# Logic Model Framework for Employability and Skills Development in Vulnerable Youth: evidence from pilot intervention and quasi-experimental research

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## Abstract

**Objective and Purpose:** The main objective of this paper is to introduce a simple logic model framework for providing role-based vocational training and sustainable placement of vulnerable and disadvantaged students. The purpose is to ascertain that sustainable skills development in vulnerable youth requires a demand driven framework that is tailored to their needs.

**Methodology:** Framework is outlined as a 'logic model' illustrating relationships between activities and outcomes with emphasis on outcome evaluation. Data is collected in three phases using qualitative and quantitative methods. Quasi-experimental research is designed to assess the differences in outcomes for experiment and comparison groups and establish effectiveness of the intervention. *t*-tests are performed to evaluate statistical differences between groups. Skewness-Kurtosis test for Normality is conducted to strengthen the validity of the *t*-test showing non-significant results of $p > 0.05$ for all samples.

**Results:** Significant difference was found between experiment group before intervention and after intervention. Wilcoxon Signed-rank Test showed significant difference in pre- and post-intervention for the experiment group, $z\ (65) = -7.026$, $p < 0.05$; this finding is consistent with *t*-test results. Behavioural changes such as motivation and self-efficacy showed the highest increase (63.45%), followed by increase in work-based skills (62.92%) and interpersonal skills (43.08%). Sustainable placements of 61 students were achieved after completion of the training. Skewness-Kurtosis test for Normality is conducted to strengthen the validity of the *t*-test showing non-significant results for all samples.

**Relevance and Originality:** The framework is built on practical experience of authors that initiated a pilot based on theoretical models of skills development. Logic model framework described here can be a useful tool to design and evaluate 'demand-driven' skills development programs specially for the vulnerable students from low-income groups.

**Practical Implications:** Aligned with SDG Target 4, this logic model framework is flexible, simple to understand and can serve as a blueprint for 'demand-driven' skills development interventions across sectors.

**Research Limitation:** The results of this study are not representative of sections of vulnerable youth that are at risk of dropping out, therefore further research is needed at the larger scale. Some inconsistencies were noted that are due to fast changing situations during COVID-19 with respect to administration of the training program.

**Social Implications:** Since this framework ensured quality training and sustainable placements to vulnerable youth, it can help organisations and institutes address challenges in delivery of TVET in post-crisis period. It is providing not only technical training but also resilience in the form of future identity and motivation to such students.

***Keywords:*** vocational education and training, skills development, logic model framework, vulnerable youth, quasi-experimental research, *t*-test, Wilcoxon signed-rank test.

***JEL Classification*:** I210, I230, 1240.

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## 1. Introduction

*"Low skills perpetuate poverty and inequality. When done right, skills development can reduce un- and underemployment, increase productivity and improve standards of living. Helping people develop and update their skills makes economic sense."*

*- (Skills Development, 2021)*

The present skills landscape in India, despite the sufficient manpower isn't encouraging. India's Skill Development initiative to skill one crore youth under Pradhan Mantri Kaushal Vikas Yojana (PMKVY) by 2020 achieved approximately 36 lakh people enrolled by the end of 2018 (Chaitanya Mallapur, IndiaSpend, 2019). Despite an increase in the number of Industrial Training Institutes (ITIs), only 15.3% were enrolled in vocational training with the enrollment rate among rural students at 24% and 8.3% among urban students (NSS 75th Round).

Skills development gains greater significance in the face of rising unemployment. Over the last few years there has been an improvement in the number of skilled labour from 34% in 2014 to 47% in 2019 but a simultaneous decrease in those who are able to find a job upon completion from 50% to 30% (India Skills Report, 2019). Participatory Labour Force Survey report (PLFS 2018) states that unemployment rates for urban youth (15 to 29 years) was 23.7% and this figure is not far from CMIE (first quarter 2019) unemployment rate of 37.9% in urban youth (20 - 24 years old). Of those surveyed under PLFS 2018, only 2% mentioned having received any formal training and 8% mentioned having some informal training, these figures also aligns with the XIIth Five Year Plan that less than 5% of those between 15 to 29 years were formally trained. However, PLFS data reveals that 33% of those formally trained remain unemployed and this highlights the problem of sustainably developing a skilled labour force.

The model of vocational training within the educational institutes in India has so far proved ineffective mainly due to a mismatch between demand and supply of skilled workforce. Vocational Education and Training (VET) and general education have been functioning as two disjoint vertices and thus have been largely inadequate in either providing "work ready" individuals or even upgraded skilled trainers (Jain, 1992; Agarwal et al, 2014; Datta, 2017). Within the formal structure of skills development itself, acquired skills of ITI/ ITC graduates do not meet the demands of the industry due

to redundant curricula, poor quality in terms of infrastructure and inadequate teachers capabilities (Mehrotra et al., 2014). The institutes lack close links with industry and understanding of employers' needs. A major challenge throughout programs lies in effectively testing the outcomes of such programs in terms of skill development. To add to this, inequalities in opportunities and human development dampen and restrict development of potential and aspirations in the vulnerable youth and "manifest as inequalities in outcomes in adulthood" (Dewan & Khan, 2019, p. 1).

Vulnerable youth face structural barriers due to poor human capital endowments, lack of relevant skills, lack of mentorship or protective factors (McClelland et al., 2000), thus are likely to be absorbed into the labour market at an early age (ILO, 2015). Most of them cannot afford to remain unemployed due to their unstable economic backgrounds and thus seek work as casual wage labourers in low or middle skilled occupations characterised by low labour productivity (Government of India: 2006; Mitra & Verick, 2013). In this context, the ability to attain sustainable employment implies more than gaining employment, where individuals could simply take up lower level jobs due to financial constraints (Pollard, 1998, pg. 2), and thus can provide an incomplete picture of what the individual has gained (Sumanasiri et. al., 2015). The channel of skills acquisition in disadvantaged and at-risk youth is highly informal making them susceptible to poor employment conditions, low productivity and lower wages (Kumar, 2019). There is thus a greater need to create a framework for training and skills development that "suits their economic compulsions" (*Government Of India*, 2016, pg. 13).

Coronavirus (COVID-19) is causing massive disruptions in economic activities, incomes, and work; with rapidly changing labour markets and new technologies, markets demand higher competencies, practical and transferable skills from individuals in order to remain competitive (Bennet, 2006; International Labour Organization & World Bank, 2021). Insufficient technical infrastructure to support effective distance learning leads to challenges in acquisition of practical skills and causes disruptions in smooth continuity of TVETs (International Labour Organization & World Bank, 2021). Unparalleled disruptions in education, training and skills development are widening pre-existing gaps in access and outcomes; putting the vulnerable disadvantaged youth at greatest risk of falling further behind. With increasing economic hardships, there is a greater need to expand availability of

accessible training programs that can develop better resiliency and maintain engagement in the face of future crises (International Labour Organization & World Bank, 2021).

### *Why Logic Model?*

There is a greater value in strengthening skills development programs designed for vulnerable youth who live in poverty which demand different methods to evaluate performance and test credibility. The complexity of challenges that the vulnerable youth face as well as gaps in the existing education and training frameworks require a tailored approach that sustainably connects such youth to employment opportunities and effectively evaluates such outcomes. To establish program effectiveness, it is observed that the focus is primarily on outcome data and less on what 'happens during the program to understand the changes in outcomes' (Martinek, 2017); for example, testing if the participants are motivated, are provided opportunities in decision making. In this context, developing an evaluation process based on logical reasoning ensures continued modifications, looking into 'what goes on' during the program and thus avoids a 'black box approach' (Patton, 1997). Thus interventions based on a logic model framework will allow monitoring what intervention 'is doing' and 'is not doing'.

Logic models have traditionally been used as important tools in 'building community capacities' and 'strengthening community voice' (*W.K. Kellogg Foundation Logic Model Development Guide*, 2004, p. III). The emphasis on providing 'evidence based' conceptual framework to 'maximise the impact of educational investments' and clearly show a path from investments to impact is explicitly discussed in order to build leadership capacity in students (Daughert et al., 2017, p. 4). Generally logic models have been used as effective action oriented tools for program planning, identifying outcomes and providing stakeholders with a clear road map (Izzo, et al., 2004; Martinek, 2017). The rationale for creating a skills development program for vulnerable youth within the framework of logic model is that i) it will create a conscious process with clear explicit understanding of challenges, inputs, activities and outcomes, ii) it will align '*planned work'* with '*intended end results'* such as outputs, outcomes and impact, and iii) it will serve as an effective evaluation tool.

In this context, we design an 'Employability and Skills Development Logic Model Framework' as the blueprint of a pilot intervention conducted over a period of 5 months from December 2020 to May

2021 in New Delhi and Mumbai; with the main objective of developing role-based technical skills in vulnerable youth and subsequently smoothen the transition from school to work. A key feature of the pilot was that stipend was paid to students to incentivise them to complete training.Our logic model framework is created with the understanding that training interventions should not only be means of getting a job, but should be able to take the edge off social disadvantages of exclusion, discrimination or even addiction and personal disadvantages such as low sense of self-efficacy and lack of future identity (Bennell, 1999; Mangoche, 2014). Framework is adapted from 'Kellogs Foundation Guidelines for Developing Logic Model' and is directly aligned with Target 4 under the Sustainable Development Goals (SDGs), and specifically aligned towards Target 4.3 which is to 'Ensure equal access to affordable and quality technical, vocational and higher education'; Target 4.4.1 which is to 'Substantially increase the number of youth and adults with ICT skills'.

## 2. Existing Frameworks of Employability and Skills Development

Studies done on employability and its determinants, have attempted to present frameworks as a guide towards successful movement of students to the labour market. Thus, "learning and employability frameworks" have been provided to help various stakeholders to understand and develop policies according to industry requirements (Sumanasiri et. al., 2015; Yorke & Knight, 2006)). These focused on providing a learning environment or an ecology that results in employability (O'Donoghue & Maguire, 2005), acknowledging a clear relationship between learning and employability. Model based on five key elements of higher education to achieve "optimum level of employability" as discussed by Bennett et al., (1999), includes i) disciplinary skills, ii) disciplinary content knowledge, iii) workplace awareness, iv) workplace experience, and v) generic skills. The USEM model is based on four interrelated employability components of i) understanding: subject knowledge, ii) skills: specific and generic, iii) efficacy beliefs: self awareness and iv) metacognition: self-reflection and regulation (Yorke & Knight, 2006).

In order to leverage the efforts of different stakeholders, the U.S. Department of Education, guided by CTE, has developed an 'Employability Skills Framework' listing a set of general

cross cutting abilities that are required to be ‘career ready’ including workplace skills such as technical use and resource management; applied academic skills and critical thinking; and interpersonal skills (*PCRN: Employability Skills*, 2021).

The theoretical model of the CareerEDGE framework of employability that is widely used focuses on developing subject knowledge and skills, both as a motivator to attain higher education and also to get wider access to employment opportunities (Dacre Pool & Sewell, 2007). Other than subject knowledge, generic skills such as creativity, adaptability, resiliency, willingness, communication, time management, attention to detail and use of new technologies are among those that employers place a higher value on (Harvey et. al., 1997). Goleman in his book ‘Working with Emotional Intelligence’ (1998) strongly supports including emotional intelligence in employability models and sets out a framework of emotional intelligence (EI) that reflects how an individual’s potential for mastering the skills of “Self-Awareness, Self-Management, Social Awareness, and Relationship Management translates into on-the-job success” (Goleman, 2001, p. 1); the model gains significance in the current knowledge based economy (Moynagh & Worsley, 2005; Erabaddage et al., 2015).

An important conceptual framework is the Skills Towards Employment and Productivity (STEP) focusing on building right technical, cognitive and digital skills and OJT (Skills Development, World Bank, 2021). Similarly the Demand-Driven Training Toolkit (DDT) provides research based and practically applied frameworks that aims to narrow the gaps between what the individual learns through formal education systems and what employer needs (DDT for youth employment- Toolkit, 2018).

## 3. Challenges in Building Framework for Skills Development

Disruptions caused by COVID-19 exposes students from low-income households to a greater risk of premature termination of their education and learning opportunities and such changes significantly affect their feeling of self-worth and sense of belonging (OECD, 2020). Identifying target groups, identifying and matching gaps in skills, co-creating or modifying curriculum, mentorship requires aligning the intervention with employers' requirements (European Training Foundation, 2013). First,

gathering labour market information (LMI) or data on 'demand for' and 'supply of' labour requires careful selection from national and local surveys, real time market data and/ or through surveys, interviews with carefully identified groups of participants, including students, schools, employers and industry experts. Data-based information provides a more accurate and comprehensive foundation for demand/ supply analysis while also keeping track of emerging skills.

Second, aligning different stakeholders on the problem, resource allocation, purpose and strategy can be challenging. Often, there is a narrow focus on factors that lead to lack of skills by stakeholders (Denney et al., 2017). Developing 'job-roles' or skills in a specific sector requires a comprehensive and coordinated approach such as 'industry-education partnerships' which are more likely to reach outcomes. Lack of clarity on roles and responsibility, lack of communication and information between various stakeholders leads to imbalances and creates difficulties in reaching the outcomes (Ferns, 2018).

Third, the process of selection is challenging. Selecting at-risk, vulnerable youth requires an extensive analysis on multiple personal and environmental elements such as: i) education and skills, ii) access to services, iii) support from family and iv) peer relations (de Bruin, Karina et al., 2014; Kunnen, 2013).

Fourth, imparting practical skills is a key element of vocational training. Recent disruptions have caused challenges in delivery and measurement of practical skills thus it becomes challenging to ensure that students have access to technical infrastructure, devices, connectivity or even uninterrupted electricity to maintain continuity (ILO, 2020).

Fifth, monitoring on-going intervention and outcome evaluation is a challenging process. Changes in industry requirements require adaptable, ongoing and accurate measures. 'Evidence-based' results require adequate resources and clarity in methods (Fugate et al., 2004). Evaluations must be benchmarked against statistically proven direct and indirect outcomes.

## 4. Building the Logic Model Framework

The Employability and Skills Development Logic Model Framework has 5 main blocks: i) Inputs; ii) Outputs; iii) Intermediate Outcomes; iv) Outcome Evaluation and v) Impact. The process is cumulative, elements in each block are based on previous course of action or stage. Data is collected

by quantitative and qualitative methods at three levels. Methodology for three levels is designed and required indicators are identified during the initial stages of the pilot. Description of each block contains a rationale (*why we included it*), data and methodology (*how we gathered information and how we analysed it*) results (*what we achieved*). Here's what our framework looks like (Figure 1):

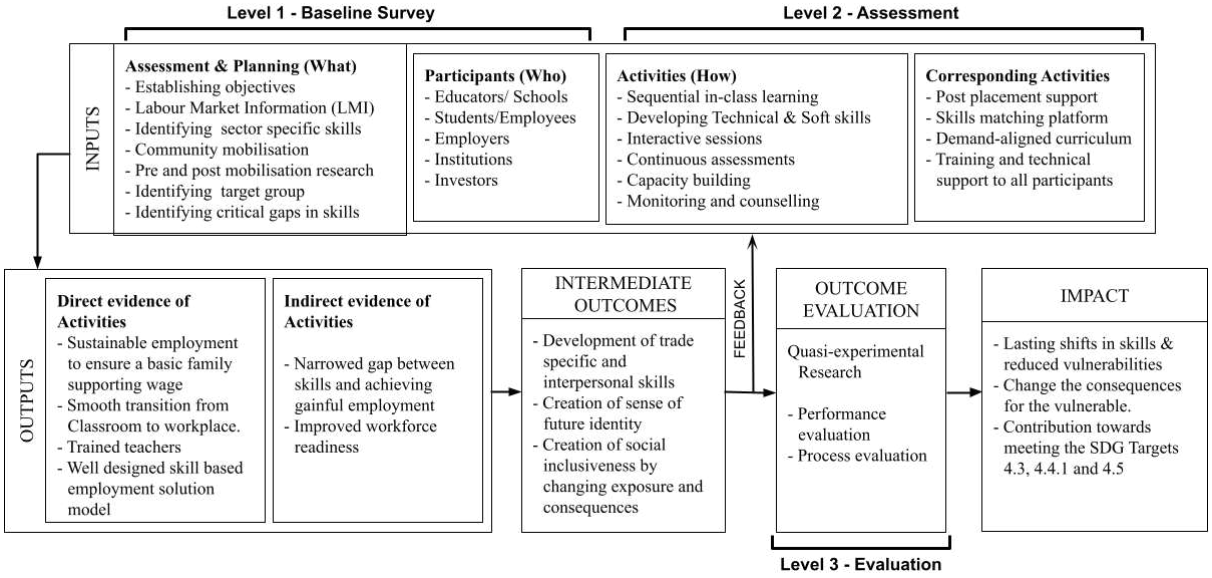


**Figure 1: Employability and Skills Development Logic Model Framework**

## 4.1 Inputs

'Inputs' include "resources and infrastructure" that will be required to run the intervention (Community Tool Box, 2020). **Assessment and Planning** *(What)* includes setting objectives and purpose of work. The main objective of our intervention is to train disadvantaged and at-risk youth in trade specific skills and subsequently transition them into formal and sustainable employment. The purpose is to establish that skills development in vulnerable youth requires a demand driven approach that is tailored to their needs (DDT Toolkit, 2018). Labour Market Information or LMI is an essential first step in evaluating sectoral and occupational changes and requirements to identify skills these youth need to develop and align them with their needs and capacity to learn.

**Level 1 (Baseline Survey)** is used for i) selection of experiment and comparison groups, ii) identifying skill gaps, iii) identifying job relevant skills and iv) designing course curriculum according to current or future requirements of the industry. Selection criteria for the total sample group is a set of

predetermined demographic factors such as household income, education and employment of parents, education type, number of gap years to identify the extent of vulnerability and disadvantage faced. From a pool of 387 students that were mobilised, 76 students were selected as the experiment group of which 65 joined the program.

Participants in the comparison group were selected such that they have similar baseline characteristics of the experiment group. Matching indicators were: i) academic level and performance (secondary/ higher secondary/ percentages or scores), ii) financial level (household income) and iii) demographic backgrounds (age, education of parents, earning and dependent members). Comparison group consists of 65 students of which only 57 remained for Outcome Evaluation after completion of the training.

Mean age of both groups is 21 years. More than half (57.4%) have annual household incomes of less than Rs. 70,000. Around 40% are first generation learners. Identifying skill gaps required us to collect data through online questionnaires circulated among 65 experiment group students and 19 selected employers from the BFSI sector. Respondents were given a list of seven skills (Martin et al. 2008; Pheko & Molefhe, 2016) and were asked to rank these on a scale of 1 to 7; Rank 1 to the skill they perceive as most important to attain employment, and rank 7 to that considered least important. Results show a mismatch between perceptions of the students and the employers. (Table 7 - 8). The skills perceived by students as least important (mean scores >5.5) were ranked moderate to high importance (mean scores < 2.5) by employers.

**Participants of different stakeholders** (*Who*) strengthen outcomes such as well-designed customised curricula, mentoring, work-readiness and hiring. Partnerships benefit all stakeholders building exposure and awareness of the work environment. The pilot provided in-class learning conducted by educational institutes, teachers from universities were selected for training the students; on-the-job training was provided by private companies operating in the BFSI sector.

**Activities** (*How*) involve tailoring and modifying existing curriculum according to the needs of the employers and thus, co-designing with employers and their expectations of the job roles. We identified 2 trade specific job roles: 1. Microfinance Associate, 2. Data Analysis Associate. These two roles have a steady job growth in future providing a middle level placements that disadvantaged and vulnerable youth otherwise find difficult to secure. BFSI itself is a high growth sector, with projected

demand of 8.5 million labour force by 2022 (National Skill Development Corporation), with Maharashtra and Uttar Pradesh generating the highest number of skilled and employable youth (India Skills Report, 2020).

Training methods included a combination of in-class and workplace based learnings. Mentoring is an instrumental element of skill development in disadvantaged groups, improving both cognitive and non-cognitive skills (DDT Toolkit, 2017, pg. 32). Two mentors were assigned for each group in New Delhi and Mumbai that were sensitised on the vulnerabilities and background of the students. Capacity building included selection of 48 teachers and providing professional training for one week (total of 10 hours). Post training Teacher's Assessments were conducted on 4 parameters: i) communication, ii) digital knowledge, iii) subject knowledge and iv) responsiveness to needs of vulnerable and at-risk students.

**Level 2 (Assessment)** We conducted a mixed-method assessment for the experiment group: standardised summative test, class presentations and computer-based assessments (CBA). All assessments were credit based and a composite credit was generated for each student based on their performance throughout the training program. Alongside feedback is taken from teachers and mentors to identify changes in performance of students and the challenges they face during module delivery; adding emphasis that interventions must be continuously monitored regardless of evaluation. Here we collected information to compare i) performance against benchmark results, ii) expected levels of technical and behavioural competencies (DDT Toolkit, 2017, pg. 20). Assessment did not require a pre-test and post-test design since the students were previously not trained for sector specific skills.

## 4.2 Outputs and Intermediate Outcomes

The 'logic' in the logic model is realised when the inputs and outputs result in desired outcomes. The outcomes provided in this framework directly address key factors that limit opportunities of (sustainable) employment among the disadvantaged and at risk students. Vocational and technical training are not and should not be a "quick fix" to address the problem of high unemployment among such students, therefore limiting themselves to reducing barriers to enter the labour market.

During the first phase of selection, a majority of students showed a high interest in learning skills and attain sustainable employment with a sole objective of contributing to family income. In disadvantaged youth such motivations result in urgent requirements to obtain low-skilled unsustainable jobs. In this context, responding to the urgent need to provide short term entry into the labour market is an incomplete solution. Given the economic and demographic vulnerability of the target group, the pilot emphasised on a learner centric approach ensuring not only a smooth transition from school to work, but also development of analytical thinking, interpersonal, communication skills and securing sustainable employment. The pilot provided sustainable employment with a formal contract for 61 of 65 students in the BFSI sector. The pilot also built technical and digital skills in BFSI aligned courses among 48 teachers.

Development of role-based technical training along with attention on curating interpersonal skills and continued mentorship is more effective at recognising that training should not only be a means of better employment opportunities or financial improvements but also take the edge off social disadvantages such as social exclusion, lower sense of self-efficacy, addiction, discrimination or even early marriage and pregnancy in young women. An effective intervention therefore includes attempts to change exposure and consequences of vulnerable youth as part of its intermediate outcomes.

### 4.3 Outcome Evaluation

The objective of outcome evaluation was to assess the progress and changes in the experiment group caused by the intervention and statistically measure such progress and changes. In order to effectively test the viability of the results, a quasi-experimental research was designed and conducted. Experimental group consists of 65 students. The comparison group consisted of students not subject to any vocational & technical intervention or training. Comparison group at baseline consisted of 65 students and post-intervention had 57 students. 8 students did not respond to questionnaires and were not available for calls. It is important to emphasise here that quasi-experiment outcome evaluation can be successfully measured only on the basis of a carefully matched comparison group, in the absence of which the evaluation can be incorrect at worst and misleading at best (Hanita et al., 2017). **Level 3 (Evaluation)** included testing on specific predetermined parameters. Work-based skills and

interpersonal skills were the two domains chosen for the comparative study. We also included a third domain on behavioural skills since these changes indirectly correlate with changes in the first two. Three broad parameters were created in each of the 3 domains.

A. **Work-based**: i) Applied knowledge ii) Technological skills and iii) Information use.
B. **Interpersonal:** i) Effective communication skills ii) Personal presentation, and iii) Time management.
C. **Behavioural:** i) Motivation and confidence ii) Future identity and iii) Willingness, responsibility and self-discipline.

A 5-point Likert scale questionnaire administered to test the respondents on the above mentioned domains. We created a baseline index by assigning scores to each question. 5 = "strongly agree/ always/ excellent"; 4 = "somewhat agree/ often/ good"; 3 = "neither agree nor disagree/ neutral/ average"; 2 = disagree/ rarely/ poor"; and 1 = "strongly disagree/ never/ very poor". The questionnaire consisted of 20 questions, 9 in domain A, 6 in domain B and 5 in domain C, such that a minimum score of 20 and maximum score of 100 was created.

Independent-samples *t*-test was conducted to compare experiment and comparison groups before the intervention (Table 1). We found no significant difference between the scores of the experiment group (M = 46.5, SD = 5.16) and comparison group (M = 46.4, SD = 6.03) before intervention; t (128) = -0.109, p = 0.913. Hence the null hypothesis of equality of two groups cannot be rejected. Results of comparing the treatment group after the completion of training with the comparison group is shown in Table 2. Significant difference was found between the scores of the experiment group (M = 72.8, SD = 4.87) after training and comparison group (M = 48.4, SD = 6.60); t (120) = -23.36, p < .001. In order to test the effectiveness of the training on the treatment group we conducted a paired sample t-test (Table 3) to compare the experiment group before and after intervention. We find significant differences (showing improvements in scores) between the scores of the experiment group before intervention (M = 46.50, SD = 5.16) and after intervention (M = 72.8, SD = 4.87); t (64) = -31.22, p < .001. This implies that the null hypothesis of equality of two groups is rejected.

Due to a small sample, we conducted a Skewness-Kurtosis test for Normality to ensure that the data followed a normal distribution and to strengthen the validity of the *t*-test (Gupta et al., 2019). This test

accepts the hypothesis of normality when $p > 0.05$. A non-significant result of $p > 0.05$ for all sample data sets is observed as mentioned in Table 4.

To further evaluate the data, we conducted the Wilcoxon Signed-rank test which is suitable to test the null hypothesis of similarity of score rankings of pre- and post-intervention in smaller samples. First, we check for similarity in experiment and comparison groups pre-intervention. Results in Table 5 show a non-significant difference, $z(65) = -0.376$, $p > 0.05$ ($p = 0.70$); implying the null hypothesis of similarity of two samples cannot be rejected. Table 6 shows a significant difference between the experiment group before and after the intervention, $z(65) = -7.011$, $p < 0.05$ ($p = 0.00$). We also tested for difference between scores of comparison and experiment groups after the intervention was completed for the experiment group, results show significant difference between the two groups, $z(57) = -6.569$, $p < 0.05$ ($p = 0.00$). These findings mirror the results of *t*-tests conducted.

Comparing before and after intervention means of the experiment group, the percentage change within group scores was greatest for work-based skills i.e., domain A (72,2%), followed by improvement in behavioural skills i.e., domain C (53.2%) and improvements in interpersonal skills i.e., domain B (37.2%).

The success of a logic model lies in its ability to produce useful research-based findings. Results show that while the experiment group has largely benefited from the intervention, a greater indirect outcome has been in the form of increase in self-confidence and motivation. Results present a strong emphasis on assessing self-efficacy, motivation and sense of future identity as an important component of skill based VET.

### 4.4 Impact

Impact of skills development interventions for disadvantaged youth needs to be examined in the context of its effect on economic and social outcomes over a longer period of time (Jung et al., 2019). The impact of the pilot is expected in terms of shift in skills, changes in consequences for the target youth and contribution towards SDG Targets 4.3 and 4.4.1. However, it is crucial to measure whether the intervention led to a long term shift in skill sets and changed the consequences for the target vulnerable youth much after training is complete.

## 5. Managerial and Policy Implications

We provide a summary of strategic points for skills development interventions and their implications for policymakers and managers.

**1) Start early and Make it work:** Vulnerable and disadvantaged youth enter the labour market without either sufficient general educational background or required employability skills. In this context, it is crucial that learning skills be progressively introduced at school level such that it creates upward mobility for them. Career counselling and employer interactions will develop domain specific interests and select 'in-demand' and locally available VET. Introducing skills early will allow the vulnerable group to build a secure future or at least the fundamental knowledge to help them explore employment opportunities in future (Datta, 2015).

**2) Reduce information asymmetry and Make it visible:** A bigger challenge lies in information asymmetry where the students do not "see" the available job opportunities and therefore do not pursue vocational education as a pathway to secure their future. Employers find sourcing skilled students difficult and thus show little interest in recruiting them. In this context, there is a growing need for digital platforms built with AI and intuitive technology to provide 'visibility' to both students and the employers. Additionally the framework can be aligned with the platform that optimises Aadhar verification to fast track on boarding geo tagging jobs to catchment areas, linking vocational certification scores to application process.

**3) Make it accessible and Maintain engagement:** Vulnerable youth face difficulties and real struggles on a daily basis. Struggles alter their aspirations. Most students we spoke to did not have an adequate environment to study at home, many faced challenges in practicing technical modules due to lack of laptops or computer systems. Interventions primararly require tailoring around these challenges and struggles. Longer duration programs for example could struggle with retention considering higher opportunity costs attached to long term training. Thus, flexibility in method of delivery (part-time/ weekends), involving mentoring, providing financial support/ social security, stipend, travel expenses have positive implications.

**4) Make it relevant and Ensure quality:** Strong multi-stakeholder partnerships are key in delivering demand driven interventions with sustainable outcomes for the disadvantaged. Partnerships can ensure quality by giving required exposure to the workplace and opportunities for on-the-job training. For employers it gives access to work-ready candidates and improved retention. Framework must incorporate 'education-industry partnerships' and leverage knowledge of markets and pedagogy to design relevant curriculum aligned with the requirements of the employer.

**5) Give credits and Make it count:** Skills development and training courses must introduce a robust credit based system to allow cumulative progression of learning and 'monetising' the credits earned to upgrade skills or re-join an advanced vocational training. Credits ensure upward mobility for the disadvantaged students in case of discontinued secondary education or gaps in higher learning by allowing them to acquire mainstream graduation. Credits also open apprentice opportunities with prospective employers, encourage on-the-job training and therefore reduce opportunity and entry barriers that the vulnerable youth face in the labour market.

**6) Make it accountable by including strong monitoring and evaluation:** Intervention must have a strong monitoring system to be able to continuously track progress regardless of whether the program will be evaluated or not. Effective monitoring generates data on the profile of vulnerable youth, their progress, changes in overall well-being and identifies unintended consequences, positive or negative. Evaluations are less implemented and the necessity of rigorous evaluations have been emphasised by academic researchers and policy makers (Mallapur, 2019).

**7) Make it sustainable and scalable:** Short duration role-based and job-specific training at local level gives vulnerable youth the first opportunity to gain professional experience. Sustainability depends on offering skills that are in demand and blending on- and off the job training. Strong collaboration with schools, local employers, sector experts, VET providers and other stakeholders is crucial to make the model scalable. Along with building specific work-based skills, incorporate transferable skills and creating key competencies within the framework. Follow up with trained youth after initial placement and provide continued support.

**8) Make social outcomes count:** Vulnerabilities are difficult to measure. But once we know that disadvantages and challenges that vulnerable youth face are long-established, then focusing solely on

training is an incomplete solution (Hargreaves, 2011). Social inclusion is becoming an important element for interventions seeking to improve the overall well-being, break down barriers and develop self-efficacy. Of-course employment itself is a visible evidence of social inclusion, but to enable vulnerable and disadvantaged youth to be able to make a *choice* about their role in the labour market, we still have a long way to go.

## References


Bennell, P. (1999). *EMPLOYMENT AND TRAINING PAPERS 43 Learning to change: Skills development among the economically vulnerable and socially excluded in developing countries*. http://www.oit.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_120372.pdf

Chaitanya Mallapur, IndiaSpend. (2019, January 29). *Budget 2019 Must Tackle Missed Skill Development Targets Even As Ministry's Funds Go Unutilised*. BloombergQuint; Bloomberg Quint. https://www.bloombergquint.com/union-budget-2019/budget-2019-must-tackle-missed-skill-development-targets-even-as-ministrys-funds-go-unutilised

Community Tool Box. (2020). *Chapter 2. Other Models for Promoting Community Health and Development | Section 1. Developing a Logic Model or Theory of Change | Main Section | Community Tool Box*. Ku.edu. https://ctb.ku.edu/en/table-of-contents/overview/models-for-community-health-and-development/logic-model-development/main

Dacre Pool, L., & Sewell, P. (2007). The key to employability: developing a practical model of graduate employability. *Education + Training*, *49*(4), 277–289. https://doi.org/10.1108/00400910710754435

Datta, A. (2015, November 2). *Why skills education has to be part of school curriculum*. The Financial Express; The Financial Express. https://www.financialexpress.com/jobs/why-skills-education-has-to-be-part-of-school-curriculum/159719/

Datta, A. (2017, September 10). *How to skill India: Youth don't want to be welders, their aspiration is drone or robot operator*. The Financial Express; The Financial Express. https://www.financialexpress.com/education-2/how-to-skill-india-youth-dont-want-to-be-welders-their-aspiration-is-drone-or-robot-operator/849756/

Daugherty, L., Herman, R., & Unlu, F. (2017). *Logic Models for Selecting, Designing, and Implementing Evidence-Based School Leadership Interventions Companion Guide to School*

*Leadership Interventions Under the Every Student Succeeds Act*. https://www.rand.org/content/dam/rand/pubs/tools/TL200/TL274/RAND_TL274.pdf

de Bruin, Karina, Cornelius, E., & Bruin, K. (2014). Self-directed learning and career decision-making. *Acta Academica*, *43*(ISSN 0587-2405), 214–235.

*Demand-driven Training For Youth Employment toolkit Demand-driven Training For Youth Employment toolkit*. (2017). https://youtheconomicopportunities.org/sites/default/files/contentupload/73868/Making_Cents_101717_Interactive_V3s.pdf

Denney, A., Derner, S., Stump, S., & Inc., V. (2017). *A Planning Guide for Aligning Career and Technical Education (CTE) and Apprenticeship Programs*. https://s3.amazonaws.com/PCRN/reports/Planning_Guide_for_Aligning_CTE_and_Apprenticeship_Programs.pdf

Dewan, S., & Khan, L. (2019). *Breaking the Cycle of Vulnerability Education, Skills and Employability for Indian Youth.* https://www.unicef.org/rosa/media/3926/file/Breaking%20the%20Cycle%20of%20Vulnerability.pdf

Erabaddage, G., Shukri, M., & Khatibi, A. (2015). Conceptualizing learning and employability "Learning and employability framework." *Journal of Education and Learning*, *Vol. 4, No. 2; 2015*(E-ISSN 1927-5269). https://doi.org/10.5539/jel.v4n2p53

European Training Foundation. (2013). *WORK-BASED LEARNING: BENEFITS AND OBSTACLES A LITERATURE REVIEW FOR POLICY MAKERS AND SOCIAL PARTNERS IN ETF PARTNER COUNTRIES*. https://www.etf.europa.eu/sites/default/files/m/576199725ED683BBC1257BE8005DCF99_Work-based%20learning_Literature%20review.pdf

Ferns, S. J. (2018). Collaboration, cooperation and consultation: Work-integrated learning partnerships for enhancing graduate employability. *https://doi.org/10.26182/5bbd68b462fb3*.

Fugate, M., Kinicki, A. J., & Ashforth, B. E. (2004). Employability: A psycho-social construct, its dimensions, and applications. *Journal of Vocational Behavior*, *65*(1), 14–38. https://doi.org/10.1016/j.jvb.2003.10.005

Goleman, D. (2001). An EI-Based Theory of Performance. In C. Cherniss & D. Goleman (Eds.), *The Emotionally Intelligent Workplace*. Jossey-Bass. ISBN-13: 978-0787956905. http://www.eiconsortium.org/pdf/an_ei_based_theory_of_performance.pdf

Gupta, A., Mishra, P., Pandey, C., Singh, U., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, *22*(1), 67. https://doi.org/10.4103/aca.aca_157_18

Hanita, M., Ansel, D., & Shakman, K. (2017). *Matched-Comparison Group Design: An Evaluation Brief for Educational Stakeholders White Paper*. https://www.edc.org/sites/default/files/uploads/matched_comparison_group_design.pdf

Hargreaves, D. H. (2011). *Leading a self improving school system*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/325890/leading-a-self-improving-school-system.pdf

*Home | Ministry of Skill Development and Entrepreneurship | Government Of India*. (2016). Msde.gov.in. https://msde.gov.in/en

*India Skills Report 2020*. (2020). https://wheebox.com/assets/pdf/ISR_Report_2020.pdf

International Labour Organization, & World Bank. (2021). *Skills development in the time of COVID-19: Taking stock of the initial responses in technical and vocational education and training United Nations Educational, Scientific and Cultural Organization*. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_766557.pdf

Izzo, C. V., Connell, J. P., Gambone, M. A., & Bradshaw, C. P. (2004). Understanding and Improving Youth Development Initiatives through Evaluation. In S. F. Hamilton & M. A. Hamilton (Eds.), *The Youth Development Handbook: Coming of Age in American Communities* (pp. 301–326). https://doi.org/10.4135/9781452232560.n13

Jung, S., Choi, S. J., Jeong, J. C., & Kim, S. N. (2019). Impact of vocational education and training on adult skills and employment: An applied multilevel analysis. *International Journal of Educational Development*, *66*(C), 129–138. https://econpapers.repec.org/article/eeeinjoed/v_3a66_3ay_3a2019_3ai_3ac_3ap_3a129-138.htm

Kumar, R., Mandava, S., & Gopanapalli, V. S. (2019). Vocational training in India: determinants of participation and effect on wages. *Empirical Research in Vocational Education and Training*, *11*(1). https://doi.org/10.1186/s40461-019-0078-y

Kunnen, E. S. (2013). The Effects of Career Choice Guidance on Identity Development. *Education Research International*, *2013*(Article ID 901718), 1–9. https://doi.org/10.1155/2013/901718

Mangoche, A. (2015). *Impact of Technical and Vocational Education and Training (TVET) on Youth vulnerability in Malawi*. Academia.edu.https://www.academia.edu/10350609/Impact_of_Technical_and_Vocational_Education_and_Training_TVET_on_Youth_vulnerability_in_Malawi

Martin, R., Villeneuve-Smith, F., Marshall, L., & Mckenzie, E. (2008). Employability skills explored. In *www.LSNeducation.org.uk*. http://fetn.org.uk/wp-content/uploads/2014/11/LSN-Employability-Skills-Explored.pdf

McClelland, M. M., Morrison, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: the role of learning-related social skills. *Early Childhood Research Quarterly*, *15*(3), 307–329. https://doi.org/10.1016/s0885-2006(00)00069-7

Mehrotra, S., Raman, R., Kumra, N., Kalaiyarasan, D., & Röß. (2014). *Vocational Education and Training Reform in India Business Needs in India and Lessons to be Learned from Germany*. http://aei.pitt.edu/74136/1/Vocational_Education_and_Training_Reform_in_India.pdf

Mitra, A., & Verick, S. (2013). *Youth employment and unemployment: an Indian perspective*. International Labour Organization. https://EconPapers.repec.org/RePEc:ilo:ilowps:994806863402676

OECD. (2020). *The impact of COVID-19 on student equity and inclusion: Supporting vulnerable students during school closures and school re-openings*. OECD. https://www.oecd.org/coronavirus/policy-responses/the-impact-of-covid-19-on-student-equity-and-inclusion-supporting-vulnerable-students-during-school-closures-and-school-re-openings-d593b5c8/

*PCRN: Employability Skills*. (2021). Ed.gov. https://cte.ed.gov/initiatives/employability-skills-framework

Pheko, M. M., & Molefhe, K. (2016). Addressing employability challenges: a framework for improving the employability of graduates in Botswana. *International Journal of Adolescence and Youth*, *22*(4), 455–469. https://doi.org/10.1080/02673843.2016.1234401

*Skills Development*. (2021). World Bank. https://www.worldbank.org/en/topic/skillsdevelopment

Sumanasiri, E. G. T., Ab Yajid, M. S., & Khatibi, A. (2015). Conceptualizing Learning and Employability "Learning and Employability Framework." *Journal of Education and Learning*, *4*(2). https://doi.org/10.5539/jel.v4n2p53

*The impact of COVID-19 on student equity and inclusion: Supporting vulnerable students during school closures and school re-openings*. (2020). OECD. https://www.oecd.org/coronavirus/policy-responses/the-impact-of-covid-19-on-student-equity-and-inclusion-supporting-vulnerable-students-during-school-closures-and-school-re-openings-d593b5c8/

UNESCO. (2018). *Quick Guide to Education Indicators for SDG 4*. http://uis.unesco.org/sites/default/files/documents/quick-guide-education-indicators-sdg4-2018-en.pdf

*W.K. Kellogg Foundation Logic Model Development Guide*. (2004). https://www.aacu.org/sites/default/files/LogicModel.pdf

Yorke, M., & Knight, P. T. (2006). *Embedding employability into the curriculum, Learning and Employability, Series 1*. The Higher Education Academy. ISBN: 1-905788-00-2. https://www.qualityresearchinternational.com/esecttools/esectpubs/yorkeknightembedding.pdf

## Appendix

**Table 1: t-test Two Sample Assuming Equal Variances: Experiment and Comparison groups pre intervention**

| | Obs | Mean | SD | [95% Conf. Interval] | | df | t Stat | P(\|T\| > \|t\|) |
|---|---|---|---|---|---|---|---|---|
| **Experiment Gr Baseline** | 65 | 46.51 | 5.16 | 45.22828 | 47.78711 | 128 | -0.1093 | 0.9131 |
| **Comparison Gr Baseline** | 65 | 46.40 | 6.03 | 44.90504 | 47.89496 | | | |

*t-Test Significance Level 5%*

**Table 2: t-test Two Sample Assuming Equal Variances: Experiment and Comparison groups post intervention.**

| | Obs | Mean | SD | [95% Conf. Interval] | | df | t Stat | P(\|T\| > \|t\|) |
|---|---|---|---|---|---|---|---|---|
| **Experiment Gr Post** | 65 | 72.80 | 4.87 | 71.59307 | 74.00693 | 120 | -23.3688 | 0.0000 |
| **Comparison Gr Post** | 57 | 48.44 | 6.60 | 46.68642 | 50.19077 | | | |

*t-Test Significance Level 5%*

**Table 3: t-test Paired Sample: Experiment group pre (baseline) and post intervention**

| | Obs | Mean | SD | [95% Conf. Interval] | | df | t Stat | P(\|T\| > \|t\|) |
|---|---|---|---|---|---|---|---|---|
| **Experiment Gr Baseline** | 65 | 46.51 | 5.16 | 45.22828 | 47.78711 | 64 | -31.2252 | 0.0000 |
| **Experiment Gr Post** | 65 | 72.80 | 4.87 | 71.59307 | 74.00693 | | | |

*t-Test Significance Level 5%*

**Table 4: Skewness-Kurtosis test for Normality in the groups to determine validity of t-test**

| | Skewness | Kurtosis | Adj. $chi^2$ | Prob>$chi^2$ | Decision |
|---|---|---|---|---|---|
| **Comparison Gr Baseline** | 0.0541 | 0.9640 | 3.88 | 0.1436 | Retain the null hypothesis |
| **Comparison Gr Post** | 0.1646 | 0.5725 | 2.36 | 0.3076 | Retain the null hypothesis |
| **Experiment Gr Baseline** | 0.6123 | 0.8748 | 0.28 | 0.8686 | Retain the null hypothesis |
| **Experiment Gr Post** | 0.4225 | 0.4133 | 1.36 | 0.5068 | Retain the null hypothesis |

*Skewness-Kurtosis Test Significance Level 5%*

**Table 5: Wilcoxon signed-rank test: Experiment group pre-intervention and Comparison group pre- intervention (n = 65)**

| | Obs | Sum of ranks | Adj. Variance | z Stat | Prob > \|z\| |
|---|---|---|---|---|---|
| Positive ranks | 28 | 1013.5 | 23361.75 | -0.376 | 0.7068 |
| Negative ranks | 35 | 1128.5 | | | |
| Ties | 2 | 3 | | | |
| Total | 65 | 2145 | | | |

*Wilcoxon Signed-rank Test Significance Level 5%*

**Table 6: Wilcoxon signed-rank test: Experiment group pre-intervention and Experiment group post- intervention (n = 65)**

| | Obs | Sum of ranks | Adj. Variance | z Stat | Prob > \|z\| |
|---|---|---|---|---|---|
| Positive ranks | 0 | 0 | 23400.13 | -7.011 | 0.0000 |
| Negative ranks | 65 | 2145 | | | |
| Ties | 0 | 0 | | | |
| Total | 65 | 2145 | | | |

*Wilcoxon Signed-rank Test Significance Level 5%*

**Table 7: Skills perceived as important by students, ranked from 1 to 7 (n = 65)**

| Skills | Literacy & numeracy | General IT | Comm. | Time-keeping | Team-work | Advanced Vocc. & role-based | Personal presentation |
|---|---|---|---|---|---|---|---|
| **Means** | 2.48 | 1.81 | 5.58 | 4.04 | 5.23 | 2.01 | 6.86 |
| **SD** | 0.87 | 0.7 | 0.63 | 0.71 | 0.95 | 1.32 | 0.39 |

**Table 8: Skills perceived as important by employers, ranked from 1 to 7 (n = 19)**

| Skills | Literacy & numeracy | General IT | Comm. | Time-keeping | Team-work | Advanced Vocc. & role-based | Personal presentation |
|---|---|---|---|---|---|---|---|
| **Means** | 2.22 | 2.11 | 2.11 | 5.66 | 6.88 | 3.55 | 4.55 |
| **SD** | 0.83 | 1.17 | 1.76 | 0.71 | 0.33 | 0.73 | 0.73 |