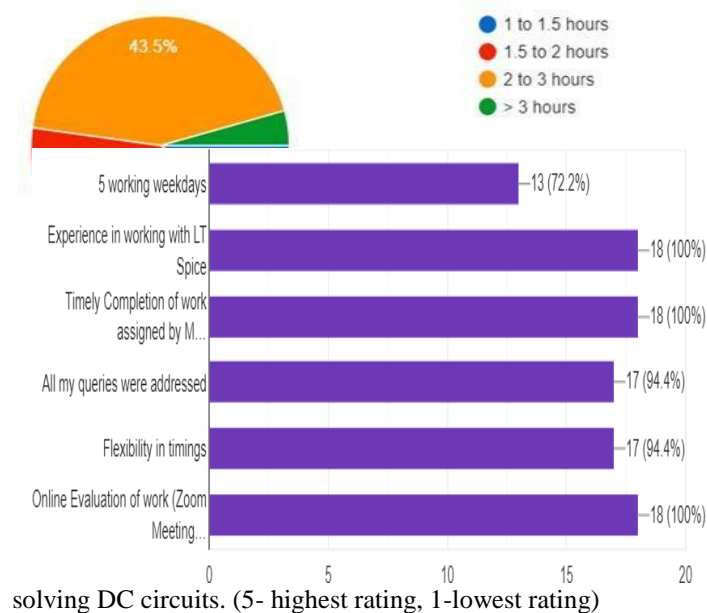
**Q2-Rate the quality of daily work evaluation via Zoom Meeting/WhatsApp?**



**Q3-Internships Week 1 Checkbox: Kindly tick the boxes (as per individual experience which has been met)**

Figure 1.7 Analysis of intern's individual experience on different points of week 1

**Q4- Whether the training videos proved to be helpful in**



solving DC circuits. (5- highest rating, 1-lowest rating)

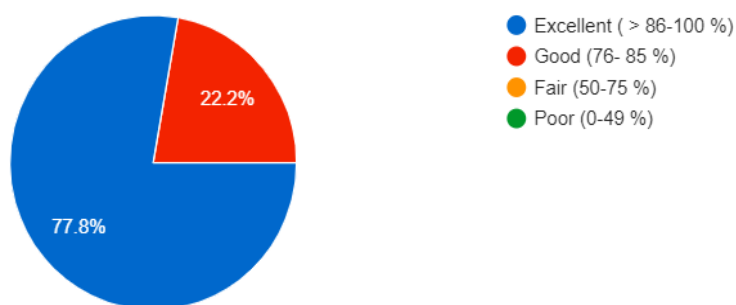


Figure 1.8 Analysis of usefulness of DC circuits training sessions to the interns

**Q5-Whether the training videos proved to be helpful in solving AC circuits? (5- highest rating, 1-lowest rating)**

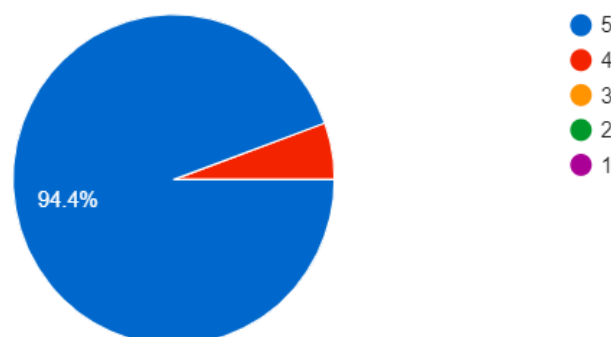


Figure 1.9 Analysis of usefulness of AC circuits training sessions to the Interns



Q6-Internships Week 2 Checkbox: Kindly tick the boxes (as per individual experience which has been met)

Figure 1.10 Analysis of intern's individual experience on different points of week 2

## VIII. INTERNSHIP STATISTICS

The internship statistics were taken on menti.com. This website has helped us in getting the opinion of the interns regarding this integrated in-house internship.

Figure 1.11 Internship Statistics



## IX. CONCLUSION

Through this internship, we have taken an initiative and found that an engineer can become a thinker, creative person or innovator only if he is allowed to independently put together all aspects of learning to solve a practical problem and look at alternatives. While an internship allows them to learn engineering practices that are executed in the technical world. Tutorials and laboratories allow them to demonstrate engineering problems up to a limited platform; only an internship gives them the opportunity to become a problem solver or an innovator. Hence, Internship is a very important constituent of our engineering curriculum. Nowadays it is necessary to understand the role and importance of internship with real learning in the professional world.

Following are the key observations based on the performance of interns

- Interns were able to correlate to cut through competition that exists around, as they were selected based on written exam.
- They learnt about how to handle workload pressure since the mentors continuously evaluated the problems given to them.
- They could understand the practical aspect of a theoretical problem since the results obtained in problem solving were simulated to have better understanding.
- They learnt about building good rapport with their mentors due to timely submission of work.

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