**SCHOOL-TO-WORK TRANSITIONS AMONG ENGINEERING STUDENTS IN INDIA**

A Literature Review Proposal

Presented

by

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**LITERATURE REVIEW**

# Introduction

School-to-work transition refers to all the activities, programs, processes, and training designed for students to start their careers. While what an individual learns right from the early years of education helps at the workplace, most of the learning in the last few years in the school/college matters the most for a smooth workplace transition and success. Hence the preparation for the workplace becomes a topic of research interest both globally as well as country-wise with the changing job market, economy, government policies as well as individual preferences based on the motivations, societal changes, and perceptions.

This literature review aims to provide a bird’ eye view of the literature available on school-to-work transitions in the context of general school-to-work transitions, country-specific, what helps to improve school-to-work transitions, challenges, and school-to-work transitions in engineering education in India. This literature review is prepared with a keyword search of “school-to-work transitions”, “school-to-work India”, “school-to-work transition theory” and “engineering education in India” in the websites Google Scholar, Research Gate, and Google Search.

The rest of the review paper is organized as follows: Taking a chronological order of the papers collected, the review starts with the earliest literature available online, followed by papers/reports in the United States of America, where significant research is available. The review touches upon the literature available in Europe, Asia, and India. The review covers a few papers on engineering education in India. The last section contains a summary of the literature.

# School-to-work transitions literature

One of the earliest pieces of school-to-work-related literature available is “Worker Adjustment--Youth in Transition from School To Work, An Annotated Bibliography Of Recent Literature” (A.P et al., 1968). It was prepared to meet the needs of practitioners and researchers while designing an exploratory study of the major sociopsychological problems faced by American youth (16 to 25 years old) in making the transition from School-to-work. The work was compiled for a project of the Center for Vocational and Technical Education and the ERIC Clearinghouse on vocational and technical education.

There are continuous changes to the labor market, economy, government policies, employer participation in designing academic courses, and individual preferences as well as motivations all over the world. The problems faced by youth also have changed and the approach to address them continues to evolve in each country depending on the maturity of the education system, research and stakeholder participation to address the same.

There are challenges in the way partnerships are working between various stakeholders in school-to-work transitions. Stakeholders in this context are the schools, trainers, employers, and policymakers. Exploring the same through an apprenticeship program in carpentry in Canada, Alison (2006) discusses the need to address coordination programs across institutions, ability to achieve agreement on goals, ability to gain commitment from the employers, and ability to promote a culture of learning at the workplace.

Do socioeconomic backgrounds play a role in better school-to-work transitions? The answer seems to be yes. Based on the longitudinal data from the Youth Development study, Jeremy and Jaylan (2008) argue that less intensive employment during high school, followed by continued part-time employment and postsecondary educational investment which is more common for the youth of higher-class origins is beneficial for young people from the lower socioeconomic background. They also argue that the second path of early rigorous work experience during high school that is less advantageous to longer-term educational and wage realizations.

Evolving Government policies play a critical role in school-to-work transition improvements as the labor market demands change from time to time and policy changes that support smoother school-to-work transitions can help the youth of any nation for better prospects in jobs after school. Jeffrey (2012) in a report on STEM (Science, Technology, Engineering, and Mathematics) Education, observes that while the United States is believed to perform poorly in STEM education, by the measure of graduate enrolments to the program it is not the case. Jeffrey also raises concerns on persistent academic achievement gaps between various demographic groups, STEM teacher quality, and the ability of the education system to meet the STEM labor system among others. He also discusses the STEM education policy issues and programs.

Insights improve in any research when the research and research methods evolve over a period. School-to-work transitions research is not an exception. The approach that was being taken to analyze the school-to-work transition was to focus on single status changes such as those between education and unemployment. As longitudinal datasets became increasingly available, Christian (2014) observes that the studies continued to focus on single status changes, which are not determined by theory but by the respective research question, or by data availability, thus leading the analysis of the micro-level transition to be selective for lack of common idea to explore them. This has put the school-to-work transition research in danger to overlook important aspects of this life-course trajectory. Christian (2014) argues that the reason is the missing theoretical definition of a transition and the approach of analyzing event changes would limit the gain of new scientific insights. He offers a comparison on the advantages and drawbacks of event and sequence methods in analyzing transitions and advocates a combined research design between explorative and hypothesis-testing methods.

There is a need to understand the individual decision-making on vocational programs and their experience of the same, as this plays a key part in school-to-work transitions. Atkins (2017) explored the relationship between individual positioning in fields and career decision-making by drawing on two narratives from a study exploring young people’s motivations for undertaking vocational programs. Atkins argues that individual social positioning is significant in its relationship to decision-making, to how the individual perceives and constructs their careers, and to the influence of serendipity on their transitions.

Comparative studies between countries on School-to-work transitions help in identifying the differences and potentially pave a path to implementing the best practices. To understand school-to-work transitions better in Spain, Vancea and Utzet (2018) investigate the main socio-demographic characteristics of young people not in education, employment, or training (NEETs) by comparing them with their non-NEET counterparts in terms of social capital and family background. Through their analysis, they conclude most of the Spanish NEETs had lower educational levels, were mainly unemployed and married, except for NEETs between 18 and 24 years, who were rather inactive and single. In comparison to their non-NEET counterparts, Spanish NEETs also experienced previous unemployment, had more unemployed friends and were coming from poorer family backgrounds.

A School-to-work regime (SWT regime) denotes the set of institutions and rules that govern and supervise the passage of young people from school to adulthood. In an editorial article Pastore and Zimmermann (2019) discuss various questions that the school-to-work transitions in countries Czech Republic, Germany, Italy, Poland, and Spain. The questions discussed include:

1. Are there gender differences in entering work after school?
2. What happens after periods of large economic and political changes?
3. What can policy do to improve the speed and effectiveness of the SWT?
4. What do university students expect from a job?
5. Does it pay to study abroad?

Taking a theoretical approach to School-to-work transitions (Lent and Worthington, 1999), Career Development Quarterly features a set of articles that examine how several prominent career development theories, namely: person-environment fit, social learning, developmental, and social-cognitive. Before these articles, Vocational Theory is usually cited for the School-to-work transition-related research. An effort is also made on theories' utility as templates for studying and facilitating the transition from school to work.

# 3. India specific & Engineering education-related

India, one of the developing countries of the world has the largest potential labor base, appetite to adapt to the digital revolution with a leapfrog approach, development projects across sectors in full swing, rapid urbanization, and Government educational policy reforms in the middle of breakthrough places itself in a position to be globally competitive. However, there is a need to build capacity, higher-order competencies, and employability skills using the new technologies with the ever-changing complex problem-solving needs of the market. One of the keys to making this happen is through significant reforms in engineering education in India.

In an interesting article by Gereffi et al (2008), authors challenge the commonly cited statistics for engineering graduates in the United States, China, and India. Authors show the gap between the number of engineers and related technologists produced in the United States versus those in India and China is smaller than previously reported, and the United States remains a leading source of high-quality global tech talent. It also discusses the prospect of substantial unemployment in China and India, despite high corporate demand for their services; this raises questions about the quality of recent graduates. Because of visa uncertainties and growing economic opportunities in their countries of origin, the United States confronts problems in its ability to attract and retain top engineering talent from abroad. It concludes that the key issue in engineering education should be the quality of graduates as the quality factors have the biggest impact on innovation and entrepreneurship, not just the quantity.

In an article that examines the growth of engineering education in India, Pradeep Kumar Choudhury (2016) finds that while there has been a significant expansion of both institutions and enrolment in engineering education in India during the post-liberalization period, this massive expansion of engineering education has not been able to provide access to the disadvantaged groups, namely women, scheduled castes and scheduled tribes. It also reveals that the public expenditure on engineering education has not increased at par with the increase in enrolment in this sector, this has resulted in a decline in per-student public expenditure.

In a collection of articles titled “Transitions from Education to Work – workforce ready challenges in the Asia Pacific”, editors Roslyn et al. (2018) divide the contributions made by researchers into 3 parts. Part I: The Issues and Challenges. Part II: Country studies. Part III: Comparative Analysis and conclusions.

To create an equitable society, there are affirmative actions taken by the Government in India in providing admissions to the “lower-caste” groups in engineering colleges in India. Studying the impacts of this affirmative action Marianne, Rema, and Sendhil (2010) show with this approach, that there is a possibility of exclusion of other disadvantaged groups like women entering into engineering colleges. Authors also argue with their estimates that the income losses experienced by the displaced upper-caste candidates outnumber the income gains experienced by the benefited by displacing lower-caste candidates.

Making observations on the dominance of a specific set of socio-economic groups in engineering education in India, Ajantha (2019) in the book “Caste of Merit” provides insights on the intimate relationship between upper caste and meritocracy over the years at the Indian Institute of Technology Madras one of the premier institutes in India.

To meet the current industry needs higher education in India would need a radical shift in its approach. Mona (2016) highlights the need to address four pressing areas as below:

1. It is observed that there is an excessive dependence on the non-formal system of vocational training, while the young graduates coming out of the formal higher education institutes are unable to meet the industry expectations on job readiness.
2. It is observed that there is an increase in the percentage of educated job seekers, while on the other the number of people being placed from this pool is significantly less.
3. It is observed that the number of professional courses is limited as the ratio of professional to non-professional enrolment is 1:3.
4. It is observed that the problem of employability skill gaps is higher in the general academic non-professional graduates that constitute the majority.

Data by the Ministry of Human Resource Development, University Grants Commission, and All India Council for Technical Education suggest significant growth in Engineering education in India. Choudhury (2016) examines three important dimensions of engineering and technical education in India, namely institutional expansion, enrolment pattern, and public financing. Choudhury observes that the growth in the number of engineering institutions as well as the student enrolment (because of the preference of engineering education by students and parents when compared to other disciplines) has been significant in the private sector. However, this growth has not benefitted marginalized classes like women as well as other groups. The study also uncovers the decline in the per-student expenditure as the expenditure on engineering has not increased while the enrollment has increased.

The school-to-work transition has been the policy focus for the Government of India for the last few years. Discussing the steps taken by the Government (Mehrotra and Mehrotra, 2018) call out how there is an improvement in the articulation of vocational education with higher education, to change the ‘dead end’ image of vocational education. The National Skills Qualification Framework is being used for making a sweeping shift to encourage private sector participation in skill development and opportunities to youth, thus allowing a smooth transition to the world of work. The Paper also discusses efforts made with new programs and schemes to meet the needs of the youth for twenty-first-century skills.

# 4. Summary of the Literature Review

Through the literature review, we can conclude that:

1. The research areas of interest on School-to-work transitions have been evolving based on the context and time from sociopsychological difficulties of youth at the workplace to the skills needed for a smooth transition.
2. The government policies seem to have played a key role in making effective School-to-work transitions happen.
3. Stakeholder engagement especially the employers in developing the vocational courses/training needed seems to have played a crucial role to get youth ready for the workplace transition.
4. Apprenticeship/Internships both part-time and full time seem to have played a critical role in smooth school-to-work transitions to happen.
5. There seems to be a need for a theoretical definition of school-to-work that can be agreed upon across the researchers as well as the evolution of theories.
6. There seems to be a need to address the Diversity, Equity, and Inclusion related issues in school-to-work transitions with much broader considerations than just a few dimensions.
7. The set of challenges faced by youth for smooth and successful school-to-work transitions seems to have been changing over the years with the changes in the labor market and economy. Hence there is a need for continuity of research to provide insights from time to time.
8. Engineering education in India has been a topic of research interest given the policy changes, motivation as well as a preference among the students, market demand, and the upsurge in the number of engineering institutions in the recent past.
9. Engineering students form a lifeline for the booming Information Technology-specific job market in India for entry-level positions. Hence there is a need to study school-to-work transitions of this category to arrive at the insights that would help to understand improving the school-to-work experience.

## 4.1 Hypothesis

A smooth School-to-work transition can be defined as continuous engagement of a student in a paid job for the first 3 to 5 years after completion of school/college without being unemployed because of lack of skills needed and the student applying the knowledge and experience that has been gained in the previous years.

There have been studies on the need for vocational education or courses part of the academic curriculum for improved school-to-work transitions (Neumark, 2007).

### 4.1.1 Internships and School-to-work transition

The scope of the current study on school-to-work transitions is limited to the engineering students in India who pass out from what are known as circuit branches which are offered by the Department of Computer Science, Information Science, Electronics, Electrical, and Instrumentation. While there are several theoretical, practical courses and projects, many colleges provide opportunities for industry internships in the form of short (2 months) or long (6 months) assignments.

**Hypothesis 1**: Any form of internship short or long-term, promotes smooth school-to-work transitions.

### 4.1.2 Academic Performance and School-to-work transition

Given the evolving skill demand in the market, there is a constant gap between academic courses offered at the colleges and the needs of the industry. Hence the academic performance is no longer an indicator of smooth school-to-work transitions.

**Hypothesis 2**: Only academic performance (better grades) without market-relevant training, may inhibit smooth school-to-work transitions.

This study once completed should advocate the need for 2 important changes:

1. Mandatory Internships in engineering colleges with circuit branches. (Which is not the case study)
2. Student orientation towards market skills/demand right from the beginning of their engineering courses and NOT just on academic performance for Indian engineering students.

## 4.2 Conclusion

This literature review shows that the research focus has been on the correlation between the smooth school-to-work transition with that of Government policies, vocational courses, need for apprenticeships/internships, social class differences, need for Diversity, Equity, and Inclusion, and finally employer engagement. While the country-specific studies are evolving, lion’s share of literature is based on the studies in the United States. Studies in India have focused on engineering education in general, however, there is no specific exploratory study as per this literature review is available on the factors that promote and inhibit smooth school-to-work transitions for engineering students. According to Statista (Statista Research Department, 2021a), 3.2 million students have enrolled in 5 disciplines of engineering in the year 2019. It also gives another alarming statistic that 46.58% (Statista Research Department, 2021b) of engineering graduates were unemployed in 2021. Given the size of the student base in engineering colleges, a school-to-work transition study on engineering students would support identifying key aspects, issues, and possible solutions for effective school-to-work transitions.

The study intends to work with a group of key stakeholders through surveys and semi-structured interviews to identify the factors that promote and inhibit employment opportunities for engineering students to make effective school-to-work transitions. It also intends to reach out to the students who have completed the school-to-work transitions five years ago, one year ago, and finally, students who will be part of this process a year from now to gather insights for the research.

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