CHAPTER – 1

1.0. INTRODUCTION

India is the world's largest engineer-producing country. Globally, the first university degree awards in Science and Engineering fields, broadly equivalent to a bachelor's degree, totalled more than 7.5 million. Almost 25% of these degrees were conferred in India (NationalScienceBoard, 2018)**.** Every year, around 1.5 million students in India enrolled in engineering programs, 7.7 lakh students complete their under graduation, and 3.7 lakh students get placement. One of the most popular degrees in the country is engineering. Engineering is viewed as a profitable career option among students. Enrollment in engineering colleges, on the other hand, has been steadily declining at a rate of roughly 4.9 per cent each year during the last five years. Similarly, the number of engineering colleges has decreased by roughly 2.15 per cent per year over the last five years (AICTE, 2021)**.** This alarming decline in the intake and institutional strength suggest that there is a need to look at the contributing factors that may be influencing this observation.

1.1. FACTORS ASSOCIATED WITH DECLINING ENROLLMENTS IN ENGINEERING PROGRAMMES

The contributing factors can be attributed to both external and internal causes. Some of the external factors associated with declining enrollments in engineering programmes include a lack of qualified faculty members, a lack of quality checks in academic appointments for technical teaching, a lack of research facilities, inadequate infrastructure, the weak linkage between engineering institutions and industry, lack of funding, graduates' lack of employability skills, employers' expectations of uncompromised superiority in their

employees' skill sets, and a negative public perception of engineering as a profession (Madheswari & Mageswari, 2020). Other internal factors that challenge students are low self-esteem and academic procrastination (Batool et al., 2017). Challenged with both external and internal factors, it remains a predicament in higher technical education, to meet the needed infrastructure from outside and enhance the intrinsic characteristics of students for the best quality output. This endangers the long-term expansion of technical education in India.

1.2. TECHNICAL EDUCATION IN INDIA: CURRENT STATUS

Despite all these adversities, students still consider engineering as a prospective and lucrative career option. In India, every year there is a 3.4 per cent increase in placements for engineers in the last five years (AICTE, 2021). Employability skills/competency deteriorated to a great extent and a report by Industry bodies, only 20%-30% of Engineering Graduates are employable (Mishra, 2017). The employability of Indian engineering graduates has remained unchanged over the last nine years. Even now, 80% of engineers are unfit for employment in the knowledge economy (Aggarwal et al., 2019). This increasing placement trend suggests that technically qualified graduates are always in demand in the industry. However, the industry always looks for potential and able candidates. This leads to a lot of rejection of mediocre graduates. Around 55.90 per cent of engineers are rejected because they are not soft-skill trainable in a short amount of time, while around 56.58 per cent are rejected because they are not technically trainable (Aggarwal et al., 2019). India's education system needs to focus more on developing students' life and career skills. If India's education system can transform those numbers into a trained workforce with the necessary diversity of abilities, it has the personnel to

significantly satisfy the needs of a globe in need of talented employees (Mohanty, 2016).

1.3. THE GAP BETWEEN ENGINEERING GRADUATE AND INDUSTRY REQUIREMENTS

The ladder of success in an engineering career comes with a lot of hard work and calibre. Moreover, the process of making a successful engineering graduate is supported by the educational setup and the family setup. Ideally, a career chosen with inherent interest and commitment is more likely to produce the best human resources. However, the prevailing social perspective in the country/Tamil Nadu is quite discouraging. Many students tend to take up engineering because it has been projected and perhaps mandated by their families. This has led to a large number of enrollments into engineering colleges without a quality turnover of human resources. This fact has been repeatedly affirmed/acknowledged by the industries. The industry has its own set of requirements for employing well-trained and highly qualified graduates who meet their needs. Students, on the other hand, still lack the necessary soft skills, managerial abilities, and technical skills (Almi et al., 2011).

1.4. EDUCATION FOR SUSTAINABLE DEVELOPMENT

At the global level, UNESCO emphasizes Education for Sustainable Development (ESD), which enables a country to address the emerging social challenges with adequate knowledge, skill, attitude, and taking responsibility for the future generation (UNESCO, 2019). However, the foundation for any sustainable practice stems from adequately fulfilling the actualization needs at the levels of self, family, organization, and society. Unfulfilled actualization needs always challenge further growth. Hence, it is very essential to ensure that a student finds that secure space, both within himself, within the family and

with close peers so that we prepare a psychologically healthy person to meet the challenges of society.

1.5. IMPLICIT ATTITUDE AND SELF-CONCEPT

This being an important issue, we attempted to study the psychological profiles of engineering students regarding their engineering career choice. Understanding attitudes have always been a challenge for psychologists as it is clouded by several social desirability factors. Recently, implicit measures have emerged as a potential tool to assess inherent attitudes and stereotypes. Implicit measures help us to understand the inherent preferences without the influence of such external social desirability factors. Among various implicit tools, the Implicit Association Test (IAT) has become very popular and a lot of validation studies have been conducted using that tool (Greenwald et al., 1998). The implicit preferences, self-concept, and attitudes of a person are assessed using a computer-based reaction time task known as the IAT. The Implicit Association Test (IAT) assesses the amount to which two target ideas (e.g., I/Me) are linked in memory to positive and negative evaluative characteristics, resulting in a prediction of implicit attitudes (Karpinski & Hilton, 2001). Some studies have used IAT to investigate various psychological constructs like self-esteem(Karpinski, 2004), personality (Grumm & von Collani, 2007), and gender association (Lewis & Lupyan, 2020; Smyth & Nosek, 2015).

1.6. PARENTING STYLES AND EMERGING ADULTHOOD

The parental role in shaping children's psychological makeup is crucial. In India especially, the majority of emerging adults depend on their parents for their college education. Hence, we can expect a more involved role of parents in children's education

and career choices. According to the social learning theory (Bandura, 1977), patterns of behaviour emulated by the children are largely a function of their earlier childhood interaction, and observational learning; and those patterns, to some extent, also percolate to adulthood. Similarly, the attachment theory posits that the nature of parental interaction and bonding in early childhood guides forming behavioural patterns that even go to adulthood. A person's sense of self-worth, feeling worthy of others' love and acceptance, and being able to trust and depend on others are all shaped by attachment styles (Ainsworth & Bowlby, 1991). Baumrind suggests four different parenting styles-authoritative, authoritarian, permissive, and rejecting-neglecting. Being demanding and responsive are the characteristics of authoritative parents, which foster a congenial ambience for growth with assuming responsibility, and self-regulation. They are assertive but do to intrude into the child's comfort zone. Authoritarian parents, on the other hand, are demanding and also are particular about their directiveness and expect the child to strictly obey them. Permissive parents are more responsive and lenient; they do not engage in unpleasant confrontations with children. Rejecting-neglecting style of parenting is neither demanding nor responsive and, on the contrary, they can even neglect the basic needs of the children (Baumrind, 1991). These different ways of interaction with a child can lead to various patterns of behavioural responses and self-identity. This, to a great extent, can be assumed to influence a child's decision on choosing a career and education.

1.7. SELF-DETERMINATION THEORY (SDT) AND CAREER CHOICE

Among motivational theories, the "Self Determination Theory" is well recognised. It implies that the three most important motivational factors are relatedness, competence, and

autonomy. SDT complements our understanding that emerges from external factors like paternal styles and attachment styles. SDT dimension primarily focuses on intrinsic characteristics. SDT provides those determinants that help in facing external adversities smoothly. Engineering education being rigorous and technical, requires a sufficient amount of learning competency. Higher competency is associated with higher levels of intrinsic motivation, and definite pursuit of goals. This also provides the need for satisfaction related to the activity of engagement (Williams & Deci, 1996). Similarly, the reason why students are engaging in learning a specific discipline is vital in deciding their future engagement and commitment. If the purpose for which the students have taken up engineering is vague, it will lead to unsatisfactory academic engagement. Choy et al. have explored the idea of why students learn, by developing a tool called as Learner Awareness Levels Questionnaire (LALQ). They have outlined four reasons for learning: ensuring one's existence, building stability, receiving approbation, and enjoying the process (Choy et al., 2016).

Depending on why a person decides to engage in, put effort into, and continue participating in a particular activity, they might be categorised along a continuum of self-determined behaviour. It shows a lack of motivation and is the least self-determined type of motivation. The next major classification is extrinsic motivation. It comprises carrying out an action with a clear goal in mind (e.g., receiving rewards, avoiding punishment). The four categories of extrinsic motivation that make up the self-determination theory cover a range of self-determined behaviour from low to high. This includes, for instance, “identifiable regulation”, “introjected regulation”, “external regulation”, and “integrated regulation”. According to SDT, “intrinsic motivation” is the last and most self-determined sort of motivation. Acting for the joy and fulfilment it offers is the general definition of

intrinsic motivation (Deci & Ryan, 1985)**.**

According to SDT, humans have fundamental requirements for competence, autonomy, and relatedness. The desire to be seen as effective in our actions is expressed by the desire for competence. The desire for autonomy is the desire to perceive one's ideas and behaviours as being freely chosen. Or, to put it another way, a sense of self-determination is required. Our desire to feel linked to those around us is reflected in our need for relatedness. According to SDT, people will pick experiences and activities that satisfy these three fundamental needs. If an activity satisfies a person's needs for competence, autonomy, and relatedness, then it is inherently pleasurable or delightful (Ryan & Deci, 2000)**.**

1.8. REASONS FOR ENGINEERING CHOICE

There are more private engineering colleges in India, some engineering graduates receive envied pay packages, there are many different career opportunities and options after engineering, and last but not least, Indian parents' stereotypical attitudes toward engineering as a career option all contribute to the popularity of engineering (Aditya, 2011).

1.9. YOGA AS A SOLUTION FOR THE CHALLENGES OF EMERGING ADULTHOOD

Joining engineering and being successful requires hard work and the right attitude. To shape these twin factors, inherent personality and parental influence play a vital role. Without the right attitude and aptitude, joining engineering may only produce ill-equipped engineering graduates. The current industry has often remarked about the inadequately

training freshers. To explore a potential solution to this problem, we proposed to study the patterns of relationship between yoga and non-yoga practitioners and compare certain intrinsic and parental factors. Yoga has been reported to groom many of the inherent characteristics in a person (Ankamreddy et al., 2020; Khemka et al., 2011; Mattison & Nemec, 2014; Monk-Turner & Turner, 2010; Raghuram et al., 2009a; Trivedi, 2014)**.**

College students who practise yoga experience positive psychophysiological impacts that boost their academic performance (Tripathi et al., 2018). College students who practise mindfulness even once a week may experience less stress and anxiety (Lemay et al., 2018). The kayakalpa yoga with exercises was found to be effective in achieving emotional stability in terms of reduction in anxiety and anger experience & expressions among students (Suresh et al., 2013). Simplified *Kuṇḍalinī* yoga training had significantly improved Flexibility (Rajam et al., 2017).

1.10. SCOPE OF THE STUDY

From the literature review, we observed that the inherent attitude towards engineering and other social determinants, like parents' influence, etc., contribute to the engineering career choice of emerging adults. Both external and internal factors challenge sustainable development in engineering education in the country. Among these two, the freedom to change the external factors is restricted, whereas the internal factors are more in control at the individual levels. in Indian culture, the role of parents in influencing career choice is immense, owing to the dependency of children even in late adulthood and further attributed to the conservative style of parenting in eastern culture. However, we did not find any studies in the Indian context using implicit measures to evaluate engineering career choices. Hence, this study attempts to study the implicit attitude of engineering students

towards joining engineering. We identified that attitude towards engineering and self-appraisal of personal characteristics may be biased by social desirability, and hence use of implicit measure is desirable. Closer to parental behaviour is attachment style, which portrays how a person behaves and makes choices based on the experiences the person had in early childhood, which was also studied, along with self-esteem, perceived attitude and competency towards engineering education. This will enable us to understand these complex issues of key psychological determinants, and enable us to think of potential solutions to this existing problem.

Nowadays some schools' managements in India are introducing yoga to their students. Yoga practice may influence the students' choice of engineering. Hence, we conducted another study to find whether yoga practice influencesce engineering choices. Another three studies aimed to measure psychophysiological variables before and after the intervention of Simplified *Kuṇḍalinī* Yoga (SKY).

These studies will enable us to understand these complex issues through several key psychological determinants, and enable us to think of potential solutions to this existing problem. We believe this work would provide insight into the interacting factors influencing the choice of joining engineering and further help in developing sustainable methods to foster higher quality technical education in India.