Chapter 4
Results and Discussions

This chapter consists of the following sections:

- Prologue
- Discussions on the results
- Summary
CHAPTER 4 – RESULTS AND DISCUSSIONS

4.1 Prologue

The results of the research work have been discussed under each of the research objectives that have been set for the purpose of clarity of the research investigation.

4.2 Research Objective 1: To validate the definition of the term 'learnability'

It is observed from primary research that recruits with learnability have:

1. the willingness to learn
2. ability to apply knowledge

The following additional inferences were drawn from the survey.

1. Every respondent who chose Hardworking also chose Willingness to learn and Ability to apply knowledge as preferable in a recruit. Hardworking is a quality of an individual. Hence it can also be deduced that willingness to learn and ability to apply knowledge by a hardworking individual leads to learnability.

Group Discussions were held with experts to understand the defining qualities of hardworking students. The attributes arrived at were:

- Self Motivation
- Disciplined
- Responsible
- Committed
Confident

It is interesting to note that learnability is seen as a combination of something internal and external in an individual. While ability to apply knowledge can be seen by the external world and is possible to measure more easily as it can be quantified and compared, the internal aspects of learnability which is the willingness to learn is much more complex and subjective to assess. It is possibly for this reason that we do not see any accepted measure of this aspect, both in the academic as well as the Corporate world. However, this aspect of willingness to learn seems to be the building block that differentiates individuals who develop huge potential in the future versus the laggards. In a learning conscious society that we are in, it becomes all the more important since the schooling environment, at least in metros, have changed so much in the private institutions that they focus a lot more on ensuring that students are motivated to learn and do not focus on clearing exams. Whether this leads to increased willingness to learn is not yet known. However, there is an increased awakening among the educated mass of the country that they do not want their siblings to become maroons and are keen to put them through an education system that provides a multifaceted growth. However, as children grow and the social fabrics start putting the pressure on them in terms of a career-oriented life, their focus shifts from learnability to adapting a straight-jacketed system that forces four years of their life to move as a “rail on its tracks” with little room for creativity and self direction.
4.3 Research Objective 2: To develop an instrument to measure learnability of engineering students

A student who has learnability is:

1. Self motivated
2. Disciplined
3. Committed
4. Confident
5. Responsible

While the above are qualities of a student with learnability, research has indicated that the behaviors exhibited by such student are as follows. Such students:

1. are open to change
2. take feedback in a positive manner
3. can set and achieve goals on their own
4. have high goals and aspirations in life
5. have reading as an hobby
6. keep discussing in the class with others
7. try to explore deeper into a subject
8. attend all classes without absenting
9. keep asking doubts in the class
10. think and talk about their future
A vital data collated as part of the research has been on the learnability of students in urban and rural areas. A correlation of 78 samples indicates that in comparison to students from urban areas, students from rural areas,

- have better academic scores
- are more self motivated
- are more committed
- are more disciplined
- are more responsible

All the above items are statistically significant.

There is no statistically significant difference in the confidence level of students from rural and urban areas. This is an indication that learnability is more self driven.

The **Aptitude to Learn Instrument (ALI)** has been developed to measure the qualities of students with learnability. This instrument has been proved to be statistically reliable and valid.

Any instrument is as good as how it is utilized. It is important that ALI is positioned as a non-threatening instrument. It is more of a self-diagnosis and a developmental tool. This is more relevant as the area that it is trying to measure is a soft aspect which is more relative in nature. The instrument has several statements which have to be rated by the individual in terms of where he or she is currently. It should not be where the respondent feels that he or she should be. This needs to be explained in a congenial manner as the error that can creep in due to this aberration can go unnoticed and the debrief can get influenced. Hence this instrument is very contextual and should be currently used only in the fresh engineering recruit community. More intensive data gathering across the social
fabric and analyzing them statistically can help arrive at relevant norms that can support calibration of this instrument across geographical, social and linguistic layers. Once calibrated, it is important that the appropriate normative instrument and pointers are used so that the debrief can be more precise and relevant to the assessed. To arrive at the willingness to learn, though the qualities are being looked into, the instrument has been conceived as a congruence of a tri-dimensional assessment on an individual’s behavior, habits, and qualities. Hence, during the debrief, the assessor has to bring out their best skills in linking across this grid based on making the assessed comfortable and open to have a discussion rather than a one sided narration.

The IT industry is the focal point of our research. Let us now discuss on how the IT industry can contribute to the learnability of engineering students.

Fig 4-1 Cultivating Willingness to Learn in the Corporate Context
Self motivation, commitment and responsibility are qualities that can be nurtured by providing employees the correct work ambience, adequate roles that are commensurate with their skill sets, motivation and encouragement through good reward and recognition system. For example, self motivation arises out of higher aspirations. Hence, the expectations from managers on fresh recruits need to be high. They should not be seen as inexperienced liabilities. They should be seen as the future stars of the organization.

If we look at the pyramid, we observe that while disciplined and confident are qualities where the academia can contribute to a large extent, they can only contribute little to the higher three levels, namely, self motivated, committed and responsible. This is where the Corporate sector can bring about the continuity of ownership to build willingness to learn. They can create the DNA for the higher three levels.

4.4 Research Objective 3: To identify the dominant learning styles of engineering students

The result of the study in the above subject indicates that the adapted learning styles of the students are:

1. Understanding the subject by using many realistic examples (Sensing learners)
2. Following a logical sequence to learn the subject (Sequential learners)
3. Learning by thinking through the subject (Reflective learners)
4. Learn by drawing mental images of concepts learnt (Visual learners)

It has also been observed that there is no difference between the learning styles of students from Urban and Rural areas.
It is time for us to compare the learning styles of students globally and that of students from the Indian engineering colleges. According to Richard Felder, it has been observed that conventional lecture-based teaching approach in engineering education favors

- Intuitive
- Verbal
- Reflective
- Sequential

learners. Hence there seems to be a mismatch in the learning style of engineering students in India and their global counterparts.

The learning styles of engineering students in the country get influenced by few distinct environments that prevail. Firstly, the entire responsibility of learning and performing well in the studies lies with the individual. The support system from parents and relatives that exist while studying in schools gets suddenly disconnected. Parents feel that after their children get admitted into a professional course, their responsibility ceases and hence they do not encourage discussion around learning that happens at the college on a daily basis. Discussions within family members start becoming more of a social subject like traffic, weather or relationships. Secondly, there is a distance between the faculty and the student in an engineering college compared to the school environment. Most school teachers remember their students and have a long lasting bond with them. But engineering faculty hardly remembers all the students by their name. This is also because unlike in school, where there is a class teacher, with whom students can associate with, almost all faculty in engineering colleges are like invited teachers for each subject. So,
there is no great need for a bond and hence, the learning responsibility is not shared.

Thirdly, the types of students who get into engineering are those who score high on the subject of mathematics, physics and chemistry. These subjects are highly sequential in nature and not exploratory like arts. The combination of these factors make engineering students in India more of what they are which has come out in our research findings.

4.5 Research Objective 4: To examine the dominant teaching methodology used by the faculty of engineering colleges

Exploratory research on the above subject indicates that engineering faculty

1. Use many realistic examples in the class - matches the sensing learning style students
2. Follow a logical sequence of the course flow to help students learn the subject - matches the sequential learning style students
3. Kindle the interest of the students and assist them to think through and learn the subject and learn - matches the reflective learning style students

Further, it has also been observed that the teaching methodology remains the same in colleges at Urban and Rural areas.

The preferred choice of profession amongst the engineering graduates is the Corporate world. Many or most of them who miss the train to the Corporate houses choose to enter the teaching arena. They complete their post graduation and opt for teaching as a profession, hence they are very good at their subjects. However, since they do not have any formal exposure to education on the “teaching-learning processes or education on the subject of education” they fail to appreciate the need for updating their teaching methodologies and keeping in sync with the current needs. Since students are forced to
score well to be part of the rat race they get adapted to the teaching methodologies. Possibly the teachers also do not see a need for alternate methods since the output from the student community in terms of their academic scores is good.

4.6 Research Objective 5: To explore the alignment between the learning style preference and teaching methodology

The results from research objective 3 and 4 indicate that the adapted learning style of engineering students is:

- sensing
- sequential
- reflective

The teaching methodology also encourages such students. This can be attributed to the below factors

1. Admissions to the IITs are based on performance in a competitive examination. For the B.Tech and the Dual Degree programme the criteria is performance in the Joint Entrance Examination (JEE). More than 3,00,000 students appear for the JEE exams

2. More than 5,00,000 students appear for the various other entrance tests for other engineering institutions

3. Engineering entrance exam papers follow the same pattern and students have to get through the same with flying colors to win in the tough competitive environment.
4. All the AICTE approved colleges follow a set semester pattern for conducting the courses and hence faculty cannot deviate too much on the teaching methodology owing to time constraints.

5. Learning is an individualistic process and not exploratory in nature. Learning Style is a preference and hence students adapt to the style of the faculty since the rule of the day is “survival of the fittest”.

4.7 Research Objective 6: To understand the impact of learning style and teaching methodology on the learning outcome of Indian engineering students.

Learnability has been defined as a combination of academic score and willingness to learn. The relationship between the two is depicted in Figure 4-2.

![Relationship between Learnability & Academic Score](attachment:image)

**Fig 4-2** Relationship between Learnability and academic scores
The education system in India starts off by encouraging learnability but unfortunately it gets muted by the time an engineering student graduates. The correlation coefficient of learnability and academic scores is -0.07 which is almost zero, hence there is no correlation between the academic scores of students and their learnability. This implies that a student scoring well in academics may or may not have the willingness to learn.

4.8 Summary

There appears to be a big stress amongst the student community in trying to balance the triad of learning outcome that is depicted in Figure 4-3.

![Fig 4.3 The learning outcome triad](image)

The teaching methods and the societal expectations are so strong that the entire focus of their energy is on getting better academic scores. Given the fact that there is hardly any correlation between academic scores and willingness to learn, it will require similar or
even higher level of energy to develop the qualities that willingness to learn demands. With practical constraints like no time to go to libraries, lack of encouragement to ask questions in the class or share ideas among a group it appears that getting academic scores and developing willingness to learn will remain as distinctly separate facts. Unless the evaluation mechanism is modified to provide marks for the behaviors that develop willingness to learn, this chasm will continue to exist. The recent development of encouraging private Universities is a great positive step in this direction as the controls that exist currently on curriculum, teaching methods and assessments are left to the University. With the promotion of the open competition environment where students are free to choose their Institution of study, it is only a matter of time by when a clear alignment arises from the triad above and the entire education system is rejuvenated.